



Draft Final Environmental Impact Report

SCH No. 2022060598

Brea Gaslight Square Redevelopment Project

City of Brea, California

Lead Agency:

City of Brea
1 Civic Center Circle
Brea, CA 92821

April 5, 2023

Draft Final Environmental Impact Report
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City of Brea, California

Lead Agency
City of Brea
1 Civic Center Circle
Brea, CA 92821

CEQA Consultant
T&B Planning, Inc.
3200 El Camino Real, Suite 100
Irvine, CA 92602

Project Applicant
Manley Fanticola Holdings, LLC

Lead Agency Discretionary Permits
General Plan Amendment (GPA 2022-02)
Zone Change Application (ZCA 2022-02)
Plan Review (PR 2022-02)
Conditional Use Permit (CUP 2022-03)

April 5, 2023

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F.0 FINAL ENVIRONMENTAL IMPACT REPORT

F.1 INTRODUCTION

This Final Environmental Impact Report (FEIR) was prepared in accordance with the California Environmental Quality Act (CEQA) as amended (Public Resources Code Section 21000 *et seq.*) and CEQA Guidelines (Title 14, California Code of Regulations, Section 15000 *et seq.*).

According to CEQA Guidelines Section 15132, the FEIR shall consist of:

a. The Draft EIR (DEIR) or a revision of the draft;

b. Comments and recommendations received on the DEIR either verbatim or in summary;

c. A list of persons, organizations, and public agencies commenting on the DEIR;

d. The responses of the Lead Agency to significant environmental points raised in the review and consultation process; and

e. Any other information added by the Lead Agency.

In accordance with the above-listed requirements, this FEIR for the Brea Gaslight Square Redevelopment Project (hereafter, the "Project") and associated discretionary and administrative actions, consists of the following:

a. Comment letters and responses to public comment; and

b. The circulated Brea Gaslight Square Redevelopment Project DEIR and Technical Appendices, SCH No. 2022060598, supplemented with a table showing revisions, with additions shown as underlined text and deletions shown as ~~stricken text.~~ Refer to Subsection F.3, *Additions, Corrections, and Revisions to the DEIR*, for a list of the changes made to the EIR since the DEIR was circulated for public review.

This FEIR document was prepared in accordance with CEQA and the State CEQA Guidelines and represents the independent judgment of the City of Brea in its capacity serving as the CEQA Lead Agency for the Project.

F.2 RESPONSES TO DEIR COMMENTS

The City of Brea received 15 comment letters in response to the DEIR, consisting of written letters and emails. A list of the agencies, organizations, and persons that submitted comments on the DEIR is presented in Table F-1, *Organizations, Persons, and Public Agencies that Commented on the DEIR*.

Table F-1 Organizations, Persons, and Public Agencies that Commented on the DEIR

Comment Letter	Commenting Party	Date
A	California Department of Transportation	March 13, 2023
B	Brea Olinda Unified School District	March 13, 2023
C	City of La Habra	March 13, 2023
D	Alex Hegdahl	March 13, 2023
E	Curtis Orthodontics	February 25, 2023
F	Diane Stites – SAFE	March 13, 2023
G	Gloria Chen	March 13, 2023
H	Jonathan Higashi	March 13, 2023
I	Lisa Irwin	March 13, 2023
J	Mary Martinez	March 13, 2023
K	Max Stites – SAFE	March 13, 2023
L	Nicole Dunn-Higashi	March 13, 2023
M	Sahaar Joseph	March 13, 2023
N	Supporters Alliance for Environmental Responsibility (SAFER)	March 3, 2023
O	Safer Avenues for Everyone (SAFE)	March 13, 2023

F.2.2 CEQA Requirements

CEQA Guidelines Section 15088 requires the Lead Agency (City of Brea) to evaluate comments received from public agencies and interested parties who reviewed the DEIR and to provide written responses with good faith and reasoned analysis to comments that relate to significant environmental issues.

CEQA Guidelines Section 15204(a) outlines the parameters for public agencies and interested parties to submit comments and the Lead Agency's responsibility for responding to specific comments. Per CEQA Guidelines Section 15204(a), comments should be related to:

> *[T]he sufficiency of the document in identifying and analyzing possible impacts on the environment and ways in which the significant effects of the project might be avoided or mitigated. Comments are most helpful when they suggest additional specific alternatives or mitigation measures that would provide better ways to avoid or mitigate the significant environmental effects. At the same time, reviewers should be aware that the adequacy of an EIR is determined in terms of what is reasonably feasible…CEQA does not require a lead agency to conduct every test or perform all research, study, and experimentation recommended or suggested by commenters. When responding to comments, lead agencies need only respond to significant environmental issues and do not need to provide all information requested by reviewers, as long as a good faith effort at full disclosure is made in the EIR.*

CEQA Guidelines Section 15204(c) further advises that, "[r]eviewers should explain the basis for their comments, and should submit data or references offering facts, reasonable assumptions based on facts, or

expert opinion supported by facts in support of the comments. Pursuant to CEQA Guidelines Section 15064, an effect shall not be considered significant in the absence of substantial evidence." Additionally, CEQA Guidelines Section 15204(d) notes that, "[e]ach responsible agency and trustee agency shall focus its comments on environmental information germane to that agency's statutory responsibility;" but, pursuant to CEQA Guidelines Section 15204(e), "[t]his section shall not be used to restrict the ability of reviewers to comment on the general adequacy of a document or of the lead agency to reject comments not focused as recommended by this section [CEQA Guidelines Section 15204]."

Per CEQA Guidelines Section 15088(c), the level of detail contained in the response may correspond to the level of detail provided in the comment: "A general response may be appropriate when a comment does not contain or specifically refer to readily available information or does not explain the relevance of evidence submitted with the comment."

F.2.3 Responses to DEIR Comments

Copies of the comment letters listed in Table F-1 are provided on the following pages, followed by responses to each individual comment. CEQA Guidelines Section 15088.5 requires recirculation of a DEIR when "significant" new information is added to an EIR, meaning the EIR is changed in a way that deprives the public of a meaningful opportunity to comment on a substantial adverse environmental effect or a feasible way to avoid such an effect, including a feasible project alternative, that the applicant declines to implement. "Significant" new information requiring recirculation includes (1) a new significant environmental impact; (2) a substantial increase in the severity of an environmental impact; (3) a feasible project alternative or mitigation measure that would clearly lessen the significant environmental impacts of the project, but the applicant declines to adopt it; or (4) a fundamentally and basically inadequate and conclusory DEIR (CEQA Guidelines Section 15088.5; see also, *Laurel Heights Improvement Assn. v. Regents of University of California* [1993] 6 Cal. 4th 1112). None of the responses to the comment letters submitted to the City required the addition of significant new information to the DEIR or otherwise meet the requirements of CEQA Guidelines Section 15088.5. Instead, these responses to comments supplement the DEIR's analysis of the same potentially significant impacts already disclosed therein. Therefore, recirculation of the DEIR is not required.

COMMENT LETTER A

STATE OF CALIFORNIA—CALIFORNIA STATE TRANSPORTATION AGENCY
Gavin Newsom, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 12
1750 EAST 4TH STREET, SUITE 100
SANTA ANA, CA 92705
PHONE (657) 328-6000
FAX (657) 328-6522
TTY 711
www.dot.ca.gov/caltrans-near-me/district12

Making Conservation a California Way of Life.

March 13, 2023

Ms. Cecilia Madrigal-Gonzalez
Assistant Planner
City of Brea
1 Civic Center Circle
Brea, CA. 92821

File: LDR/CEQA
SCH: 2022060598
12-ORA-2022-02198
SR-90, PM 4.052

Dear Ms. Madrigal-Gonzalez,

Thank you for including the California Department of Transportation (Caltrans) in the review of the Draft Environmental Impact Report (DEIR) for the Gaslight Square Redevelopment Project. Caltrans has reviewed and provided previous comments on the Notice of Preparation for this project on July 20th, 2022. A-1

The Gaslight Square is currently developed with five existing commercial buildings, totaling 23,558 square feet. The project proposes to retain two of the existing five buildings that are currently used for medical uses. The remaining three commercial buildings, totaling 18,286 square feet, would be demolished to facilitate the construction of a 2,000 square foot drive-through restaurant with an outdoor seating area and a 6,000 square foot commercial building consisting of 2,400 square feet of restaurant and 3,600 square feet of medical or retail space. A-2

The project location is at 255 E. Imperial Hwy., commonly known as the Gaslight Square and is directly adjacent to State Route (SR) 90. State Route 90 is owned and operated by Caltrans. Therefore, Caltrans is a responsible agency on this project, and has the following comments: A-3

Transportation and System Planning

1. Caltrans supports the inclusion of bicycle storage facilities pursuant to CALGreen code. Caltrans also recommends following bicycle parking best practices described in the "Essentials of Bike Parking" guide created by the Association of Pedestrian and Bicycle Professionals (link to online A-4

"Provide a safe and reliable transportation network that serves all people and respects the environment"

PDF: https://www.apbp.org/Publications). Bike parking should be installed a minimum of 24" away from walls and other objects (e.g., trash cans, plants, etc.). With the growing popularity of electric bikes and cargo/utility bikes (which tend to be bigger and heavier), Caltrans also recommends that bicycle storage facilities be designed to accommodate a range of bicycle styles, sizes, and weights. A-4 (CONT.)

2. Please consider providing adequate wayfinding signage to nearby transit stops within the proposed project. Connectivity of first and last mile mobility options and transit services help integrate a complete multimodal transportation network. A-5

3. Please Consider encouraging or incentivizing the use of transit among both construction workers of the proposed development and future employees. Increasing multimodal transportation will lead to a reduction to congestion, Vehicle Miles Traveled, and improve air quality. A-6

Encroachment Permits

4. Any project work proposed in the vicinity of the State Right-of-Way (ROW) would require an encroachment permit and all environmental concerns must be adequately addressed. If the environmental documentation for the project does not meet Caltrans's requirements for work done within State ROW, additional documentation would be required before approval of the encroachment permit. For specific details for Encroachment Permits procedure, please refer to the Caltrans's Encroachment Permits Manual at: http://www.dot.ca.gov/hq/traffops/developserv/permits/ A-7

5. Additional information regarding encroachment permits may be obtained by contacting the Caltrans Permits Office at (657) 328-6553 or D12.Permits@dot.ca.gov. Early coordination with Caltrans is strongly advised for all encroachment permits. A-8

"Provide a safe and reliable transportation network that serves all people and respects the environment"

Caltrans' mission is to provide a safe, sustainable, equitable, integrated, and efficient transportation system to enhance California's economy and livability. Please continue to coordinate with Caltrans for any future developments that could potentially impact State transportation facilities. If you have any questions, please do not hesitate to contact Julie Lugaro at Julie.lugaro@dot.ca.gov.

A-9

Sincerely,

Scott Shelley
Branch Chief, Regional-LDR-Transit Planning
Caltrans, District 12

"Provide a safe and reliable transportation network that serves all people and respects the environment"

RESPONSES TO COMMENT LETTER A:
California Department of Transportation

A-1: California Department of Transportation (Caltrans) makes an introductory statement thanking the City for including Caltrans in the DEIR review process and refers to Caltrans' comment letter on EIR's Notice of Preparation (NOP). The Caltrans letter submitted on the NOP, dated July 20, 2022, was received and included in the DEIR as part of Technical Appendix A. A summary of Caltrans' NOP comments was included in Table 1-1, *Summary of NOP and Scoping Meeting Comments*, on DEIR page 1-7, and comments pertinent to the environment were addressed in the DEIR as noted in DEIR Table 1-1.

A-2: Caltrans notes the existing conditions of the Project Site and the proposed Project, with some inaccuracies. As described in DEIR Section 3.0, *Project Description*, the Project Site is currently developed with six existing buildings (instead of five as indicated by Caltrans) with a total square footage of 24,283 s.f. (instead of 23,558 s.f. as indicated by Caltrans). The Project includes the retention of two of the six buildings, which are currently used for medical uses. The other four existing buildings (rather than three as indicated by Caltrans), with a total square footage of 18,873 s.f. (rather than 18,286 s.f. as indicated by Caltrans), are proposed for demolition.

A-3: Caltrans accurately describes the Project location and introduces themselves as a responsible agency for the proposed Project. The DEIR, in Section 1.0, *Introduction*, on page 1-5, acknowledged Caltrans as a responsible agency. No change to the DEIR is warranted.

A-4: Caltrans recommends the inclusion of bicycle facilities as required by the California Green Building Standards Code (CALGreen); following bicycle parking best practices as described in the *Essentials of Bike Parking* guide; and providing bicycle facilities that accommodate a range of bicycle styles, sizes, and weights. As shown in the DEIR on Figure 3-6, *Preliminary Site Plan*, both short-term bike racks for hourly use and long-term bike lockers for day use by employees are proposed as part of the Project. Refer to Site Plan Notes #13 and #14.

A-5: Caltrans recommends that adequate wayfinding signage be provided to nearby transit stops. As indicated on DEIR page 2-10, Orange County Transportation Authority (OCTA) Route 143 runs along Brea Boulevard, with the closet bus stop being located 0.1-mile (one block) northwest of the Project Site at the intersection of Brea Boulevard and Imperial Highway. Wayfinding to the bus stop is not required to reduce any of the Project's environmental effects to less than significant, as the DEIR concludes that the Project would have no significant and unavoidable environmental effects. Nonetheless the City has added a condition of approval to the Project requiring the installation of a wayfinding sign on the Project Site to the bus stop.

A-6: Caltrans recommends encouraging or incentivizing transit use among construction workers and future Project employees. The City appreciates this recommendation, but it is not required to reduce any of the Project's environmental effects to less than significant, as the DEIR concludes that the Project would have no significant and unavoidable environmental effects. As indicated in Response A-5,

OCTA Route 143 runs along Brea Boulevard only 1 block from the Project Site; as such, it is probable that some amount of transit use by Project employees and visitors will occur during the Project's construction and long-term operation. Although not required by CEQA to reduce impacts to less than significant, the City will provide a copy of the bus schedule to the Project Applicant for the purpose of distributing to construction contractors and building occupants to encourage ridership. It is not within the jurisdictional authority of the City to require that private businesses, including those that would locate on the Project site, to encourage or incentivize employee transit use.

A-7: Caltrans states that any work proposed within State right of way (ROW) (i.e., Imperial Highway) would require an encroachment permit from Caltrans, and all environmental concerns would need to be adequately addressed. Caltrans is noted as a Responsible Agency on DEIR p. 1-5 for the potential need for issuance of an encroachment permit, the environmental effects of which are addressed in the DEIR. The South Flower Closure Alternative discussed in EIR Section 6.0, *Alternatives*, which considers the redevelopment of the Project Site in accordance with the proposed Project, but with the closure of South Flower Avenue adjacent to the eastern boundary of the Project Site with its intersection with Imperial Highway, would require an encroachment permit from Caltrans. With this alternative, South Flower Avenue would end in a cul-de-sac.

A-8: Caltrans provides contact information for additional information on encroachment permits and recommends early coordination. This general comment is acknowledged.

A-9: Caltrans provides their mission statement, contact information, and requests continuing coordination for any future development that could impact State transportation facilities. This general comment is acknowledged.

COMMENT LETTER B

Brea Olinda Unified School District

1 Civic Center Circle, Level II
P.O. Box 300
Brea, CA 92822-0300
(714) 990-7800
Fax: (714) 529-2137
www.bousd.us

March 13, 2023

Mr. Jason Killebrew
Community Development Director
City of Brea - Planning Division
1 Civic Center Circle, Level 3
Brea, CA 92821

Re: Brea Gaslight Square Redevelopment Project
Draft Environmental Impact Report

Dear Mr. Killebrew,

Thank you for providing the Brea Olinda Unified School District the opportunity to review the Draft Environmental Impact Report (DEIR) for the Brea Gaslight Square Redevelopment Project (Project). The Brea Olinda Unified School District (District) has reviewed the provided Draft DEIR for the proposed Project and has the following comments below. B-1

Background
As stated in the DEIR, the project Applicant proposes: B-2

> To redevelop the southern 0.95-acre of the 1.88-acre Project Site containing existing development located at 255 East Imperial Highway, within the City of Brea, Orange County, California. The Applicant proposes the demolition of the four existing buildings and the redevelopment of this portion of the Project Site with two new commercial buildings: A 6,000 sf commercial building is proposed at the northeast corner of South Orange Avenue and Imperial Highway, which would include a 2,400 sf sit-down restaurant and 3,600 s.f. of retail or medical office use. In addition, an approximate 2,000 sf drive-through restaurant is proposed at the northwest corner of South Flower Avenue and Imperial Highway. The Project also includes the installation of associated site improvements, including drive aisles, parking areas, landscaping, utility infrastructure, exterior lighting, and walls/fencing. No tenants are yet identified to occupy the proposed new Building(s). Laurel Elementary School (Laurel) is located east of the Project site.

BOARD TRUSTEES: **Deana Miller,** President · **Paul Ruiz,** Vice President/Clerk · **Chris Becerra, Ed.D.** · **Carrie Flanders** · **Gail Lyons**
ADMINISTRATION: **Brinda C. Leon**, *Superintendent* · **Phil D'Agostino, Ed.D.**, *Asst. Supt./ Educational Services*
Richard Champion, *Asst. Supt./ Business Services* · **Valerie Rogers, Ph.D.**, *Asst. Supt./ Human Resources*

On January 29, 2021, a response was forwarded to the City of Brea regarding the District's opinion on the proposed similar project located in the same location adjacent to Laurel (the District's Prior Letter). Although the District's Prior Letter addressed a project that has since been removed for consideration, the concerns expressed in the District's Prior Letter apply to the current Project as explained below since the current Project is located in the same area as the prior project, next to the District's Laurel Elementary School site (Laurel Elementary). As stated in the District's Prior Letter, the District has a duty to protect the health, safety, and welfare of all District students and staff, not only attending Laurel Elementary but at all of our school sites throughout the District. With respect to the Project, the District has the following concerns about the Project that may adversely affect the District's students, staff, and parents: B-3

- Pedestrian/student safety during the daily walk to and from school
- Increase of traffic and congestion on Flower Street and surrounding streets, which serves as the primary student pick-up/drop-off point, as well as the sole entrance for staff and visitor parking
- After-hours school facility safety due to crowds associated with late hours of operation B-4
- Environmental impact in the form of additional air pollution on young, developing lungs from idling cars in the close proximity of a drive-thru B-5
- Potential litter on the school grounds as a result of late hours of operation warranting increased custodial needs B-6
- Potential increase in automobile collisions and pedestrian injuries B-7
- Loss of parking lot adjacent to Laurel leading to increased walking traffic by students, particularly through the Gaslight Square B-8
- Ill-timed traffic study conducted during the Covid-19 closures B-9

These concerns are similarly expressed in the District's Prior Letter and apply to the current Project as well, since it is similarly situated. The District's Prior Letter included a list of recommendations should the prior project move forward which also apply to this Project. We have attached this list, along with a copy of the District's Prior Letter for reference. B-10

On May 6, 2021, we partnered in a traffic circulation and parking study with the City. The purpose of the Laurel Elementary School Traffic Circulation and Parking Study (Study) was "to identify a list of potential physical and operational improvements that can address the circulation and operational challenges at the school." The Study also "identified potential improvements located within the Laurel Elementary School property or within the public right-of-way in the vicinity of the school property."

As stated within the Study, the District and the City presented the Study to the City Traffic Committee, the District Board of Education, Laurel Elementary School staff and parents, and the City of Brea City Council for feedback and direction on steps to implement recommendations. The City is the lead agency on the Study and contracted with Kittelson and Associates, Inc. (Kittelson). As of the date of the letter, the Study has not yet been finalized, but we are attaching a draft summary report as a point of reference of the challenges to identity vehicle "bottlenecks", conflict points, and site/operational constraints that affect traffic flow and pedestrian circulation, and recommendations to address identified pedestrian and vehicular traffic interactions. B-11

As a result of the Study, a number of recommendations were categorized into three stated timeline goals (identified as quick-action, short-term, and long-term), with each recommendation proposing physical improvements and

programmatic changes assigned to either the City, District, and both agencies with the ability to review and define. The improvements, listed in the draft Study, incorporated some of the mitigation recommendations noted above and detailed in the District's Prior Letter. The Report's recommendations were presented to the District's Board of Education on March 10, 2022, by Kittelson incorporating input from Laurel Elementary School staff and parents, the City of Brea, BOUSD, and Brea Police and Fire Departments

B-11 (CONT.)

Furthermore, the Study was referenced in the DEIR table 1-1 comment and in section 4.12-Transportation. Though the Study had not yet been finalized and adopted by the City, the District has proceeded with a number of the "quick-action" recommendations within our purview as recommended within the Study. The District has communicated with City staff to finalize the Study to aid in the District's long-term planning process.

4.12 Transportation

This Subsection of the DEIR assesses potential transportation impacts resulting from the implementation of the Project.

Table 4.12-3 Project Net New Daily Trips

	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Project	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Existing Uses	31	13	44	18	23	41	7	20	27	362
Proposed Project	64	55	119	30	32	62	39	34	73	872
Variance (Proposed - Existing)	**33**	**42**	**75**	**12**	**9**	**21**	**32**	**14**	**46**	**510**

B-12

As stated previously, the District's overarching concern is the potential of "increased traffic and congestion on Flower Street" and student/staff safety. As stated above and listed in Table 4.12-3, an increase of daily traffic of 510 trips per day creates a concern during school site weekday operational hours, thus more than doubling the number of vehicles within the community served by Laurel Elementary.

Therefore, we have concluded that an increase in traffic on Flower Avenue and surrounding streets, as identified in Table 4.12.-3, and without mitigating measures, will negatively impact school drop off and pick up, thus potentially increasing the number of pedestrian and vehicular interactions which could compromise student and staff safety as communicated by the District, identified in the draft Laurel Elementary School Traffic Circulation and Parking Study, and the Project's DEIR

Project alternatives

As stated on Pg 6-1, An Environmental Impact Report (EIR) must identify ways to mitigate or avoid the significant effects that a Project may have on the environment. In compliance with CEQA Guidelines Section 15126.6(a), an EIR must "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any significant effects of the project, and evaluate the comparative merits of the alternatives".

B-13

An alternative incorporated within the DEIR to mitigate the impact of increased traffic vehicular trips is the closure of South Flower Avenue (Section 6.0-Alternatives). It is proposed the closure of South Flower Avenue adjacent to the eastern boundary of the Project Site at its intersection with Imperial Highway. South Flower Avenue would end in a cul-de-sac. As stated in 6.2.3, an additional right-of-way would be required to implement an offset cul-de-sac design at the terminus of South Flower Avenue should this alternative be selected. Additionally, this would be subject to, but not limited to;

- Brea Public Works Department review since the Brea Public Works Department has no standards for an offset cul-de-sac and the conceptual plan may change.
- The City of Brea would be required to obtain a right-of-way from Brea Olinda Unified School District in order to implement the offset cul-de-sac.
- The pedestrian pathway to the existing Laurel Elementary School building would also need to be redesigned to ensure applicable ADA standards are met, and the District anticipates the Division of State Architects (DSA) agency review
- The District would need to engage legal counsel to determine the measures needed to take if a land transfer was requested due to granted a right of way
- The median and eastbound left turn lane on Imperial Highway would be closed as part of this alternative.
- Vehicles that currently access northbound South Flower Avenue from Imperial Highway and vehicles that currently access Imperial Highway from southbound South Flower Avenue would be rerouted to other nearby roadways.

B-13 (CONT.)

The DEIR (Section 6.2.3 (L)) addresses the "South Flower Avenue Closure Alternative" as follows:

"The South Flower Avenue Closure Alternative would result in the same daily passenger vehicle trips to the Project Site as the Project. However, because vehicles would not be able to directly access Imperial Highway from southbound South Flower Avenue and vehicles would not be able to directly access northbound South Flower Street from Imperial Highway, VTM [vehicle miles traveled] would increase under this Alternative due to longer trip lengths associated with rerouting. Nonetheless, both this Alternative and the No Project Alternative would meet the small project screening criteria resulting in less-than-significant VMT impact. With the closure of the intersection of South Flower Avenue at Imperial Highway, it is expected that this Alternative would provide a safer environment for pedestrians in the Project area. The pedestrian pathway to the existing Laurel Elementary School building would need to be redesigned to ensure applicable ADA standards are met. Vehicles that typically access northbound South Flower Avenue from Imperial Highway would be rerouted to other nearby roadways Brea Boulevard, Orange Avenue and other nearby local streets."

The DIER concludes that "the Flower Avenue Closure Alternative would have a greater safety impact than the proposed Project, although the level of impact would remain less than significant compared to the existing condition."

Although the District believes that the Flower Avenue Closure Alternative may address some of the District's concerns, as set forth above, it believes additional measures should be incorporated into the Alternative to fully protect the District's students and staff. These additional measures include, but are not limited to, the following, which the District suggests be incorporated into the Alternative concept.

B-14

- An addition of a crossing guard located at the intersection of Orange Avenue and Imperial Avenue to address increased traffic during both am and pm school hours
- Improvements in the traffic signal and pedestrian crosswalk on Birch Street and Flower (Identified in the draft Study) and the continued presence of a crossing guard
- The closure of the Project site entrance/exit onto Flower Avenue
- Installation of "mid-block" crosswalk on Flower Avenue
- Identification and positioning of new parking access on Flower Avenue for District use
- Collaboration and/or sub-committee review on the impacts of Alternative with City
- Finalizing the Laurel Elementary School Circulation and Parking Study by the City of Brea and incorporating the recommendations for the physical improvements as identified on Birch Street and the North-South Alley located east of the school.
- The City of Brea should work with both the District and the Project to determine to obtain a right-of-way in order to implement the offset cul-de-sac as opposed to requiring the District to provide the right-of-way as suggested in the DIER.

B-14 (CONT.)

In conclusion, the District recognizes that it is not the responsible or lead agency as defined in CEQA guidelines with discretionary approval powers over the Project. However, the District reserves the right to comment and communicate its concerns and bring forth recommendations. These recommendations are necessary to fully protect the safety of District students, staff, and parents. As previously noted, if the recommendations suggested by the District are not incorporated into the Project, the District cannot take any actions to mitigate the harmful conditions that would be created by the Project. Further, the District cannot afford any improvements on the Laurel school site to help mitigate conditions created as a result of the Project and/or the Alternative. Therefore, additional traffic study and District input is needed, along with the collaboration of City staff and others to be identified, to address the District concerns and incorporate further mitigation measures into the Alternative including, but not limited to, the recommendations set forth above.

Again, thank you for the opportunity to submit comments on this DEIR. The District reserves the right for future comments on this project furthering discussions, specifically addressing additional mitigation and alternative measures. As always, the Brea Olinda Unified School District looks forward to collaborating with the City of Brea and its stakeholders.

B-15

Sincerely,

Richard Champion
Assistant Superintendent, Business Services

Enc: Letter dated January 9, 2023: Mr. Killebrew
Draft: Laurel Elementary School Circulation and Parking Study

Brea Olinda Unified School District

January 29, 2021

Dear Mr. Killebrew:

At the Brea Olinda Unified School District's Board of Education Regular Meeting on January 28, 2021, the Board Members discussed the Raising Cane's development project located at Brea Gaslight Square. Please find a summary below of the Board of Education's majority opinion and their associated concerns with the proposed project, as well as accompanying mitigation recommendations should the project be approved.

The School Board's majority opinion was ***opposed*** (*with a result of 3 against; 0 neutral; and 2 in favor of the project with necessary traffic and safety mitigation measures addressed)*. Although the School Board understands that the ultimate decision to approve or deny the Raising Cane's project belongs to the Brea City Council; the Board Members have provided their position for the City Council's consideration when voting on the matter at the February 2, 2021 Brea City Council Meeting. There is a majority belief that the 1988 CUP that disallowed a restaurant at the proposed Raising Cane's location continues to be the best approach for the property. The primary concerns of the School Board are the health, safety, and welfare of the students, staff and families that are served at Laurel Elementary Magnet School of Innovation & Career Exploration.

To that end, a belief exists that the true impact of the proposed Raising Cane's project is unknown. First, the traffic study was conducted when the COVID-19 pandemic caused the physical closure of Laurel Elementary School. This ill-timed study eliminated the analysis of accurate and representative traffic patterns during in-person student attendance. Second, there is an understanding that the CEQA and EIR requirements were waived because the Raising Cane's restaurant footprint is a third of the size of the current buildings on the property. The assumption of such a waiver is that bigger buildings generate a greater impact. That assumption would be true for a hotel or major retail box store; however it does not take into account the type of business nor its effects related to traffic and

B-16

congestion that would be caused by a high volume drive-thru restaurant. For these reasons, further study or mitigation measures are strongly desired by the BOUSD Board Members.

The following factors weighed heaviest during the Board's discussion and deliberation:

1. Pedestrian/student safety during the daily walk to and from school
2. Increase of traffic and congestion on Flower Street which serves as the school's primary student pick-up and drop-off point, as well as the sole entrance for the staff parking lot
3. After-hours school facility safety due to crowds associated with late hours of operation
4. Environmental impact in the form of additional air pollution on young, developing lungs from idling cars in the close proximity drive-thru
5. Potential litter on the school grounds as a result of late hours of operation warranting increased custodial needs
6. Potential increase in automobile collisions and pedestrian injuries
7. Loss of Church parking lot use will lead to increased walking traffic by students, particularly through the Gaslight Square
8. The ill-timed traffic study conducted during the COVID-19 pandemic when normal student attendance and school traffic could not be considered or evaluated

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In the event the City Council approves the Raising Cane's project as submitted, attached is a list of mitigation recommendations for your review.

If you should have any questions, or if I can provide clarification on any of the above, please do not hesitate to contact me (714) 990-7824.

Sincerely,



Brad Mason, Ed.D.
Brea Olinda Unified School District
Superintendent of Schools

RAISING CANE'S MITIGATION RECOMMENDATIONS

1. Create a right hand turn pocket for traffic turning right onto Flower from Imperial (would need to work with Brea City Staff and CalTrans)
2. Adding crossing guards to cross students at both Flower & Imperial Highway and Orange & Imperial Highway before and after school each day
3. Installation of an illuminated crosswalk at Flower and Imperial Highway and Orange and Imperial Highway
4. Right turn only "pork chop" at Flower and Imperial Highway that would disallow traffic from turning left onto Imperial Highway
5. Right turn only exit from Raising Canes when turning onto Flower by adding delineators to the street to prevent a left hand turn
6. Adding speed humps onto Flower to slow traffic on the street
7. U-turn mitigation on Flower Street
8. Allow parking spots (20+) to the north of the Gas Light Square complex owned by the city to be used for staff or parent parking/drop-off of Laurel students before and after school
9. Complete fencing on Laurel campus to prevent foot traffic from the restaurant entering into Laurel's inner campus
10. Possible camera setup protecting the Laurel campus from after-hours Raising Cane's foot traffic
11. Alley improvements on the east side of campus to assist parents using that location for pick-up and drop-off, partner with the City of Brea to make these improvements
12. Require that Raising Cane's trash does not become a daily nuisance for our custodians or a mitigation plan would be established
13. BOUSD personnel allowed to sit in on demolition/construction meetings
14. Demolition should not occur during school time, preferably during our Spring Break (April 3-April 11) or another agreeable time such as summer
15. Require a security guard on the Raising Cane's property to ensure that traffic and operations are handled well and oversight is maintained of surrounding properties, including Laurel Elementary School

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KITTELSON & ASSOCIATES

LAUREL ELEMENTARY SCHOOL CIRCULATION AND PARKING STUDY

BREA, CA

DRAFT

February 27, 2022



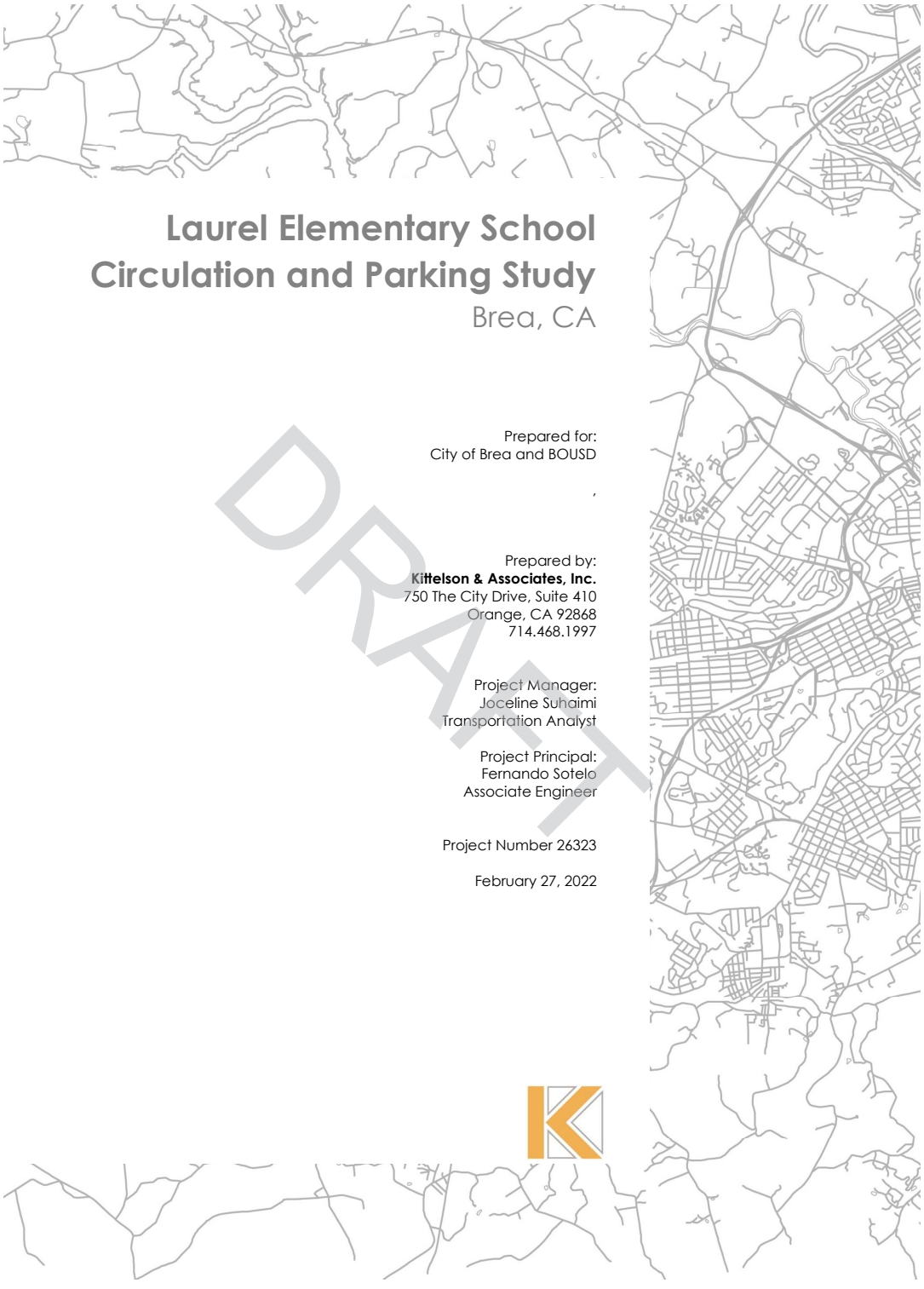
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Laurel Elementary School Circulation and Parking Study

Brea, CA

Prepared for:
City of Brea and BOUSD

,

Prepared by:
Kittelson & Associates, Inc.
750 The City Drive, Suite 410
Orange, CA 92868
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Project Manager:
Joceline Suhaimi
Transportation Analyst

Project Principal:
Fernando Sotelo
Associate Engineer

Project Number 26323

February 27, 2022

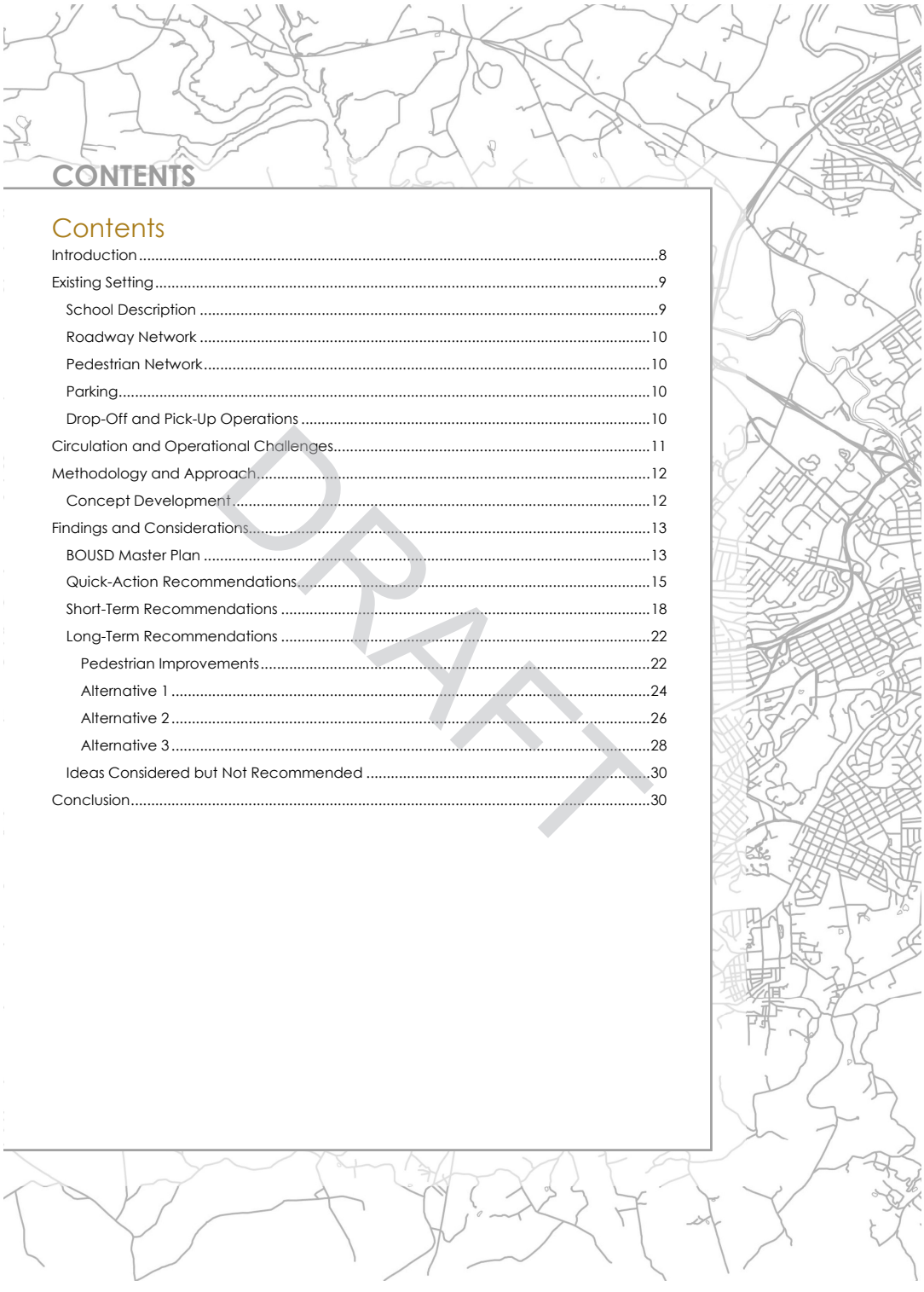
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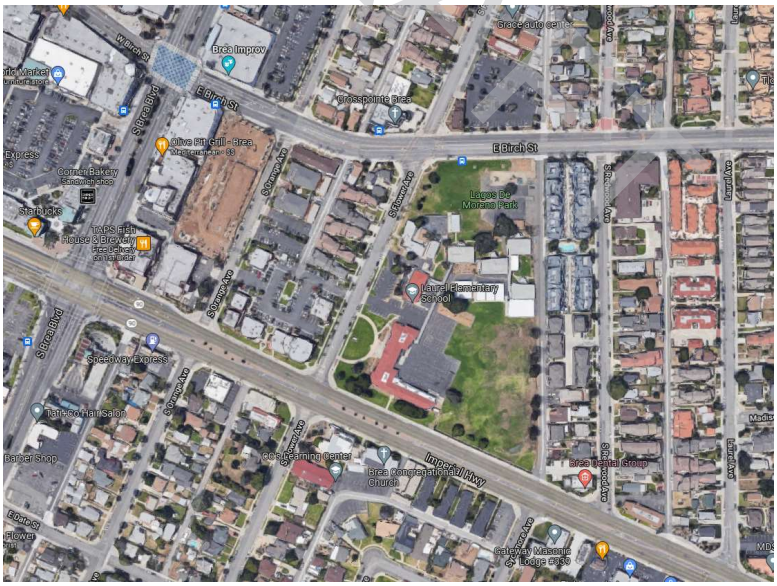
INTRODUCTION

The City of Brea has been coordinating with the Brea-Olinda Unified School District (BOUSD) to identify potential methods to facilitate enhanced pedestrian safety, to reduce queueing within the public right-of-way, and to add additional parking for the staff, parents, guardians, and visitors of Laurel Elementary Magnet School of Innovation and Career Exploration. Laurel Elementary School has served the community in the City of Brea for over 100 years, and has faced a number of challenges as the street network and land uses around the school have changed. The City and BOUSD have jointly commissioned this study to provide a comprehensive list of both on-campus and off-campus recommendations to address circulation and parking challenges at Laurel Elementary School. The school is locted at 200 South Flower Avenue in Brea. Figure 1 presents the school location and vicinity.

The City of Brea and BOUSD have selected Kittelson and Associates, Inc. (Kittelson) to conduct this study. Kittelson is a full-service transportation planning and engineering firm that works on delivering comprehensive transportation solutions to public agencies and private organizations. Kittelson staff members have experience working on a variety of circulation, parking, and traffic studies for schools across California and the United States.

The purpose of the Laurel Elementary School Traffic Circulation and Parking Study is to identify a list of potential physical and operational improvements that can address the circulation and operational challenges at the school. The Circulation & Parking Study identifies potential improvements located within the Laurel Elementary School property or within the public right-of-way in the vicinity of the school property. It is anticipated that this study will be presented to the City Traffic Committee, the BOUSD School Board, Laurel Elementary School staff and parents, and the City of Brea City Council for feedback and direction on steps to implement these recommendations.

Figure 1: Site Vicinity



SOURCE: GOOGLE MAPS

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EXISTING SETTING

SCHOOL DESCRIPTION

Laurel Elementary Magnet School of Innovation and Career Exploration has 72 full- and part-time staff members. Laurel Elementary School had an enrollment of 423 students in the 2020-2021 school year and 473 students in 2019-2020, according to the California Department of Education.

The bell schedule is shown in Table 1 below. Apart from the TK/Kindergarten students, all other students arrive and leave at the same times. Thus, the drop-off at 8:00 AM and the regular pick-up at 2:10 PM and the early pick-up on Wednesdays at 1:25 PM are the peak times for school activity.

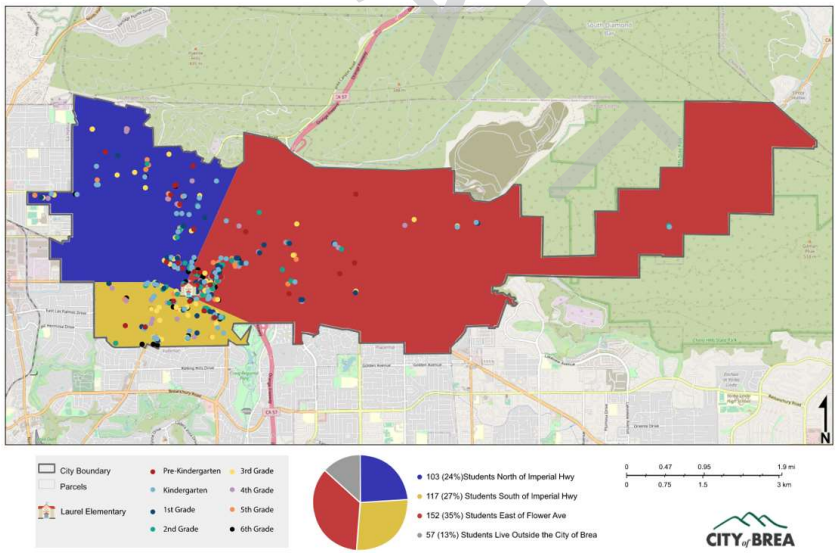
Table 1: Laurel Elementary School 2021-2022 Bell Schedule

Grade	Regular Class Time		Early Release Wednesday	
	Start Time	End Time	Start Time	End Time
TK-K (Group 1)	8:00 AM	11:30 AM	8:00 AM	11:15 AM
TK-K (Group 2)	10:20 AM	2:10 PM	9:50 AM	1:25 PM
1-2	8:00 AM	2:10 PM	8:00 AM	1:25 PM
3-6	8:00 AM	2:10 PM	8:00 AM	1:25 PM

SOURCE: LAUREL ELEMENTARY MAGNET SCHOOL

The City of Brea provided a student residency map for Laurel Elementary School for the 2019-2020 school year, which shows the locations of student residences throughout the City.

Figure 2: Laurel Elementary School Student Residency



SOURCE: CITY OF BREA

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ROADWAY NETWORK

Imperial Highway (SR-90) is an east-west highway with three lanes in each direction and a raised center median. The posted speed limit is 40 miles per hour (mph); however, a 25-mph school zone has been established from Redwood Avenue to Orange Avenue. Imperial Highway is under the jurisdiction of the California Department of Transportation (Caltrans).

Birch Street is an east-west roadway with two lanes in each direction and a two-way left-turn lane. The posted speed limit is 35 mph; however, a 25-mph school zone is designated in the vicinity of the school.

Flower Avenue is a north-south roadway with one lane in each direction. It is a local road with a speed limit of 25 mph. On-street parking is allowed on the west side of the road, but not on the east side of the road.

North-South Alley between Flower Avenue and Redwood Avenue is approximately 20 feet of wide and 900 feet long. The alley provides access to retail and residential building driveways near Imperial Highway and parking for Lagos de Moreno Park near Birch Street. The alley is currently utilized by Laurel Elementary School for drop-off and pick-up operations.

PEDESTRIAN NETWORK

Sidewalks are in place and in good condition around the school. Yellow standard crosswalks are present on Birch Street and Flower Avenue and across Flower Avenue at Imperial Highway. However, Flower Avenue and Imperial Highway does not have crosswalks that allow pedestrians to cross Imperial Highway. The nearest places to cross Imperial Highway are at Laurel Avenue (located ¼-mile from Flower Avenue) to the east and Brea Boulevard (located 600 feet from Flower Avenue) to the west.

Crossing guards are present during the drop-off and pick-up times at Flower Avenue and Birch Street and at Imperial Highway and Brea Boulevard. Right turns from Flower Avenue on to Birch Street are restricted when the crossing guard is present.

PARKING

The site currently has a 36-space parking lot on Flower Avenue that includes 2 accessible parking stalls. Nine parking spaces are available in the alley to serve Lagos de Moreno Park, a public park located north of Laurel Elementary School. Street parking is allowed on the west side of Flower Avenue, which is commonly used by staff and visitors. Parking is not allowed along the east curb of Flower Street because it is always designated for school drop-off/pick-up. The school has an informal agreement with the church located north of the site on Birch Street, so some staff members park at the church lot.

DROP-OFF AND PICK-UP OPERATIONS

Figure 3 depicts the school's drop-off and pick-up locations, school entrances, and parking areas. Kittelson, City, and District staff visited Laurel Elementary School on June 1, 2021, to observe the pick-up operations. Due to the COVID-19 pandemic, school staff changed drop-off and pick-up operations to allow for distancing and to maintain stable cohorts. Pick-up/drop-off was split into two areas: the front of the school on Flower Avenue, and the alleyway. Adults were given a colored piece of paper with their student's name on it, and colors corresponded to different classes.

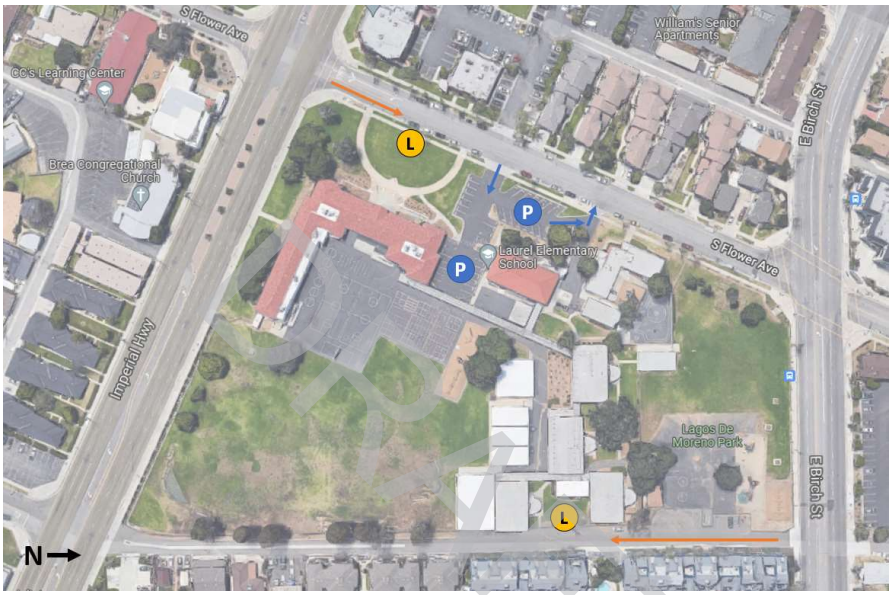
According to feedback received from school staff, pick-up and drop-off usually occurs on Flower Avenue in the parking lot and in the front of the school. Queues from Flower Avenue can spill onto Birch Street and Imperial Highway. Teachers have observed that some adults try to pick up students on Imperial Highway, raising traffic and safety concerns for motorists as well as students.

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Flower Avenue provides about 350 feet of curb space for drop-off. The school is not served by regular school bus service. Special Education vans typically drop-off and pick-up students in the parking lot alongside other pick-up/drop-off operations. The existing accessible[1] pick-up/drop-off point is not ideally located for loading and unloading of special education students.

Figure 3: Existing Drop-Off and Pick-Up Setting



CIRCULATION AND OPERATIONAL CHALLENGES

On June 1, 2021, Kittelson, City, and BOUSD staff met with teachers, administrators, and staff members of Laurel Elementary School to discuss circulation and operations issues around school drop-off/pick-up and parking and potential solutions to consider. That day approximately 70% of the enrolled students attended classes in-person. Kittelson also observed the pick-up operations of the school on that day to identify bottlenecks, conflict points, and constraints that are affecting traffic flow and optimal pedestrian circulation, and locations where pedestrians and vehicles interactions may conflict.

The following main issues were identified by the project team and stakeholders at the meeting.

- The student drop-off/pick-up zones for private autos and the ADA vans for special ed students are not separated. Separating vans and buses from private automobiles creates a streamlined drop-off/pick-up operation.

[1] American Disabilities Act (ADA) compliant parking spaces are also known as accessible parking spaces.

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- The site layout does not provide enough space to accommodate the queue on-site, causing it to spill over onto Birch Street and Imperial Highway.
- Students are being picked up and dropped off on public streets due to congestion on Flower Street.
- The site is constrained due to the historic nature of the building and proximity to a major highway under Caltrans jurisdiction.
- Off-street parking is insufficient to accommodate the demand for staff, volunteers, and visitors. Staff have trouble finding parking early in the morning. In addition, adults who want to greet younger students often have nowhere to park during the pick-up period.
- There is limited pedestrian connectivity and few facilities for students who walk to school, especially on Imperial Highway. Approximately 27 percent of students live south of Imperial Highway, as shown in Figure 2.
- Birch Street is a relatively high-traffic street. While crossing guards are present during school pick-up and drop-off, it is still a very high-stress street for students crossing. Many people make right turns even when a crossing guard is present.

METHODOLOGY AND APPROACH

The challenges described in the previous section were then used to develop recommendations to improve parking and circulation for Laurel Elementary School. These recommendations include quick-action, short-term, and long-term changes to address historical issues and concerns expressed by the BOUSD, school staff and parents, and the City of Brea. The size and location of buildings assumed in the BOUSD Master Plan were kept intact, but alterations to roadway, parking, sidewalk, and open space areas were viewed as available for modification.

Kittelson also reviewed existing publicly available documents and studies conducted in the area, provided by the City of Brea, as follows:

- Transportation Assessment for a drive-through restaurant
- Laurel Elementary School access plan
- BOUSD Master Plan
- Brea Place Traffic Study

In addition, Kittelson led a meeting with City staff, BOUSD staff, and Laurel Elementary School teachers, administrators, and staff members to discuss circulation, parking, and safety issues, possible solutions, and concerns.

CONCEPT DEVELOPMENT

Kittelson staff investigated potential traffic and parking modifications adjacent to Flower Avenue and the isle along the eastern boundary of the school. Key references reviewed included the California Manual of Uniform Traffic Control Devices (CAMUTCD), the California Department of Education school design guidelines, recommendations for school design and operations from several organizations such as the Institute of Transportation Engineers (ITE). City parking requirements and typical parking standards were also reviewed to assess the feasibility to add or modify parking lots to add parking to the school. Further, best practices that have been developed through Kittelson's experience with similar school projects were reviewed for applicability to the Laurel Elementary School site and issues. To the extent feasible, the recommendations included the following best practices for school site planning:

- Separate drop-off/pick-up for students transported by parents and by school buses or vans.
- Provide maximum feasible separation for buses, autos, and pedestrians.
- Provide ample internal storage for vehicles to avoid congestion and queuing on public streets.

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- Provide a passing lane for vehicles in the drop-off/pick-up zones. Outer lane loading should not be allowed to prevent students from walking between cars.
- The driveway along the drop-off/pick-up zones should be as straight as possible so drivers can more easily maintain distance from the curb.
- Avoid driveways where cars may cross the path of a student walking.
- Avoid driveways that allow drivers to take shortcuts through parking lots to get to the drop-off/pick-up zone.
- Avoid crosswalks that cross the line of vehicles in the drop-off/pick-up queue.
- Provide direct and convenient pedestrian paths without crossing parking lots and driveways.

With feedback received from City Public Works, Planning, Police, BOUSD, and Laurel Elementary School staff, Kittelson developed conceptual design and operational plans to address the transportation issues at Laurel Elementary School.

Many options were considered, and a few were recommended as quick-action, short-term, and long-term alternatives that can be implemented in time periods ranging from six months to five years. The options illustrate each recommended circulation, parking, and safety improvements that may include traffic and pedestrian travel paths, turn restrictions, parking restrictions, and concept-level pavement and curb markings, signage, and physical improvements.

FINDINGS AND RECOMMENDATIONS

The following summarizes Kittelson's review of the BOUSD Master Plan for the school, and the circulation and parking recommendations for quick action/turnkey, short-term, and long-term improvements.

There are a totally of 27 distinct recommendations in three categories. The long-term recommendations come with three different alternatives with various costs and benefits. Each recommendation is a standalone item and not every item must be implemented for other elements to be built. Each item has been given a unique number and may be used in multiple categories and alternatives.

Each package of improvements builds on the previous improvements, and it is intended that any recommendation implemented in the quick-action and short-term phases will remain in place during the long-term phases.

BOUSD MASTER PLAN

In 2018, Brea Olinda Unified School District (BOUSD) published a Master Plan for Laurel Elementary School, which includes modernizing seven classroom buildings and the multi-purpose building, removing portables, a new classroom building, and additional campus. Figure 4 shows a conceptual layout of the BOUSD Master Plan.

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Figure 4: BOUSD Master Plan



SOURCE: BREA OLINDA UNIFIED SCHOOL DISTRICT

While the BOUSD Master Plan is not recommended as a long-term plan from a traffic and circulation standpoint, elements of the plan, such as additional parking, new driveway entrances and drop-off areas were included in the recommendations discussed below.

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QUICK-ACTION RECOMMENDATIONS

There are opportunities for quick-action improvements that can be implemented adjacent to the school property without making substantial changes to the school layout and street network. This set of recommendations could be implemented within 6 months of approval. Although these recommendations are quick to build, many of them could remain in place regardless of future development. Figure 5 and Figure 6 show conceptual plans of the proposed improvements.

PHYSICAL IMPROVEMENTS

1. **Expand the Adaptive Traffic Signal System to include the Birch and Flower traffic signal.** This recommendation allows the City to utilize technology to modify signal timings during school drop-off and pick-up to enhance operations based on real-time volumes. As part of this measure, signal timing would be modified to provide a Leading Pedestrian Interval and increase pedestrian walk time. This improvement increases visibility of crossing guards and pedestrians by providing pedestrian walk time prior to vehicle green time. If a leading pedestrian interval does not improve the pedestrian environment, a right-turn on red restriction can be added to the signal.
    - **Agency Responsibility:** City
2. **Change right-turn regulatory sign and stripe a 50-foot right turn lane pocket.** This modification changes the operations of the right-turn to remove vague time restrictions and allow right-turns but require yielding to any pedestrians using the crosswalk. The right-turn pocket provides space for right-turn vehicles to queue. This modification will require red curb markings and will cause a loss of 2-3 parking spaces.
    - **Agency Responsibility:** City
3. **Improve drop-off/pick-up signage (e.g., restrictions, pull-forward signage) and provide clear curb markings on Flower Ave (green or white curb).** This improvement would help move some drop-off/pick-up operations away from Imperial Highway and designate space in the roadway where vehicles should stop for loading.
    - **Agency Responsibility:** BOUSD
4. **Delineate median to prevent U-turn movement.** This recommendation would restrict U-turn movements along Flower Avenue between Imperial Highway and the most southern retail driveway. This has been a common place for U-turns for vehicles either returning to Birch Street after drop-off or getting to the front of the school.
    - **Agency Responsibility:** City
5. **Restrict left turns from Flower Avenue using delineators and striping.** This improvement would simplify the intersection of Flower Avenue and Imperial Highway, decreasing delay and potential conflict points. This would require replacing the existing R61-19 sign with R3-2 sign.
    - **Agency Responsibility:** City, BOUSD
6. **Allow drop-off/pick-up along Flower Avenue school driveways, using cones to close driveways for vehicle access except ADA-related vehicles.** This recommendation would help lengthen the pick-up/drop-off frontage along Flower Avenue to help reduce queues on Imperial Highway.
    - **Agency Responsibility:** BOUSD
7. **Add striping and signage for pedestrian traffic at the alleyway** (e.g., striped crosswalks, "yield to pedestrians" sign).
    - **Agency Responsibility:** City, BOUSD
8. **Restrict left turns at the alley at Imperial Highway during drop-off and pick-up hours.** Add sign R33A (CA) "No Left Turns (Specify days and times)" to the alley.
    - **Agency Responsibility:** City

Estimated total cost: $15,000

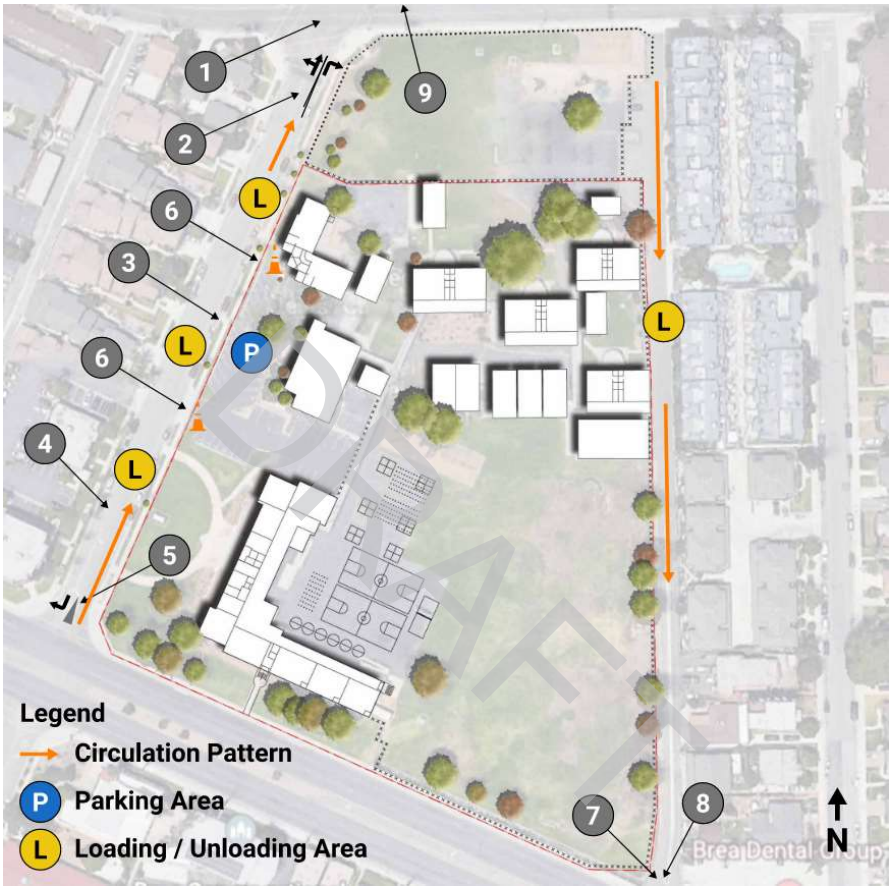
PROGRAMMATIC CHANGES

9. **Implement an agreement to allow off-site parking at the Brea Baptist Church.**
10. **Develop and publicize a drop-off/pick-up plan.**

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Figure 5: Quick-Action Recommendations



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Figure 6: Flower Avenue Quick-Action Recommendations Detailed Concept



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SHORT-TERM RECOMMENDATIONS

The short-term recommendations identified utilize green field space adjacent to the alley to provide additional drop-off/pick-up area support and other spot improvements that can be completed in a relatively short time frame, within approximately 18 months of approval. Moving drop-off and pick-up operations to the alley will allow for later phases of construction along Flower Avenue. These improvements include:

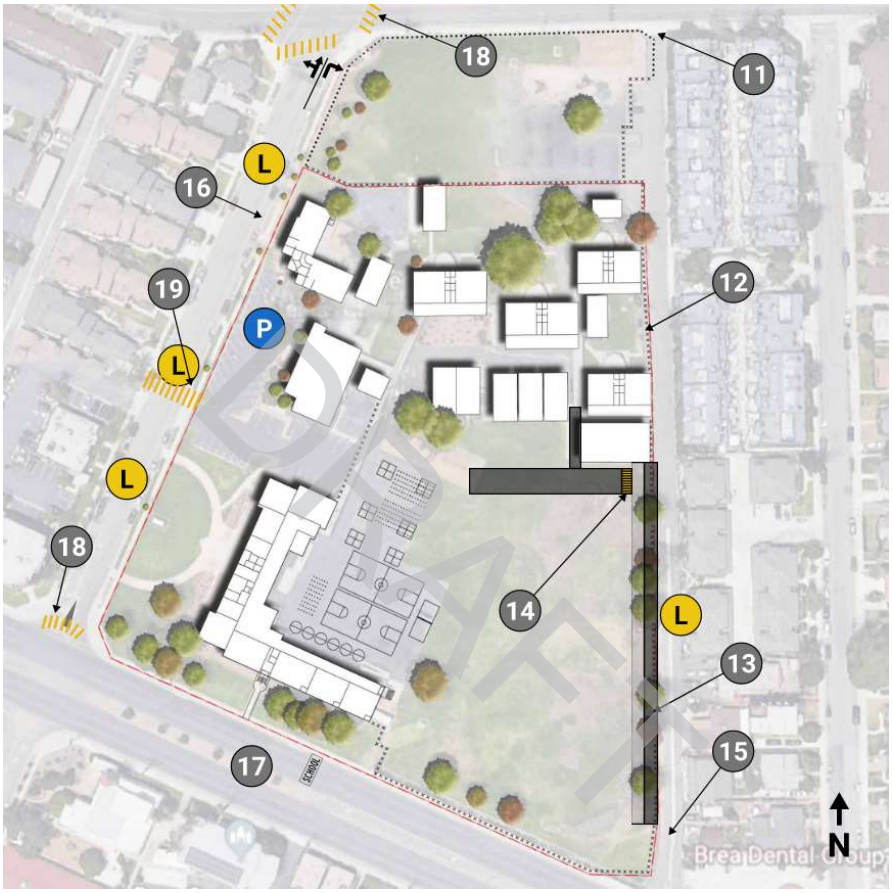
11. **Improve the southwest corner of Birch at alley driveway** with a greater turn radius for vehicles making an eastbound right turn from Birch Street to the alley.
12. **Remove/relocate the existing utility pole** in the northeast corner of the school in the alley.
13. **Widen the alley by 16 feet for drop-off, pick-up, and parking.** 8 feet of pavement will be for vehicles to pull in and drop-off/pick-up students, and 8 feet will be for a sidewalk. This area can also be used for parking outside of the drop-off/pick-up time periods and can be used for overflow staff or visitor parking in the future.
14. **Upgrade the gate and student gathering area. Add an ADA-compliant walking path from the alley to the school.** An updated area for students to wait to be picked up encourages adults to pick their students up in the alley. A walkway needs to be provided for all students to access the alley drop-off area.
15. **Use signage to restrict the northbound movement through alley** during the pick-up and drop-off time periods. This will require Caltrans concurrence due to the presence of an eastbound left turn pocket leading to northbound travel in the alley.
16. **Designate a separate loading area for special education students.** This will improve traffic flow during the drop-off and pick-up times and can enhance safety for students with special needs. See Figure 8 for details. The placement of this loading area could potentially be in the alley or in the existing parking lot at the front of the school.
17. **Add additional school zone signage and striping along Imperial Highway.** Imperial Highway is a designated school zone from Redwood Avenue to Orange Avenue. Adding pavement markings that say "SCHOOL" is recommended. This would require Caltrans approval, as Imperial Highway is under Caltrans' jurisdiction.
18. **Add high-visibility crosswalks** at the intersections at Flower Avenue/Birch Street and Flower Avenue/Imperial Highway**.** Ladder striping increases pedestrian visibility.
19. **Add a mid-block crosswalk on Flower Avenue.** A well-placed crosswalk can also help lengthen the pick-up queue and ensure that adults pull forward as far as possible when picking up students. In addition, a mid-block crosswalk provides a much safer alternative for students who need to cross Flower Avenue. However, this will result in a loss of approximately four on-street parking spaces. The crosswalk can be a standard high-visibility crosswalk with yellow ladder striping or a raised crosswalk.
    a. **Standard crosswalk with high-visibility striping.** A standard crosswalk would be less costly and much faster to build and could be completed in the short-term timeframe.
    b. **Raised crosswalk.** Raised crosswalks serve as traffic calming measures and increase visibility of pedestrians. A civil engineering review will be required to ensure proper drainage, that adequate space exists between residential and commercial driveways, and ADA crossing features can be provided. A raised crosswalk would most likely need to be implemented in a long-term phase.

Estimated total cost: $100,000

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Figure 7: Short-Term (7-18 month) Recommendations



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Figure 8: Flower Avenue Short-Term Recommendation Detailed Concept



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Figure 9: Alley Short-Term Recommendation Detailed Concept



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LONG-TERM RECOMMENDATIONS

The long-term recommendations are organized into three alternatives, as well as pedestrian improvements that can be implemented in conjunction with the short-term and long-term recommendations. These recommendations could be implemented over three to five years.

PEDESTRIAN IMPROVEMENTS

These recommendations can be implemented in conjunction with any of the three alternatives described below.

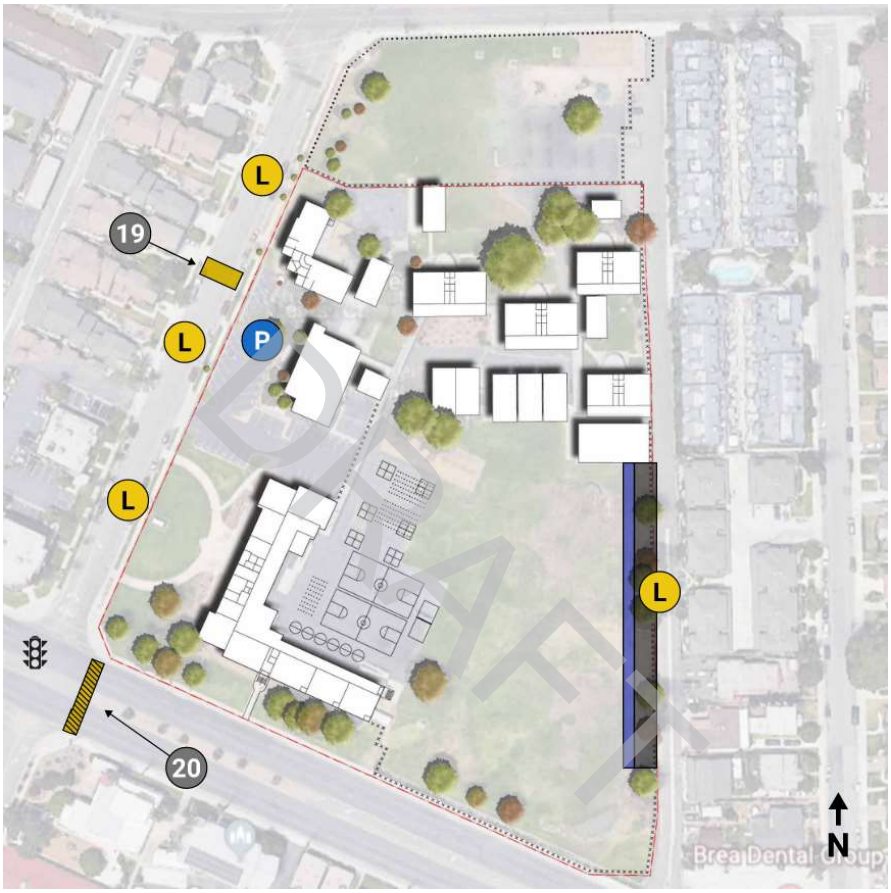
19. **Add a mid-block crosswalk on Flower Avenue.** A well-placed crosswalk can also help lengthen the pick-up queue and ensure that adults pull forward as far as possible when picking up students. In addition, a mid-block crosswalk provides a much safer alternative for students who need to cross Flower Avenue. However, this will result in a loss of approximately four on-street parking spaces. The crosswalk can be a standard high-visibility crosswalk with yellow ladder striping or a raised crosswalk.
    a. **Standard crosswalk with high-visibility striping.** A standard crosswalk would be less costly and much faster to build, and could be completed in the short-term timeframe.
    b. **Raised crosswalk.** Raised crosswalks serve as traffic calming measures and increase visibility of pedestrians. A civil engineering review will be required to ensure proper drainage, that adequate space exists between residential and commercial driveways, and ADA crossing features can be provided.
20. **Install a traffic signal and raised median** to support a new pedestrian crossing at Imperial Highway on the east side of the intersection with Flower Avenue.

Estimated total cost: $500,000

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Figure 10: Long-Term Recommendations – Pedestrian Improvements



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ALTERNATIVE 1

The Alternative 1 Long-Term Recommendations focus on improvements to make Flower Avenue the main access for the school. The alley provides opportunity for additional parking, since it was expanded in a previous phase.

21. **Add a right-turn lane from Imperial Highway to Flower Avenue.** This would provide queuing space on Imperial Highway for right-turn traffic. This improvement would require coordination with Caltrans.
22. **Reconfigure the front of the school to incorporate an on-site pick-up/drop-off area with a new driveway.** See Figure 11 for details.
23. **The alley can be converted into a parking lot for staff and visitors.** The front parking lot would be replaced with the new pick-up/drop-off configuration. Approximately 20 parallel parking spaces can be added to the alley.

Potential Benefits	Potential Drawbacks
• Increases the amount of on-site parking • Repurposes some underutilized field space near Imperial Highway • Adds a space on Imperial Highway for queuing vehicles that is outside the travel lane	• Reduces recreational space • Affects historical front of the school • There is limited queuing space in front of school (~300 feet) • The right-turn lane on Imperial Highway requires changing the configuration of the crosswalk

Estimated total cost: $1,000,000

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B-17
(CONT.)

Figure 11: Long-Term Recommendations – Alternative 1



B-17
(CONT.)

ALTERNATIVE 2

Alternative 2 Long-Term Recommendations adds queue space to the school site without adding a lane on Imperial Highway. It removes the queue from Imperial Highway and puts it on the school site and uses existing driveways.

24. **Add a drive aisle (instead of a right-turn lane) off Imperial Highway to increase queuing space on site.** The drive aisle can connect to an existing driveway on Imperial Highway west of the fence and the existing driveway to the current parking lot. This removes the need for Caltrans to maintain a right-turn lane, does not increase the width of Imperial Highway in front of the school, and does not impact the existing crosswalk on Flower Avenue.
25. **Reconfigure front of school to incorporate an on-site pick-up/drop-off area using the existing driveways.**
23. **The alley can be converted into a parking lot for staff and visitors.** The front parking lot would be replaced with the new pick-up/drop-off configuration.

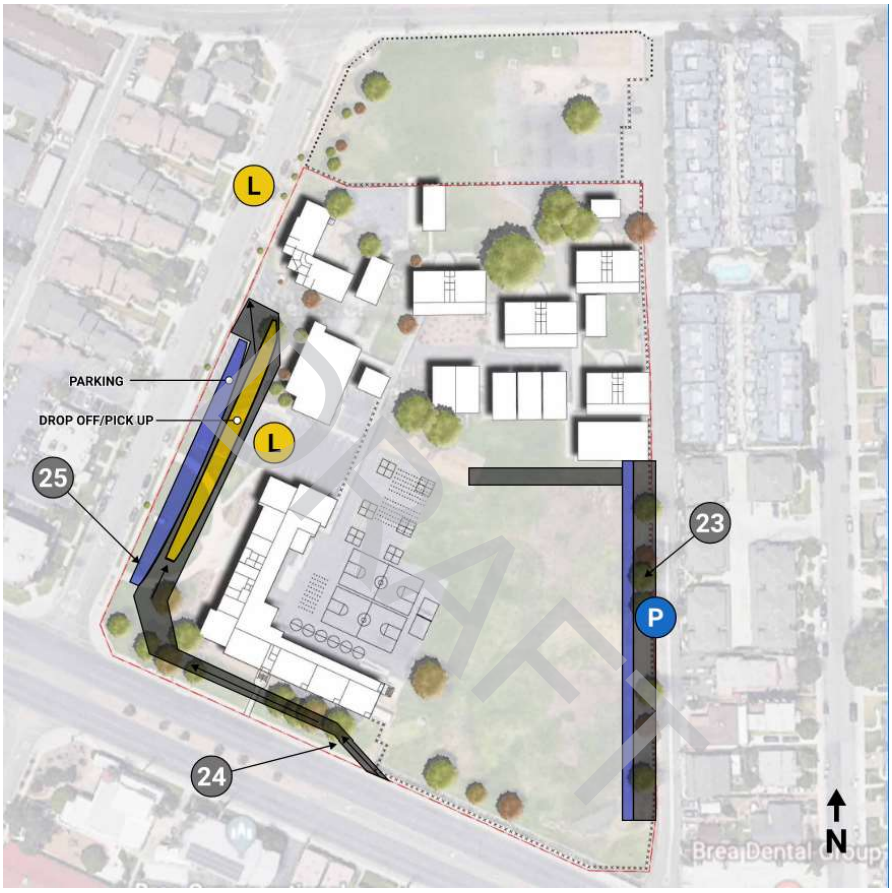
Potential Benefits	Potential Drawbacks
• Increased on-site parking • New drive lane would provide deceleration lane on Imperial Highway for school and commercial traffic • Moves queues from Imperial Highway to the school site • Adds approximately 600 feet of queue space on-site	• Reduces recreational green space at the school • Affects the historical front of the school

Estimated total cost: $1,200,000

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Figure 12: Long-Term Recommendations – Alternative 2



B-17
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ALTERNATIVE 3

The Alternative 3 Long-Term Recommendations add more queue space for drop-off and pick-up but require a new driveway.

26. **Add drive aisle** with a new driveway that provides angled entry into a horseshoe-style drop-off area. The drive aisle will connect further east to the existing driveway and connect to the existing driveway at the current parking lot.
27. **Reconfigure front of school to incorporate an on-site pick-up/drop-off area.**
23. **The alley can be converted into a parking lot for staff and visitors.** The front parking lot would be replaced with the new pick-up/drop-off configuration.

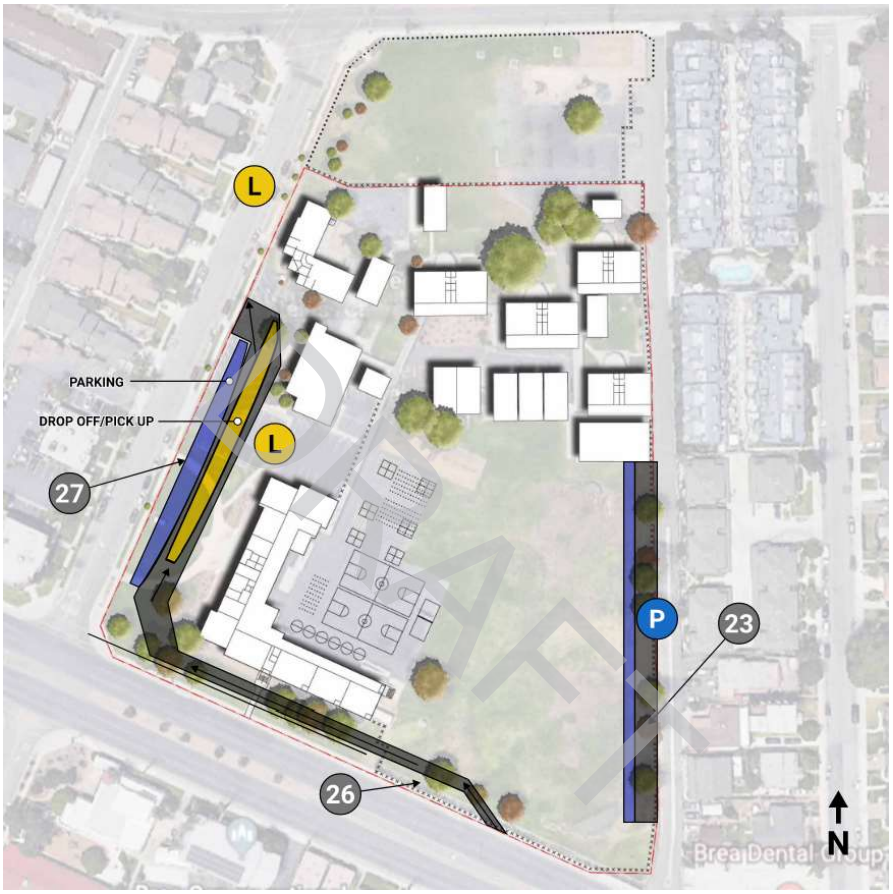
Potential Benefits	Potential Drawbacks
• Increased on-site parking • New drive lane would provide deceleration lane on Imperial Highway for school and commercial traffic • Moves queues from Imperial Highway to the school site • Adds approximately 800 feet of queue space on-site	• Reduces recreational green space at the school • Affects the historical front of the school • Affects the existing batting cage

Estimated total cost: $1,500,000

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B-17
(CONT.)

Figure 13: Long-Term Recommendations – Alternative 3



B-17
(CONT.)

IDEAS CONSIDERED BUT NOT RECOMMENDED

The project team has discussed a few solutions that ultimately were not recommended due to cost, timing, and logistical challenges.

1. **Converting Flower Avenue into a one-way street.** This may improve operations on Flower Avenue during the school drop-off and pick-up times, which occur for short periods of time during school days. However, converting Flower Avenue to one-way would reduce access to residents and businesses along Flower Avenue, and would require modifications to the intersections at Imperial Highway and Birch Street.
2. **Reconfiguring the existing parking lot at the front of the school to add more spaces.** This would involve removing mature trees and converting angled spaces to perpendicular spaces to allow for more parking. However, converting the angled spaces to perpendicular spaces would make the drive aisle narrow and difficult for vehicles to maneuver in and out of spaces. Given the number of spaces that would be added in comparison to the cost and resulting circulation, this solution is not recommended.

CONCLUSION

Laurel Elementary Magnet School of Innovation and Career Exploration has served the community for over 100 years. During those years, the land use and transportation network around the school have changed. These changes have created a desire for improvements to be made to Laurel Elementary School's circulation and traffic, parking, and safety conditions.

The City of Brea and Brea Olinda Unified School District have jointly commissioned a study to be conducted on Laurel Elementary School's transportation challenges and for a set of recommendations to be made to improve these issues.

With input from school, City, and school district staff, Kittelson identified the circulation, parking, and safety issues at the school. The following issues were identified by the project team and stakeholders at the meeting.

- The student drop-off/pick-up zones for private autos and the ADA vans for special ed students are not separated. Separating vans and buses from private automobiles creates a much safer and streamlined pick-up and drop-off operation, particularly for students with special needs.
- The site layout does not provide enough space to accommodate the queue on-site, causing it to spill over onto Birch Street and Imperial Highway.
- Students are being picked up and dropped off on Imperial Highway due to congestion on Flower Street.
- The site is constrained due to the historic nature of the building and proximity to a major highway under Caltrans jurisdiction.
- Off-street parking is insufficient to accommodate the demand for staff, volunteers, and visitors.
- There is limited pedestrian connectivity and few facilities for students who walk to school, especially on Imperial Highway.
- Birch Street is a relatively high-traffic street. While crossing guards are present during school pick-up and drop-off, it is still a very high-stress street for students crossing. The walk light across Birch Street is very short, and many people make right turns even when a crossing guard is present.

The recommendations in this report were developed with input from Laurel Elementary School staff and parents, the City of Brea, BOUSD, and Brea Police and Fire Departments. Ultimately, 27 different recommendations have been made, a mix of physical and operational improvements separated into three packages: quick-action, short-term, and long-term. The quick-action recommendations can be implemented within 6 months. The short-term recommendations can be implemented over 7 to 18 months. The long-term recommendations, which include pedestrian improvements and three different alternatives,

B-17 (CONT.)

can be implemented over three to five years. The recommendations are summarized below. Figures and planning-level cost estimates can be found in the Findings and Recommendations section of this report, which begins on Page 13. Each recommendation can be implemented independently; however, the short-term and long-term packages can build on the previous packages.

QUICK-ACTION RECOMMENDATIONS

This set of recommendations could be implemented within 6 months of approval. Although these recommendations are quick to build, many of them could remain in place regardless of future development.

PHYSICAL IMPROVEMENTS

1. Expand the Adaptive Traffic Signal System to include the Birch and Flower traffic signal and update the signal timing.
2. Change right-turn regulatory sign and stripe a 50-foot right turn lane pocket.
3. Improve drop-off/pick-up signage (e.g., restrictions, pull-forward signage) and provide clear curb markings on Flower Ave (green or white curb).
4. Delineate median to prevent U-turn movements.
5. Restrict left turns from Flower Avenue using delineators and striping.
6. Allow drop-off/pick-up along Flower Avenue school driveways, using cones to close driveways for vehicle access except ADA-related vehicles.
7. Add striping and signage for pedestrian traffic at the alleyway (e.g., striped crosswalks, "yield to pedestrians" sign).
8. Restrict left turns at the alley at Imperial Highway during drop-off and pick-up hours. Add sign R33A (CA) "No Left Turns (Specify days and times)" to the alley.

PROGRAMMATIC CHANGES

9. Implement an agreement to allow off-site parking at the Brea Baptist Church.
10. Develop and publicize a drop-off/pick-up plan.

SHORT-TERM RECOMMENDATIONS

The short-term recommendations can be completed in a relatively short time frame, within approximately 18 months of approval. These improvements include:

11. **Improve the southwest corner of Birch at alley driveway** with a greater turn radius for vehicles making an eastbound right turn from Birch Street to the alley.
12. **Remove/relocate the existing utility pole** in the northeast corner of the school in the alley.
13. **Widen the alley by 16 feet for drop-off, pick-up, and parking.** 8 feet of pavement will be for vehicles to pull in and drop-off/pick-up students, and 8 feet will be for a sidewalk.
14. **Upgrade the gate and student gathering area. Add an ADA-compliant walking path from the alley to the school.** An updated area for students to wait to be picked up encourages adults to pick their students up in the alley.
15. **Use signage to restrict the northbound movement through alley** during the pick-up and drop-off time periods.
16. **Designated a separate loading area for special education students.** This will enhance traffic flow during the pick-up and drop-off time periods and can enhance safety for students with special needs. See Figure 8 for details.
17. **Add additional school zone signage and striping along Imperial Highway.** Imperial Highway is a designated school zone from Redwood Avenue to Orange Avenue. Adding pavement markings that say "SCHOOL" is recommended.

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18. **Add high-visibility crosswalks** at the intersections at Flower Avenue/Birch Street and Flower Avenue/Imperial Highway**.** Ladder striping increases pedestrian visibility.
19. **Add a mid-block crosswalk on Flower Avenue.** The crosswalk can be a standard high-visibility crosswalk with yellow ladder striping or a raised crosswalk.
    c. **Standard crosswalk with high-visibility striping.** A standard crosswalk would be less costly and much faster to build and could be completed in the short-term timeframe.
    d. **Raised crosswalk.** Raised crosswalks serve as traffic calming measures and increase visibility of pedestrians. A raised crosswalk would most likely need to be implemented in a long-term phase.

LONG-TERM RECOMMENDATIONS

The long-term recommendations are organized into three alternatives, as well as pedestrian improvements that can be implemented in conjunction with the short-term and long-term recommendations. These recommendations could be implemented over three to five years.

PEDESTRIAN IMPROVEMENTS

These recommendations can be implemented in conjunction with any of the three alternatives described below.

19. **Add a mid-block crosswalk on Flower Avenue.**
    a. **Standard crosswalk with high-visibility striping.** A standard crosswalk would be less costly and much faster to build, and could be completed in the short-term timeframe.
    b. **Raised crosswalk.** Raised crosswalks serve as traffic calming measures and increase visibility of pedestrians. A civil engineering review will be required to ensure proper drainage, that adequate space exists between residential and commercial driveways, and ADA crossing features can be provided.
20. **Install a traffic signal and raised median** to support a new pedestrian crossing at Imperial Highway on the east side of the intersection with Flower Avenue.

ALTERNATIVE 1

The Alternative 1 Long-Term Recommendations focus on improvements to make Flower Avenue the main access for the school. The alley provides opportunity for additional parking, since it was expanded in a previous phase.

21. **Add a right-turn lane from Imperial Highway to Flower Avenue.** This would provide queuing space on Imperial Highway for right-turn traffic. This improvement would require coordination with Caltrans.
22. **Reconfigure the front of the school to incorporate an on-site pick-up/drop-off area with a new driveway.** See Figure 11 for details.
23. **The alley can be converted into a parking lot for staff and visitors.** The front parking lot would be replaced with the new pick-up/drop-off configuration. Approximately 20 parallel parking spaces can be added to the alley.

ALTERNATIVE 2

Alternative 2 Long-Term Recommendations adds queue space to the school site without adding a lane on Imperial Highway. It removes the queue from Imperial Highway and puts it on the school site and uses existing driveways.

24. **Add a drive aisle (instead of a right-turn lane) off Imperial Highway to increase queuing space on site.**

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25. **Reconfigure front of school to incorporate an on-site pick-up/drop-off area using the existing driveways.**
23. **The alley can be converted into a parking lot for staff and visitors.** The front parking lot would be replaced with the new pick-up/drop-off configuration.

ALTERNATIVE 3

The Alternative 3 Long-Term Recommendations add more queue space for drop-off and pick-up but require a new driveway.

26. **Add drive aisle** with a new driveway that provides angled entry into a horseshoe-style drop-off area. The drive aisle will connect further east to the existing driveway and connect to the existing driveway at the current parking lot.
27. **Reconfigure front of school to incorporate an on-site pick-up/drop-off area.**
23. **The alley can be converted into a parking lot for staff and visitors.** The front parking lot would be replaced with the new pick-up/drop-off configuration.

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B-17
(CONT.)

RESPONSES TO COMMENT LETTER B:
Brea Olinda Unified School District

B-1: This introductory comment from Brea Olinda Unified School District (BOUSD) thanks the City for the opportunity to review the DEIR. This general comment is acknowledged.

B-2: BOUSD restates the Project description summary from the DEIR. This comment is noted.

B-3: BOUSD states its duty to protect the health, safety, and welfare of all District students and staff and expresses general concern over pedestrian and student safety during the walk to and from school, and the increase in traffic and congestion on Flower Street and surrounding streets that serve as the primary pick-up/drop-off point as well as the only entrance for visitor and staff parking. No specific comments are made regarding the adequacy of the DEIR's transportation safety analysis. The BOUSD is referred to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for the analyses of transportation safety, which conclude that the Project's impacts would be less than significant.

B-4: BOUSD expresses concern about after-hours school safety and makes an unsupported assumption that the Project would attract crowds during late hours of operation. These statements are speculative and are not supported by facts that qualify as substantial evidence of a significant environmental impact. As such, no revisions to the DEIR are necessary or warranted.

B-5: BOUSD expresses concern that the Project would cause additional air pollution affecting young, developing lungs from idling cars including from vehicles in the proposed drive-thru lane. Refer to DEIR Subsection 4.2, *Air Quality*, and Technical Appendix B, *Air Quality Impact Analysis*, for an analysis of the Project's effects on human health from air pollutant emissions. As explained on DEIR pages 4.2-18 to -21, the greatest potential for a significant air pollution impact on human health would be during the Project's construction phase due to the presence of diesel-fueled construction equipment; as demonstrated in the analysis, construction-related effects on human health would be less than significant and as shown on DEIR Table 4.2-8, the air pollutant emissions during construction would fall far below levels that the South Coast Air Quality Management District (SCAQMD) considers significant to human health.

During the Project's operation, there is no reasonable potential that the Project, including idling vehicles in the drive-thru lane, would produce air pollution to a level that would significantly impact school children because vehicular tailpipe emissions are strictly regulated by State and federal agencies including the State and federal Environmental Protection Agencies. The California Air Resources Board (CARB) reports that emissions of carbon monoxide, hydrocarbons, and oxides of nitrogen from passenger vehicles have decreased by 75-85% between 1999 and 2018 alone.[1] and it would take thousands of idling cars over a short period of time to cause Clean Air standards to be exceeded. As noted in the DEIR and underlying air quality impact analysis (DEIR Technical Appendix B) and associated trip generation summary (DEIR Technical Appendix H1), the Project would generate 1,068

[1] California Air Resources Board. Light Duty Vehicle Research. https://ww2.arb.ca.gov/resources/documents/light-duty-vehicle-research

daily vehicular trips for the drive-thru use (without accounting for pass-by trips) – even if 25% of the total daily vehicular trips occurred during a one-hour period (which is very unlikely due to operational constraints), that would result in 267 vehicular trips occurring during a peak period. Furthermore, although not required, as stated in the DEIR and underlying technical air quality impact analysis (see DEIR Technical Appendix B, page 37), a new supplemental localized significance assessment for Project operations has been conducted using CalEEMod. CalEEMod is an air quality modeling software program recommended for use by the South Coast Air Quality Management District (SCAQMD) for estimating air pollutant emissions from land use development projects.[2] Further, CalEEMod was developed by the California Pollution Control Officers Association (CAPCOA), which represents various air districts throughout the State and is the industry-standard for estimating air quality and greenhouse gas emissions for land uses projects throughout California. CalEEMod was utilized to determine the on-site emissions associated with both on-site travel and on-site idling from all the Project's uses. The results of the analysis indicate that the Project would result in a maximum of 1.52 pounds per day of NOx, 12.90 pounds per day of CO, 0.06 pounds per day of PM10, and 0.03 pounds per day of PM2.5 emissions. As such, emissions from NOx, CO, PM10, and PM2.5 are well below the applicable localized thresholds of 147 pounds per day for NOx, 762 pounds per day for CO, 6 pounds per day for PM10, and 2 pounds per day for PM2.5. A summary of the localized emissions and associated thresholds is presented at Table F-2, *Localized Significance Summary Operations,* below, and added as FEIR Technical Appendix B2.

Table F-2 Localized Significance Summary Operations

Localized Significance Summary Operations				
	NO_x	CO	PM_{10}	$PM_{2.5}$
Maximum	**1.52**	**12.90**	**0.06**	**0.03**
SCAQMD Localized Threshold	147	762	6	2
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: (Urban Crossroads, 2023g)

Further, the vehicle fleet in California is aggressively transitioning to zero emission (ZE) vehicles, which will virtually eliminate tailpipe emissions in the future. The California Air Resources Board (CARB) adopted Advanced Clean Cars II requirements in 2022 that impose low-emission and zero-emission vehicle standards for model years 2026-2035. By 2035 all new passenger cars, trucks and SUVs sold in California will be zero emission. The Advanced Clean Cars II regulations take the state's already growing zero-emission vehicle market and robust motor vehicle emission control rules and augments them to meet more aggressive tailpipe emissions standards and ramp up to 100% ZE vehicles.[3]

[2]South Coast Air Quality Management District. Air Quality Modeling. http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-modeling

[3] California Air Resources Board, Advanced Clean Cars Program. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

B-6: BOUSD expresses concern about potential litter on the school grounds as a result of late hours of Project operation that may warrant increased custodial needs. Concern about littering on school grounds is speculative in nature and a general occurrence, which would not manifest into demonstrable, significant impacts on the environment under the topics germane to the CEQA Statute or Guidelines. According to California Penal Code, Part 1, Title 10, *Of Crimes Against the Public Health and Safety*, it is unlawful to litter or cause to be littered in or upon public or private property and is punishable by a mandatory fine.

B-7: BOUSD expresses general concerns regarding the potential for an increase in automobile collisions and pedestrian injuries due to the Project. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related safety impacts would be less than significant. Speculation and generalizations about environmental effects, including transportation safety such as presented in this comment does not constitute substantial evidence (*Snyder v City of S. Pasadena* (1975) 53 CA3d 1051, 1060, wherein public comment that unforeseen factors may lead to traffic impacts was properly disregarded as speculation). The commenter is referred to the DEIR's South Flower Avenue Closure Alternative, in which a design alternative is addressed that would decrease the number of vehicles using the segment of South Flower Avenue that abuts Laurel Elementary School.

B-8: BOUSD expresses concerns about more students walking, including through the Project Site. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which considers school-related non-vehicular travel modes and conclude that Project-related safety impacts would be less than significant. Public sidewalks for pedestrians around the Project Site are located along South Orange Avenue, South Flower Avenue, and Imperial Highway (Google Earth, 2022). The Project would have no significant adverse effects to the public sidewalk system regardless of the number of persons using the sidewalks. The Project's design meets City Municipal Code standards, including for pedestrian movement pathways.

B-9: BOUSD makes an incorrect assumption that the Project's traffic study was conducted during Covid-19 closures. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix H1, *Trip Generation Memo*, for a discussion of the traffic counts for the trip generation assessment that were collected on September 20 and 21, 2022, while Laurel Elementary School was in full session.

B-10: BOUSD refers to a comment letter the District submitted on a different project proposed at the Project Site in 2021. The concerns previously submitted, and now resubmitted for the proposed Project, are addressed above in Responses B-3 through B-9.

B-11: BOUSD refers to a draft Laurel Elementary School Traffic Circulation and Parking Study and attaches a copy of the document dated February 27, 2022, for reference. The Study identifies 27 recommendations, which are a mix of physical and operational improvements separated into quick-action, short-term, and long-term approaches to improve parking and student pick-ups and drop-offs. Existing operations at the school including pick-up and drop-off patterns were considered as part of the Project's *Safety Study* included as DEIR Technical Appendix I, which concludes that the Project's

transportation safety impacts would be less than significant. The DEIR also includes an alternative (refer to DEIR Subsection 6.3.6) that evaluates the potential closure of South Flower Ave at Imperial Highway as an alternative means to improve transportation safety. While the Laurel Elementary School Circulation and Parking Study sets forth draft recommendations for changes or improvements at the school and along fronting public streets, the Study was considered as part of the DEIR's preparation process. The DEIR, Subsection 4.12, *Transportation*, and Technical Appendices H1 and I conclude that the Project would not have a VMT impact and no hazardous transportation design features would be introduced within the City public right-of-way through implementation of the Project.

B-12: BOUSD has concerns that the increase of 510 trips per day may negatively impact school drop-off and pick-up, potentially increasing the number of pedestrian and vehicular interactions, compromising student and staff safety. The DEIR, Subsection 4.12, *Transportation*, and Technical Appendices H1 and I, conclude that the Project would not have a VMT impact and no hazardous transportation design features would be introduced within the City public right-of-way through implementation of the Project. The BOUSD does not present facts, reasonable assumptions based on facts, or expert opinion supported by facts to substantiate its contention that vehicles traveling to and from the Project Site could compromise school safety. The BOUSD's comment is based on unsubstantiated opinion, whereas the Project's *Safety Study* contained as DEIR Technical Appendix I was prepared by transportation safety professionals based on empirical data and expert opinion. Exhibits 3-7, 4-3, 5-1, and 5-2 of the Project's *Traffic Study* shows that the Project's traffic would represent approximately 0.7% of the total daily trips using Imperial Highway and 26% of the total daily trips on South Flower Avenue between Imperial Highway and the Project's driveway. Under the South Flower Avenue Closure Alternative analyzed in EIR Section 6.0, *Alternatives*, (refer to Traffic Study Exhibits 5-3 and 5-4), the Project's traffic would represent approximately 0.3% of the total daily trips using Imperial Highway and 4% of the total daily trips South Flower Avenue between Imperial Highway and the Project's driveway, up to Birch Street. Although neither the proposed Project nor the South Flower Avenue Closure Alternative would result in a significant safety impact, the South Flower Avenue Closure Alternative would result in fewer Project-generated vehicles using South Flower Avenue in front of Laurel Elementary School.

B-13: BOUSD provides text from the DEIR about the South Flower Avenue Closure Alternative and provides a list of items that would need to occur to implement the alternative. The DEIR at pages 6-12 to 6-16 concludes that the alternative would meet all of the Project's objectives but would not reduce any of the Project's less-than-significant environmental effects and in several respects would increase impacts due to the greater extent of ground-disturbing construction activities and the need for traffic that uses the intersection to reroute. The City acknowledges the list of items provided in this comment; however, these do not change the conclusions of the DEIR.

B-14: BOUSD provides text from the EIR regarding the South Flower Avenue Closure Alternative and informs that while the alternative may address some of BOUSD's concerns, the District requests that additional design and operational features be added should this alternative be selected for implementation. These measures are not required to reduce any of the Project's environmental effects to less than significant, as the DEIR concludes that the Project, as well as the South Flower Avenue

Closure Alternative, would have no significant and unavoidable environmental effects. Although no revisions to the DEIR are required, the City acknowledges BOUSD's requests and several of the requests are addressed as proposed conditions of approval for the Project. The Planning Commission and City Council members will have the opportunity to deliberate upon these and other requests as they relate to the proposed Project during the decision-making hearings on the proposed Project.

B-15: The concluding comments from BOUSD acknowledge that the District has no jurisdiction over the Project but reserves the right to further comment on the Project in the interest of protecting student, staff, and parent safety. These comments are noted.

B-16: BOUSD attached a letter dated January 29, 2021, that was previously submitted to the City and which addressed a former application that proposed a Raising Cane's restaurant on the Project Site. That project is no longer proposed. The City acknowledges the 2021 letter, but responses are not required because it addresses a project that is no longer proposed.

B-17: BOUSD attached a copy of the draft Laurel Elementary School Circulation and Parking Study, dated February 27, 2022. Refer to Response B-11 that addresses this Study.

Comment Letter C

From: Vanessa Quiroz
To: Brea Planning
Subject: Gaslight Square - 255 E. Imperial Highway
Date: Monday, March 13, 2023 9:56:01 AM
Attachments: image001.png
image002.png

Hello,

Thank you for notifying us of the draft EIR for the Gaslight Square project at 255 E. Imperial Highway. The City of La Habra does not have any comments at this time.

C-1

Thank you,

Vanessa Quiroz
Senior Planner
Community and Economic Development
City of La Habra • 110 E. La Habra Blvd. • La Habra, CA 90631

RESPONSES TO COMMENT LETTER C:
The City of La Habra

C-1: The City of Brea acknowledges that the City of La Habra has no comments on the DEIR.

Comment Letter D

From: Alex Hegdahl <alextheboy82@msn.com>
Sent: Sunday, March 12, 2023 10:16 AM
To: Madrigal-Gonzalez, Cecilia <ceciliamg@ci.brea.ca.us>
Subject: Gaslight environmental report
To Whom it may concern,

My wife and I have a son who is currently in second grade in Laurel Elementary. We have heard there are plans to make a drive-thru venue directly across the street of his school. In this regard, we feel it would not be very safe for so many small children to be around the high flow of traffic that would arise from this change. Thank you for your time.

D-1

RESPONSES TO COMMENT LETTER D:
Alex Hegdahl

D-1: Mr. Hegdahl expresses concern about student safety in relation to the Project's proposed drive-thru and flow of traffic that would occur across the street from Laurel Elementary School. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

Comment Letter E

From: Richard M. Curtis, DDS, MS
To: Brea Planning; Madrigal-Gonzalez, Cecilia
Subject: re: Gaslight Square project draft EIR
Date: Saturday, February 25, 2023 10:15:56 AM

To whom it may concern:

I have reviewed the Draft EIR for the proposed redevelopment project at Gaslight Square. As both a business-owner and building-owner in Gaslight Square, I will be directly impacted by this project and I would like the following items to be re-considered as this project moves forward:

- Consider removal of the existing garage on the north side of the property - this garage is in poor condition and will be an eyesore once this redevelopment is completed
- Consider opening the city-owned lot to the north of Gaslight Square for parking with an additional entry from Gaslight - possibly where the current garage is located

Thank you for your consideration of these important issues. I look forward to a project that will benefit the neighboring school, surrounding homeowners, and established businesses.

E-1

Sincerely,

Dr. Curtis

Richard M. Curtis, DDS, MS
Diplomate of the American Board of Orthodontics

230 South Orange Avenue
Brea, California 92821
714-990-5414
714-990-9489 [fax]
contact@breasmiles.com
www.breasmiles.com

RESPONSES TO COMMENT LETTER E:
Curtis Orthodontics

E-1: This comment introduces Curtis Orthodontics as a business owner in Gaslight Square and suggests removal of the existing parking garage on the north side of the property and a reconfiguration of parking areas and drive aisles around the site. The commenter's suggestions will be considered by the City separate and apart from the proposed Project. Under CEQA, the DEIR is obligated to study the project that is proposed, which does not include these items. As such, no revisions to the DEIR are needed or warranted.

COMMENT LETTER F

From: Diane Stites <dianestites@sbcglobal.net>
Sent: Monday, March 13, 2023 7:42 AM
To: Madrigal-Gonzalez, Cecilia <ceciliamg@ci.brea.ca.us>; Killebrew, Jason <jasonk@ci.brea.ca.us>; City ClerksGroup <CityClerksGroup@ci.brea.ca.us>; Brea Planning <planner@ci.brea.ca.us>
Cc: SAFE Safer Avenues For Everyone <saferavenuesforeveryone@gmail.com>; Brinda Leon <bleon@bousd.us>; Richard Champion <rchampion@bousd.us>; Carrie Flanders <cflanders@bousd.us>; Deana Miller <dmiller@bousd.us>; Gail Lyons <glyons@bousd.us>; Paul Ruiz <pruiz@bousd.us>; Chris Becerra <cbecerra@bousd.us>; Annette Arora <aarora@bousd.us>
Subject: Gaslight Square Proposal & DEIR - Deny Increasing Daily Danger

Dear Brea Planning Commissioners and City Council Members,

Last time you listened and trusted the Raising Canes application information before you. This time what will you do?

Planning Commissioners, very few people knew about Raising Canes application, so you did not hear their concerns last time. Laurel Elementary families are not told of these proposals at Gaslight Sq; so many people can't tell you because they don't know. You also did not hear from Brea-Olinda Unified School District, BOUSD.

Brea City Council, on Raising Canes you heard many people, some Laurel Families and BOUSD tell you about their concerns, their opposition and the existing and future dangers. But the professionals said it was all going to be fine. It was not fine.

The people have told you it was not fine then and it is not fine now. It is dangerous. F-1

City of Brea, you acknowledged the dangers when you said in 2021 you were going to engage in a Laurel Elementary Traffic Circulation & Parking Study with BOUSD because you acknowledged the dangers to pedestrians, especially schoolchildren.

Now there is a new application for Gaslight Sq. F-2

The evident daily danger to vulnerable children is the close daily proximity to a drive-thru restaurant and all the traffic it would generate. F-3

A Drive-thru restaurant would make its business by drawing cars off of Imperial Hwy and onto Orange & Flower, residential streets. It would be pulling cars into the what should be Safe Routes To School for the Laurel Elementary schoolchildren. F-4

This is a fundamental, structural change not only to Brea's General Plan and Zoning, but also to the daily lives of thousands of people, including 457 Laurel schoolchildren & their families. F-5

What are your fundamental priorities? What do you see, what's your vision for this neighborhood of Brea?

Now we, SAFE, have employed the law firm, Shute, Mihaly and Weinberger, because of the evident daily dangers posed from this application's vision and that the DEIR either does not acknowledge, or it minimizes or implies that dangers from a drive-thru will be mitigated.

Those daily dangers are real and will come with any drive-thru. F-6

1

When you read the DEIR, do you see the questions, esp. of safety, being answered? Or are the answers inaccurate, insufficient and/or omitting or minimizing obvious information?

F-6 (CONT.)

And does Gaslight Sq Zone Change fit the Criteria for Zone Change (paraphrased here, for full language, See § 20.404.020 BCC CHANGE OF ZONE.)

Does this zone change conform with the General Plan? NO

Is the proposed Gaslight Sq property suitable? NO

Is the proposed Gaslight change of zone not detrimental to the use of land in any adjacent zone? THE CHANGE OF ZONE WOULD BE DETRIMENTAL TO THE USE OF THE ADJACENT PUBLIC FACILITY. This adjacent public facility is Laurel Elementary Magnet School, it serves schoolchildren, families, staff, teachers as well as community members.

F-7

If you have not seen the backup in and around Laurel, here are additional facts: recent photos, videos and a link to a Laurel teacher telling BOUSD School Board of the experiences of the staff and teachers.

Links:

Laurel Teacher speaks at 3/9/23 BOUSD SB

Driveways 3-1-2023
https://drive.google.com/file/d/1-TzY1Kw0J_5FfrMCbMtptULpCynRG1S-/view?usp=share_link

Traffic at Laurel Pick-up 3-2-2023
https://drive.google.com/file/d/1RuneL84RnQ0H4jZj1F-vQGH_Ekn6X5w3/view?usp=share_link

F-8

For all of these reasons, deny this Gaslight application and use your fiduciary powers to take any and all steps you possibly can to protect schoolchildren of Laurel Elementary School. You already have some solutions in the Laurel Traffic Study; but a drive-thru is not the answer, it only makes the situation more dangerous for our most vulnerable, schoolchildren.

For more info, I urge you to see SAFE's Facebook page:
https://www.facebook.com/saferavenuesforeveryone

Stay Safe.

F-9

Sincerely,

Diane Stites,
Long-time Laurel Volunteer
SAFE Volunteer

2

RESPONSES TO COMMENT LETTER F:
Diane Stites

F-1: Ms. Stites refers to a project that included a Raising Cane's restaurant that was previously proposed on the Project Site. That project is no longer proposed. Ms. Stites claims that Laurel Elementary School families were not made aware of the proposed Project, that the City did not hear from the BOUSD, and opines that the Project is dangerous. Regarding the currently proposed project, the City followed its public notification procedures for the EIR's Notice of Preparation (NOP) and the DEIR. In addition, public notification of the NOP and DEIR were made available on the City's website at https://www.ci.brea.ca.us/1549/In-Progress-Environmental-Documents and on the California Office of Planning and Research State Clearinghouse website at https://ceqanet.opr.ca.gov/2022060598/2. The BOUSD received notification of the NOP and DEIR, but the City is not obligated to separately notice every family with a student attending Laurel Elementary School. BUOSD submitted a comment letter on the NOP, dated July 19, 2022, which is included in Technical Appendix A. BUOSD also commented on the DEIR (refer to comment letter B, previously presented). Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that the Project's impacts on transportation safety would be less than significant.

F-2: Ms. Stites refers to a pending Laurel Elementary Traffic Circulation and Parking Study. The City acknowledges that the Study was drafted, which was attached to the DEIR comment letter submitted by the BOUSD (refer to comment letter B and the attachment referenced as comment B-17). Refer above to Response B-11, which explains that the Laurel Elementary School Circulation and Parking Study was considered as part of the DEIR's preparation process. The DEIR, Subsection 4.12, *Transportation*, and Technical Appendices H1 and I conclude that the Project would not have a VMT impact and no hazardous transportation design features would be introduced within the City public right-of-way through implementation of the Project. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

F-3: Ms. Stites opines that the proximity of a drive-thru restaurant and the traffic it would generate would be a danger to children. This opinion is unfounded and not based on substantial evidence. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

F-4: Ms. Stites indicates that a drive-thru restaurant would draw cars off of Imperial Highway onto Orange Avenue and Flower Avenue into what should be Safe Routes to School for the Laurel Elementary students. Safe Routes to School (SRTS) is an approach that promotes walking and bicycling to school through infrastructure improvements, enforcement, tools, safety education, and incentives to encourage walking and bicycling to school. Related to the Project Site, public sidewalks for pedestrians around the Project Site are located along South Orange Avenue, South Flower Avenue, and Imperial Highway (Google Earth, 2022). The City provides crossing guards through the police department at key intersections to facilitate safe crossing by students. The Project would not result in any significant

adverse effects to the public sidewalk system, public bike lane network, or to the crossing guard program. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

F-5: Ms. Stites opines that the Project would be a fundamental structural change to the Brea General Plan and zoning map, affecting thousands of people, including Laurel Elementary School students and families. The DEIR, Subsection 4.10, *Land Use and Planning*, provides a detailed description of the City of Brea General Plan and as summarized in Table 4.10-1, concludes that the Project would be consistent with or otherwise not in conflict with applicable General Plan goals and policies related to environmental effects. A discussion of zoning is also included in DEIR Subsection 4.10, page 4.10-9, which concludes the Project would not conflict with any development regulations and design standards in the Zoning Ordinance pertaining to the Mixed Use III zone.

F-6: Ms. Stites informs that the group SAFE has employed the firm Shute, Mihaly, and Weinberger to address the dangers of the Project, and questions as to when the City reads the EIR whether they see the questions of safety being answered. As part of the DEIR preparation process, the firm Urban Crossroads, a professional transportation engineering and safety firm, prepared a *Safety Study* for the Project, which is relied upon in DEIR Subsection 4.12, *Transportation*, and is included as DEIR Technical Appendix I, *Safety Study*. Urban Crossroads also prepared a *Traffic Study* for the Project dated April 5, 2023, which is included in the City's administrative record for the Project and is added as Technical Appendix H3 to the Final EIR (Urban Crossroads, 2023g). Urban Crossroads concluded that the Project's impacts on transportation safety would be less than significant under CEQA.

The Project's proposed site plan dated December 8, 2022, and included as DEIR Figure 3-6 indicates that the Project's proposed drive-thru lane will provide approximately 257 feet of storage length for vehicles. Approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. Based on the proposed site plan, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles can be accommodated in the 110 feet from the order board to drive isle. Per City of Brea Municipal Code Section 20.08.040, *Off-Street Parking and Loading*, "Drive through" or "Drive in" restaurants are required to provide a minimum of 160 feet of stacking space, as measured from the pick-up window, for each drive through lane. The Project's site plan accommodates a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet. As such, the Project more than meets City standards for drive-thru lane capacity.

F-7: Ms. Stites questions whether the proposed Project's zone change fits the criteria of Brea Municipal Code Section 20.404.020, *Change of Zone*; whether the zone change conforms with the General Plan; whether the proposed Gaslight Square property is suitable; and whether the change of zone would be detrimental to the adjacent public facility land use of Laurel Elementary. The DEIR, Subsection 4.10, *Land Use and Planning*, page 4.10-9, provides a discussion of zoning, which concludes that the Project would not conflict with any development regulations and design standards in the Zoning Ordinance pertaining to the Mixed Use III zone. Also refer to staff reports that the City will prepare for

presentation to the Planning Commission and City Council as part of deliberations on the Project, which address matters such as land use and zoning consistency.

F-8: Ms. Stites provides links to show the vehicle backup in and around Laurel Elementary School. This general comment is acknowledged. Existing conditions including at pick up and drop off times for the school were considered in the DEIR and its pertinent technical analyses as part of the existing environmental setting. The existing congestion occurring at the school is part of the baseline environmental condition.

F-9: Ms. Stites concludes by requesting that the City deny the Project to protect Laurel Elementary students and provides a link to SAFE's Facebook page. This general comment is acknowledged and the commenter is referred to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

Comment Letter G

From: Gloria Chen <glrchen@gmail.com>
Sent: Saturday, March 11, 2023 8:50 PM
To: City ClerksGroup <CityClerksGroup@ci.brea.ca.us>
Subject: Gaslight planning

Dear City of Brea,

As a resident of Brea, mother of a Laurel leopard, and patron of downtown Brea, I oppose the efforts to change the zoning for the Gaslight commercial district. It is a school zone already on a very busy Imperial road that would lead to potential dangers if able zone as a drive-thru. G-1

There is heavy foot traffic from children and parents in the morning and various after school hours that would put them at danger if allowed MORE CAR TRAFFIC. G-2

Also higher amounts of traffic would harm the air quality around the school. If there is a drive-thru, idle vehicles would emit a lot of green house gases and noxious chemical where our children play, learn , and eat! G-3

There have been multiple attempts and bringing more traffic around the school purely for profit and power at the detriment of the health and quality of the school and children who attend. I would not feel comfortable allowing this or continuing to sent my children to Laurel if zoning and building of unhealthy restaurants are allowed directly across from Laurel Elementary. G-4

Please keep our kids safe!

- Gloria C.
Brea Resident

1

RESPONSES TO COMMENT LETTER G:
Gloria Chen

G-1: Ms. Chen expresses opposition to the Project due to the school zone being located on Imperial Highway and the potential dangers of the drive-thru. The commenter's opposition is acknowledged. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

Pertaining to the drive-thru design, the Project's proposed site plan dated December 8, 2022, and included as DEIR Figure 3-6 indicates that the Project's proposed drive-thru lane will provide approximately 257 feet of storage length for vehicles. Approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. Based on the proposed site plan, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles can be accommodated in the 110 feet from the order board to drive isle. Per City of Brea Municipal Code Section 20.08.040, *Off-Street Parking and Loading*, "Drive through" or "Drive in" restaurants are required to provide a minimum of 160 feet of stacking space, as measured from the pick-up window, for each drive through lane. The Project's site plan accommodates a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet. As such, the Project more than meets City standards for drive-thru lane capacity.

G-2: Ms. Chen states that there is heavy foot traffic from children and parents both in the morning and after school hours and opines that more car traffic would put them in danger. The Project is calculated to generate 75 additional vehicle trips in the AM peak hour (7-9AM), 21 additional vehicle trips in the mid-day peak hour (at school dismissal time) and 46 more trips in the PM peak hour (4-6 PM) than occurs under existing conditions. The same Project Site driveway locations would be used that are present under existing conditions, with no significant disruptions to the existing public sidewalk or bike lane systems. Vehicles destined for the Project site would traverse in and out of the Project Site's driveways as vehicles do under existing conditions. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant. Further, there are school crossing guards that facilitate pedestrian movements at the intersections of Flower Avenue & Birch Street and Brea Boulevard & Imperial Highway during school admission and dismissal hours, to address public safety. The addition of Project-related traffic is determined to not increase safety hazards.

G-3: Ms. Chen expresses concern about the air quality around Laurel Elementary School due to higher amounts of traffic and idling vehicles. Refer to DEIR Subsection 4.2, *Air Quality*, and Technical Appendix B, *Air Quality Impact Analysis*, for an analysis of the Project's effects on human health from air pollutant emissions. As explained on DEIR pages 4.2-18 to -21, the greatest potential for a significant air pollution impact on human health would be during the Project's construction phase due to the presence of diesel-fueled construction equipment; as demonstrated in the analysis, construction-

related effects on human health would be less than significant and as shown on DEIR Table 4.2-8, the air pollutant emissions during construction would fall far below levels that the South Coast Air Quality Management District (SCAQMD) considers significant to human health.

During the Project's operation, there is no reasonable potential that the Project, including idling vehicles in the drive-thru lane, would produce air pollution to a level that would significantly impact school children because vehicular tailpipe emissions have improved significantly and it would take thousands of idling cars over a short period of time to cause Clean Air standards to be exceeded. As noted in the DEIR and underlying air quality impact analysis (DEIR Technical Appendix B) and associated trip generation summary (DEIR Technical Appendix H1), the Project would generate 1,068 daily vehicular trips for the drive-thru use (without accounting for pass-by trips) – even if 25% of the total daily vehicular trips occurred during a one-hour period (which is very unlikely due to operational constraints), that would result in 267 vehicular trips occurring during a peak period. Furthermore, although not required, as stated in the DEIR and underlying technical air quality impact analysis (see DEIR Technical Appendix B, page 37), a new supplemental localized significance assessment for Project operations has been conducted using CalEEMod. CalEEMod was utilized to determine the on-site emissions associated with both on-site travel and on-site idling from all the Project's uses. The results of the analysis indicate that the Project would result in a maximum of 1.52 pounds per day of NOx, 12.90 pounds per day of CO, 0.06 pounds per day of PM10, and 0.03 pounds per day of PM2.5 emissions. As such, emissions from NOx, CO, PM10, and PM2.5 are well below the applicable localized thresholds of 147 pounds per day for NOx, 762 pounds per day for CO, 6 pounds per day for PM10, and 2 pounds per day for PM2.5. A summary of the localized emissions and associated thresholds is presented at Table F-3, *Localized Significance Summary Operations,* below, and added as FEIR Technical Appendix B2.

Table F-3 Localized Significance Summary Operations

Localized Significance Summary Operations				
	NO_x	CO	PM_{10}	$PM_{2.5}$
Maximum	**1.52**	**12.90**	**0.06**	**0.03**
SCAQMD Localized Threshold	147	762	6	2
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: (Urban Crossroads, 2023g)

Further, the vehicle fleet in California is aggressively transitioning to zero emission (ZE) vehicles, which will virtually eliminate tailpipe emissions in the future. The California Air Resources Board (CARB) adopted Advanced Clean Cars II requirements in 2022 that impose low-emission and zero-emission vehicle standards for model years 2026-2035. By 2035 all new passenger cars, trucks and SUVs sold in California will be zero emission. The Advanced Clean Cars II regulations take the state's already growing zero-emission vehicle market and robust motor vehicle emission control rules and

augments them to meet more aggressive tailpipe emissions standards and ramp up to 100% ZE vehicles.[4]

G-4: Ms. Chen states that multiple projects have been proposed that would result in more traffic around Laurel Elementary School, and she is not comfortable sending her children to the school directly across from the Project Site. This general comment is acknowledged.

[4] California Air Resources Board, Advanced Clean Cars Program. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

Comment Letter H

From: Jonathan Higashi <jonhigashi@gmail.com>
Sent: Sunday, March 12, 2023 11:37 AM
To: Brea Planning <planner@ci.brea.ca.us>
Subject: Gaslight Square

Dear City Planners & Brea City Council,
My name is Jonathan Higashi and I'm writing to you to urge you to oppose Zone changes and the building of drive-thru & restaurant at Gaslight Square - 207-235 W Imperial Hwy. Over 33 years ago, the men and women in your very position saw the potential problems that would arise by having a fast food restaurant in such close proximity to our beloved Laurel Magnet School. Since that time, our population has steadily grown from 32,800 to over 39,000. Even though it may not seem like a lot, for our modest 12 square miles, it equates to almost 550 more people per square mile. In addition, the building of 3 new communities with over 1,000 homes and more proposed communities in the coming years, our streets will continue to become more congested. This doesn't even take into consideration the incoming traffic from Fullerton, Placentia, Yorba Linda and La Habra. Looking at these numbers from a macro view of the city and then scaling it down to the impact it will have on a 1,000 foot stretch of road (S. Flower Ave) and the surrounding streets is devastatingly unsafe for our kids, families, and faculty of Laurel as well as the neighboring community. Drivers already dismiss the speed limits, crossing guards, and other signs that help protect our kids, families, and faculty, so it will only get worse if we allow a fast food restaurant to invade that space.
We are not opposed to bringing restaurants and revenue to our city, we are merely requesting that they find another location. If the owners of Gaslight Square don't consider that an option, then I hope you'll hold firm on zoning in place and protect our kids.
The City Council knew back in 1988 that it was a bad idea to add a fast food restaurant in such close proximity to Laurel Elementary School, so they took the steps to prevent that from happening. We urge you to uphold these protections & not only oppose this restaurant, but put the possibility of any high traffic restaurants or grocery stores in this location to rest once and for all.
Thank you for your time and consideration!
Jonathan Higashi

H-1
H-2
H-3
H-4
H-5

RESPONSES TO COMMENT LETTER H:
Jonathan Higashi

H-1: Mr. Higashi expresses opposition to the Project. This general comment is acknowledged.

H-2: Mr. Higashi informs that Brea has seen an increase in population and several new residential communities, causing the streets to become more congested. This general comment is acknowledged. Professional traffic engineers and transportation safety specialists at the firm Urban Crossroads evaluated the Project in a *Traffic Study* dated April 5, 2023, which is on file in the City's administrative record. The *Traffic Study* reports on existing and projected traffic volumes at intersections around the Project Site at makes recommendations for improvements at the intersection of Imperial Highway & South Flower Avenue.

H-3: Mr. Higashi states that the incoming traffic from other cities makes South Flower Avenue and surrounding streets unsafe for Laurel Elementary and the surrounding community and opines that traffic will get worse if a fast-food restaurant is developed on the Project Site. As shown on DEIR Table 4.12-3, the Project is calculated to generate 501 total additional daily vehicle trips, with 75 additional vehicle trips in the AM peak hour (7-9AM), 21 additional vehicle trips in the mid-day peak hour (at school dismissal time) and 46 additional trips in the PM peak hour (4-6 PM) than occurs under existing conditions. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts would be less than significant. Also refer to Response H-2, which explains that a *Traffic Study* also was prepared for the Project that makes recommendations for improvements at the intersection of Imperial Highway & South Flower Avenue.

H-4: Mr. Higashi is not opposed to bringing restaurants and revenue to the City, but would rather them be in a different location and would like the City to keep the Project Site's existing zoning in place. Refer to the No Project Alternative and the General Plan Consistency Redevelopment Alternative, which are addressed in DEIR Section 6.0, *Alternatives*, which present alternatives to the Project that retain the Project Site's existing zoning designation. Although these alternatives would be environmentally superior to the Project as shown in DEIR Table 6-1, they would not meet the Project's objectives.

H-5: Mr. Higashi requests that the City opposes any high traffic restaurant or grocery store in close proximity to Laurel Elementary School. The commenter's general opposition is acknowledged.

Comment Letter I

From: Lisa I <femmedegaul@gmail.com>
Sent: Saturday, March 11, 2023 11:48 AM
To: City ClerksGroup <CityClerksGroup@ci.brea.ca.us>
Subject: Gaslight Square Drive Thru

Good morning,

On behalf of our most vulnerable citizens, I am imploring that you reconsider the proposed drive-thru in Gaslight Square. The obvious dangers to nearby school children, and other pedestrians, are evident and the protected congestion creates a situation that could be tragic and fatal.

Brea is being consumed by its desire to create more density in our city, ultimately making it unbearable.

Please vote NO on this project.

Thank you,
Lisa Irwin

I-1

1

RESPONSES TO COMMENT LETTER I:
Lisa Irwin

I-1: Ms. Irwin requests that the City oppose the Project due to the dangers of traffic congestion to nearby school children and other pedestrians. This comment is acknowledged. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

Comment Letter J

From: Mary Martinez
To: Madrigal-Gonzalez, Cecilia; Killebrew, Jason
Cc: Planning; City ClerksGroup; Vargas, Steven; Hupp, Cecilia; Simonoff, Marty; Marick, Christine; Stewart, Blair
Subject: GASLIGHT SQUARE DEIR
Date: Monday, March 13, 2023 10:29:58 AM

The Gaslight Square project(s) have been presented with many fundamental flaws. The biggest is that it will not have significant impacts to the surrounding/existing area. J-1

1.Increasing traffic on residential streets designed for pedestrian use, especially within a elementary school zone will most definitely have a significant impact on school children's safety getting to and from school. J-2

2.Asking for a rezoning to Mixed Use III is not necessary for the projected development as it does not contain any housing component. J-3

3.Alternatives do not include ingress/egress off on Imperial instead of residential streets. As stated in **§ 20.258.030 SPECIFIC DEVELOPMENT STANDARDS FOR ALL MIXED-USE PROJECTS.** section I. *Parking facilities standards:* 6. *Ingress and egress.* Vehicular circulation shall be designed to direct traffic away from residential streets to the greatest extent feasible. J-4

4. The hours of operation do not comply with **20.258.030 SPECIFIC DEVELOPMENT STANDARDS FOR ALL MIXED-USE PROJECTS.**
Section H. *Operational standards.*
1. *Hours of operation.* Outdoor nonresidential uses in mixed-use projects shall be prohibited from operating between the hours of 10:00 p.m. and 7:00 a.m. J-5

5.There is not a CUP asking for a change in operational hours attached to this Project.

6.A traffic study showing potential LOS at intersections Flower/Imperial, Flower/Birch, Orange/Imperial, Orange/Birch, Brea Blvd/Imperial Hwy, Brea Blvd/Birch is not included as part of this DEIR. Only 3 of the 6 intersections are controlled by lights. J-6

Again the conclusion that this project will not result in any significant and unavoidable impacts is FALSE.

This proposed project in within an elementary school zone. Drive thrus by nature are car oriented. Increasing the number of cars increases the number of potential child vs car accidents.

Eating while driving is one of the major reasons for distracted driving. Drive thrus by nature are designed to pick up food to consume while heading to your destination. For example, a line from In n Out: "is this to for the car or to go". J-7

Distracted driving in a School Zone will result in more child vs car accidents.

Please deny this project, zone change and CUP that would allow a drive thru in Gaslight Square.

Mary Martinez

RESPONSES TO COMMENT LETTER J:
Mary Martinez

J-1: Ms. Martinez opines that the Project has fundamental flaws, including significant impacts to the surrounding area. Refer to DEIR, Section S.0, *Executive Summary*, page S-5, which concludes that after the application of feasible mitigation measures, the Project would not result in any significant and unavoidable environmental effects.

J-2: Ms. Martinez opines that increasing traffic especially in an elementary school zone, will have a significant impact on school children's safety getting to and from school. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related impacts to transportation safety would be less than significant.

J-3: Ms. Martinez inaccurately states that a rezoning to Mixed Use III is not necessary for the projected development because it does not contain a housing component. Refer to DEIR, Section 3.0, *Project Description*, page 3-5, which describes proposed Zone Change No. 2022-02, which seeks to change the zoning classification of the Project Site from "Administrative and Professional Office (CP)" with a "Precise Development (P-D)" overlay to "Mixed Use III." As stated on DEIR page 3-5, the "Mixed Use III" zoning classification is intended to provide opportunities for the revitalization of deteriorated commercial corridors and centers located on arterials by allowing the development of neighborhood-serving commercial uses and vary [sic] intensity offices paired with residential uses. The development of residential uses, however, is not mandatory in the Mixed Use III Zone as described in the Brea Municipal Code, Section 20.258.030, *Specific Development Standards for all Mixed Use Projects*; residential uses are allowed, but not required. Refer to DEIR, Subsection 4.10, *Land Use and Planning*, page 4.10-9, which provides a discussion of zoning, and which concludes that the Project would not conflict with any development regulations and design standards in the Zoning Ordinance pertaining to the Mixed Use III zone.

J-4: Ms. Martinez opines that the Project design does not meet the criteria of the Brea Municipal Code Section 20.258.030 regarding ingress and egress of mixed-use projects. Code Section 20.258.030(I)(6) states: "Vehicular circulation shall be designed to direct traffic away from residential streets to the greatest extent feasible." City staff has determined that the Project complies by using existing Site ingress and egress driveways on Orange Avenue and South Flower Avenue. The addition of a driveway on Imperial Highway at the Project Site is not feasible given intersection spacing requirements with South Flower Avenue to the east and Orange Avenue to the west. Additionally, Orange Avenue and Flower Avenue are local roads connecting two arterial roads and are not classified as residential streets.

J-5: Ms. Martinez contends that the proposed Project's hours of operation do not comply with the Brea Municipal Code Section 20.258.030 regarding hours of operation. Refer to DEIR, Section 3.0, *Project Description*, page 3-15, which discusses Conditional Use Permit No. 2022-03, proposed as part of the Project. The drive-thru would be allowed to operate 24 hours a day, seven days per week; however, the outdoor patio areas would be conditioned to comply with the Mixed Use III development standards.

The commenter is referred to the Project's conditions of approval that will be presented to and deliberated upon by the Planning Commission and City Council, and which address the operating hours.

J-6: Ms. Martinez disagrees with the DEIR's conclusion that the Project will not result in significant and unavoidable impacts because a traffic study was not included as part of the DEIR. Refer to DEIR, Subsection 4.12, *Transportation*, which assesses potential transportation impacts resulting from implementation of the Project, and based on a *Trip Generation Assessment* (DEIR Technical Appendix H1), a *Safety Study* (DEIR Technical Appendix I), and a *VMT Screening Analysis* (DEIR Technical Appendix H2) prepared for the Project, and appropriately concludes that that impacts would be less than significant under the CEQA Statute and Guidelines. A level of service (LOS) based traffic study is not required to determine the significance of transportation impacts as explained on DEIR page 4.12-1. The California Natural Resources Agency (CNRA) adopted changes to the CEQA Guidelines in December 2018, which stipulate that vehicle miles traveled (VMT) is the appropriate metric to evaluate a project's transportation impacts. As of December 2018, when the revised CEQA Guidelines were adopted, automobile delay, as measured by "level of service" (LOS) and other similar metrics, does not constitute a significant environmental effect under CEQA. A *Traffic Study* for the Project dated April 5, 2023, is included in the City's administrative record for the Project and will be considered by the City when deliberating on the Project, but is not a basis for the Project's environmental impacts under CEQA.

J-7: Ms. Martinez requests that the City deny the Project due to the potential for child vs car accidents. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude that Project-related transportation safety impacts would be less than significant.

Comment Letter K

From: max stites <mdstites@sbcglobal.net>
Sent: Monday, March 13, 2023 7:56 AM
To: Madrigal-Gonzalez, Cecilia; City ClerksGroup; Planning
Cc: saferavenuesforeveryone@gmail.com
Subject: Gaslight Square DEIR comments

Dear Planning Commission and City Council Members,

Sensible city leaders in 1988 realized the most precious treasures they could protect were the city' most vulnerable residents, the children of the community. K-1

They ensured drive-through restaurants would not be permitted in Gaslight Square. The prohibition is entirely sensible. A drive-through across the street from an elementary school is incompatible with ensuring the safety of the schools' young students and their families. K-2

The school is a pedestrian generator. A drive-through is a vehicle generator.
Intentionally adding traffic to a school zone residential street is folly.

A proposal to do just that should be rejected outright. Unfortunately, that is not reality.

The reality is the majority property owner of gaslight square, knowing the restriction on drive-through restaurants, is attempting, as it is within their right to do, for the second time, to change the current zoning to allow construction of a drive through on the property. K-3

Raising Cane's withdrew from a previously city council approved project in 2021 as a result of a lawsuit filed on the children's' behalf by Safer Avenues for Everyone (SAFE) a not for profit volunteer organization.

Current city officials now have the opportunity to show that the safety, health, and welfare of Brea's most precious residents, it's young students, is their highest priority.

Much personal testimony about the past and current risks facing Laurel Magnet School pedestrians has been shared. Statistical data regarding the increased risk of school aged pedestrians that occurs close to the school has been provided. Our local police are consistently attempting to discourage distracted driving, even sharing a video titled "Don't burrito and drive." K-4

What benefit to the community will emerge as a result of officials approving a project to knowingly increase vehicular traffic in a school zone that has acknowledged problems?

No benefit is worth the increased risk to student safety that would result from drawing more cars onto Flower Avenue across the street from the school. K-5

Protect the Kids. Maintain the current protections. Deny the the application.

Thank you.

Max Stites
SAFE Volunteer

1

RESPONSES TO COMMENT LETTER K:
Max Stites - SAFE

K-1: Mr. Stites makes reference to the City realizing in 1988 that children are vulnerable residents, but does not cite the source of this statement. The comment is acknowledged without context.

K-2: Mr. Stites opines that placing a drive-thru across from an elementary school is incompatible with school safety. The comment is not supported by factual evidence and is unsupported speculation. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through technical analysis and expert opinion that Project-related impacts to transportation safety would be less than significant.

K-3: Mr. Stites believes that the City should reject the Project and makes reference to a previous project proposed on the Project Site that included a Raising Cane's restaurant. The previously proposed project is no longer proposed. The general comments are acknowledged.

K-4: Mr. Stites makes a general statement that data has been provided regarding increased safety risks to school aged pedestrians, but does not cite the data, and makes reference to a Brea Police Department campaign to discourage distracted driving. No facts or evidence are presented to substantiate the speculation that the Project could result in a significant safety impact. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through analysis and expert opinion that Project-related impacts to transportation safety would be less than significant.

K-5: Mr. Stites makes concluding comments stating that the City should deny the Project and not permit more cars on Flower Avenue across the street from a school. These general comments are acknowledged.

Comment Letter L

From: Nicole Dunn-Higashi <dunnhigashin@gmail.com>
Sent: Sunday, March 12, 2023 11:19 AM
To: Brea Planning <planner@ci.brea.ca.us>
Subject: Gaslight Square

Dear City Planners,

I wanted to share my thoughts & concerns regarding a new development proposal at Gaslight Square: 207-235 W Imperial Hwy. I must admit that I am terribly disheartened that we are once again having to reach out and request your support in maintaining city planning that was put in place decades ago (before our city's tremendous growth). Having any type of Drive-thru AND now a restaurant on top of a medical building, at this loca on would most definitely pose a threat to the safety of the students, faculty, staff and general welfare of the kids and neighbors. *I have read that the drive thru plan is scaled back to hold just 13 cars, but this actually sounds more scary to me - more cars wai ng in the parking lot and overflowing out on to the streets (as just because it is full, people will not opt to leave, they will wait)... L-1

We chose to send our children to Laurel Magnet School because of its incredible program and staff. Everything has been beyond AMAZING at school, but the lack of cau on from drivers on Flower St on top of the scary backup and near-collision-misses at our drop off & pick up line (from Imperial Hwy) is already frightening. To add to these already overwhelmed streets is incredibly irresponsible. Recently, I have seen posts on Brea Buzz that are trying to draw a en on to the similari es between the new Coffee Bean & Tea Leaf that was built on Lambert, across the street from Brea Junior High, to any drive thru that could be placed 30 feet away from Laurel. I must admit that this comparison is befuddling to me. We are looking at a 6-lane (and in some places 8) major highway with a center median, major light, crossing guard, and exit from Coffee Bean sending cars AWAY from Brea Jr High to a barely 2 lane side residen al street that is completely overwhelmed throughout the day. But, in the hopes of keeping an open mind, I took some photos so I could see if I was overreac ng in any way. I am including those below. If anything, these images make me even more nervous about this proposal. L-2



L-3







L-3
(CONT.)



L-3 (CONT.)

I've also seen the argument that Jr. High kiddos are more reckless than elementary aged children and while this may be true in some ways, I personally have seen mul ple near-misses when a younger sibling or kindergartner has bolted from their parent, right into the street during drop off and pick up hours. I'd also like to point out that a Laurel staff member was hit by a car, while crossing with the right of way in the crosswalk (pre-drive thru) AND a child at Falcon Academy was hit by a car while leaving school at day's end. This is also, with no drive thru and in a residen al area - distracted & rushed driving is high without the addi on of a favorite coffee, soda, or snack.

L-4

And finally, sadly, our na on has witnessed too much senseless violence at elementary/secondary schools in the last several years and it occurs to me that having businesses (that were never intended to be placed there) that will draw so many more people to them at various hours of the day, also increases the visibility of our open campus, just 30 feet away... who will keep the children, staff, classrooms and grounds safe from patrons of all hours? We have already had a mentally unstable man walk through our campus without his shirt on because it was a "short cut".

L-5

Please, please, please keep the already-standing General Plan and City Zoning in place at Gaslight Square. I definitely acknowledge & appreciate all that the owners of this property have done for our city and I am confident that their vision & prowess can be used in ways that will beyond support the success of this beau ful loca on WHILE remaining within the limits set by city planning so long ago.

I truly, truly appreciate your me and dedica on to our city and the kids and families that reside here.

Please do not hesitate to let me know if you have any ques ons or concerns.

L-6

Many thanks and best wishes always,
Nicole Dunn-Higashi
Brea Resident

RESPONSES TO COMMENT LETTER L:
Nicole Dunn-Higashi

L-1: Ms. Higashi opines that adding a drive-thru and restaurant at the Project Site would pose a safety threat to students, faculty, and staff of Laurel Elementary School, and expresses speculative concern about cars queuing onto the public street. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through analysis and expert opinion that Project-related impacts to transportation safety would be less than significant. Also, a technical queuing analysis is contained in the Project's *Traffic Study* on file as part of the City's administrative record, prepared by Urban Crossroads and dated April 5, 2023, which concludes that there would not be queuing at the Project site's inbound driveways. The *Traffic Study* identifies a cumulative queuing concern at the Imperial Highway & South Flower Avenue intersection and makes recommendations for improvements at this intersection to alleviate queuing lengths. The City will consider the *Traffic Study* and the options for improvements at the Imperial Highway & South Flower Avenue intersection as part of its deliberations on the Project.

Pertaining to the drive-thru design, the Project's proposed site plan dated December 8, 2022, and included as DEIR Figure 3-6 indicates that the Project's proposed drive-thru lane will provide approximately 257 feet of storage length for vehicles. Approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. Based on the proposed site plan, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles can be accommodated in the 110 feet from the order board to drive isle. Per City of Brea Municipal Code Section 20.08.040, *Off-Street Parking and Loading*, "Drive through" or "Drive in" restaurants are required to provide a minimum of 160 feet of stacking space, as measured from the pick-up window, for each drive through lane. The Project's site plan accommodates a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet. As such, the Project more than meets City standards for drive-thru lane capacity.

L-2: Ms. Higashi provides personal observations about the lack of caution exercised by drivers on South Flower Avenue and near-collision misses at the drop-off and pick-up line from Imperial Highway and expresses opinion that adding traffic to these streets would be irresponsible. The existing condition associated with school drop-off and pick-up conditions is acknowledged and was considered by the DEIR as part of the existing baseline condition. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through technical analysis and expert opinion that Project-related impacts to transportation safety would be less than significant.

L-3: Ms. Higashi makes a comparison between the coffee shop built across the street from Brea Junior High and the Project Site. The comparative comments are acknowledged and will be considered by the City during its deliberations on the Project. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through analysis and expert opinion that Project-related impacts to transportation safety would be less than significant.

L-4: Ms. Higashi informs of incidents where a Laurel Elementary School staff member was hit by a car and a child at Falcon Academy was hit by a car. These comments are acknowledged and are unrelated to the proposed Project. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through analysis and expert opinion that Project-related impacts to transportation safety would be less than significant.

L-5: Ms. Higashi makes reference to senseless violence at schools across the country and expresses concern that the Project would draw visibility to the school campus and increase safety concerns. No facts or evidence are presented to substantiate the speculation that the Project could result in a significant safety impact that is germane to the environmental topics governed by the CEQA Statute and Guidelines.

L-6: Ms. Higashi requests that the City keep the existing general plan and zoning designations in place at the Project Site. Refer to the No Project Alternative and the General Plan Consistency Redevelopment Alternative, which are addressed in DEIR Section 6.0, *Alternatives*, which present alternatives to the Project that retain the Project Site's existing General Plan and zoning designations. Although these alternatives would be environmentally superior to the Project as shown in DEIR Table 6-1, they would not meet the Project's objectives.

Comment Letter M

From: Sahaar Joseph <sjoseph@homehealthmd.com>
Sent: Sunday, March 12, 2023 11:59 AM
To: City ClerksGroup <CityClerksGroup@ci.brea.ca.us>; Brea Planning <planner@ci.brea.ca.us>
Subject: Gaslight Square

Dear City Planners & Brea City Council,

My name is name Sahaar and I'm writing to you to urge you to oppose zone changes and the building of drive-thru & restaurant at Gaslight Square - 207-235 W Imperial Hwy. M-1

Our city acknowledged the potential problems that would arise by placing a fast food drive-thru and/or restaurant directly across the street from Laurel Elementary over 33 years ago and they put zoning in place that would protect this residential and primary school space. As time has passed, our city has grown and distracted driving is at an all-time high thanks to the increase of cell phone use and the pressures faced with getting to work or varying activities throughout the day. When you add eating to the mix, things only become more scary. I'm aware of several incidents, one already at Laurel and another at Falcon Academy, that have occurred recently and caused injury to pedestrians (a child being one of them) thanks to distracted driving. This is without a fast food restaurant within 30 feet of these school's entrances. M-2

We are not opposed to bringing restaurants and revenue to our city, we are merely requesting that they find another location. If the owners of Gaslight Square don't consider that an option, then I hope you'll hold firm on zoning in place and protect our kids.

The City Council knew back in 1988 that it was a bad idea to add a fast food restaurant in such close proximity to Laurel Elementary School, so they took the steps to prevent that from happening. We urge you to uphold these protections & not only oppose this restaurant, but put the possibility of any high traffic restaurants or grocery stores in this location to rest once and for all. M-3

Thank you for your time and consideration!

- Sahaar

--
Sahaar Joseph
HospiceMD, Inc.
100 N. Citrus St. Suite 225
West Covina, CA 91791
Tel: (626) 699-2135
Fax: (626) 228-0862
www.HospiceMD.com

RESPONSES TO COMMENT LETTER M:
Sahaar Joseph

M-1: Ms. Joseph urges the City to oppose the Project. This general comment is acknowledged.

M-2: Ms. Joseph expresses concern about adding a fast-food drive-thru and/or restaurant across from Laurel Elementary School and makes reference to two incidents, one at Laurel Elementary and one at Falcon Academy, that caused injury to pedestrians. These comments are acknowledged. Refer to DEIR Subsection 4.12, *Transportation*, and Technical Appendix I, *Safety Study*, for an analysis of transportation safety, which conclude through analysis and expert opinion that Project-related impacts to transportation safety would be less than significant.

M-3: Ms. Joseph urges the City to oppose the restaurant and possibility of high traffic restaurants or grocery stores at the Project Site and makes reference to a City action taken in 1988, but does not cite the source of this statement. The comment is acknowledged without context.

COMMENT LETTER N

LOZEAU DRURY LLP
T 510.836.4200
F 510.836.4205
1939 Harrison Street, Ste. 150
Oakland, CA 94612
www.lozeaudrury.com
adam@lozeaudrury.com

Via Email
March 3, 2023

Cecilia Madrigal-Gonzalez, City Planner
1 Civic Center Circle
Brea, CA 92821
ceciliamg@ci.brea.ca.us

Re: Comment on the Draft Environmental Impact Report, Brea Gaslight Square Redevelopment Project

Dear Ms. Madrigal-Gonzalez:

I am writing on behalf of Supporters Alliance for Environmental Responsibility ("SAFER") regarding the Draft Environmental Impact Report ("DEIR") prepared for the Brea Gaslight Square Redevelopment Project, including all actions related or referring to the proposed construction of two new commercial buildings to facilitate a 2,000 square foot drive-thru restaurant and a 6,000 square foot commercial building, located at 255 E. Imperial Highway in the City of Brea ("Project"). N-1

After reviewing the DEIR, we conclude that it fails as an informational document and fails to impose all feasible mitigation measures to reduce the Project's significant environmental impacts. SAFER requests that the Planning Division address these shortcomings in a revised draft environmental impact report ("RDEIR") and recirculate the RDEIR prior to considering approvals for the Project. N-2

We reserve the right to supplement these comments during review of the Final EIR for the Project and at public hearings concerning the Project. *Galante Vineyards v. Monterey Peninsula Water Management Dist*., 60 Cal. App. 4th 1109, 1121 (1997). N-3

Sincerely,

Adam Frankel

RESPONSES TO COMMENT LETTER N:
Supporters Alliance for Environmental Responsibility (SAFER)

N-1: This introductory comment states that comments are being submitted on behalf of SAFER and provides a brief description of the Project. This general comment is acknowledged.

N-2: SAFER opines that the DEIR fails as an informational document and does not impose all feasible mitigation measures to reduce Project impacts; SAFER request the Planning Division address these shortcomings in a revised draft environmental impact report (RDEIR) and recirculate the RDEIR prior to considering approvals for the Project. As stated in DEIR, Section S.0, *Executive Summary*, page S-5, after the application of all feasible mitigation measures, the Project would not result in any significant and unavoidable environmental effects. SAFER does not cite any facts, reasonable assumptions based on facts, or expert opinion supported by facts in support of the comment. Pursuant to CEQA Guidelines Section 15064, an effect shall not be considered significant in the absence of substantial evidence. As such, no revisions to the DEIR are warranted and recirculation of the DEIR is not required.

N-3: SAFER states that they reserve their right to supplement their comments during review of the FEIR and at public hearings concerning that Project. This general comment is acknowledged.

COMMENT LETTER O

SHUTE, MIHALY & WEINBERGER LLP

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GABRIEL M.B. ROSS
Attorney
Ross@smwlaw.com

March 13, 2023

Via E-Mail

City of Brea Community Development
Department, Planning Division
1 Civic Center Circle
Brea, California, 92821
E-Mail: planner@cityofbrea.net

Re: Gaslight Square Redevelopment Project Draft Environmental Impact Report

To Whom it May Concern:

On behalf of our clients, Safer Avenues for Everyone ("SAFE"), we submit the following comments on the Draft Environmental Impact Report for the Brea Gaslight Square Redevelopment Project. Safer Avenues for Everyone ("SAFE") was formed to safeguard the people of Brea, especially students and pedestrians, from incompatible development. It represents volunteers and staff at Laurel Elementary School, as well as Laurel neighbors. Like all concerned members of the public, SAFE had hoped to rely on the environmental document required by the California Environmental Quality Act ("CEQA") for an honest and thorough assessment of the Project's environmental impacts. Unfortunately, the City's Draft Environmental Impact Report ("DEIR") for the Brea Gaslight Square Redevelopment Project ("Project") is neither honest nor thorough. As described in these comments, the DEIR fails to adequately disclose, analyze, and mitigate the Project's significant impacts, including those to transportation and public safety. O-1

The proposed Project would demolish four of the existing buildings located at 255 East Imperial Highway ("the Project Site") and construct two new commercial buildings. The first—a 6,000 square foot commercial building with a 2,400 square foot sit-down restaurant and 3,600 square feet of retail or medical office uses—would be located at the northeast corner of South Orange Avenue and Imperial Highway. The other building would be a 2,000 square foot drive-thru restaurant located at the northwest corner of South Flower Avenue and Imperial Highway. The Project Applicant has not identified O-2

any tenants to occupy the new proposed buildings, which would be located across the street from Laurel Elementary School.

O-2 (CONT.)

Despite the DEIR's refusal to disclose or acknowledge the severity of the Project's impacts, discussed further below, the reality is that approving a large drive-thru project with another dine-in restaurant and retail/medical space across from a busy elementary school drop off/pick up zone will result in significant and potentially devastating impacts that cannot be avoided through mitigation. The Project will increase vehicular trips to the area and add more traffic to an already-unsafe intersection that school children and their families rely on to access Laurel. "Regardless of design, previous research has shown where there is more traffic near [a] higher density of children more child pedestrian-vehicle collisions will occur."[1] This Project is inherently unsafe and should be rejected for that reason alone.

O-3

I. The Brea City Council Can and Should Exercise Its Discretionary Authority to Deny This Project.

As the City Council is aware, this is not the first drive-thru project proposed for the Imperial Highway and Flower Avenue intersection. In 2020, the City considered an application to develop a Raising Cane's drive-thru restaurant on the site. Fearful that the increased traffic and drive-thru nature of the Project would make the Imperial Highway and Flower Avenue intersection even more dangerous for Laurel Elementary students and caregivers, SAFE and other community members vehemently opposed the project. Despite this significant public opposition and the serious pedestrian safety concerns, the City approved the project. Left with no other recourse, SAFE and other concerned citizens filed a lawsuit challenging the City's environmental review and approval of the Raising Cane's project. Faced with SAFE's robust legal arguments against the project, Raising Cane's settled the case and relinquished its approvals. The City Council rescinded the approvals in February 2022.

O-4

Now, just over a year later, the City Council is once again considering a drive-thru project at Gaslight Square—this one larger and arguably more impactful. Indeed, the proposed Project, which includes a drive-thru restaurant, a dine-in restaurant, and medical/retail space, would be more than double the size of the previous proposal. The myriad factors that made the Raising Cane's project so inappropriate and dangerous for the Gaslight Square location all remain. The existing traffic conditions at Imperial

O-5

[1] The Effects of Land Use Patterns and Street Network Connectivity on the Frequency of Child Pedestrian-Vehicle Collisions: An aggregate analysis in Portland, Oregon, June 2012, at 44, attached as Exh. 1.

Highway and Flower Avenue have not improved. The number of Laurel Elementary School students, staff, and caregivers who walk to and from school through this intersection and in the surrounding area has not decreased. The inherent danger that increased vehicular traffic presents to pedestrians—especially small, impulsive school children—has not changed. If anything, the new Project's impacts on transportation and public safety will only be worse.

O-5 (CONT.)

Under the California Environmental Quality Act ("CEQA"), Public Resources Code sections 21000 et seq., the City Council has the authority to disapprove any project in order to prevent such impacts. CEQA Guidelines, Cal. Code Regs., tit. 14, sections 15000 et seq. ("Guidelines"), section 15042 states: "A public agency may disapprove a project if necessary in order to avoid one or more significant effects on the environment that would occur if the project were approved as proposed." If the City Council determines that denying this Project is the best way to avoid these environmental impacts and dangers to some of its most vulnerable citizens, it has the full authority to do so.

If the City Council needs further justification to wholly reject the proposed Project, it need only look to the Project's fundamental inconsistency and incompatibility with the City's planning documents, including the General Plan. "[T]he propriety of virtually any local decision affecting land use and development depends upon consistency with the applicable general plan and its elements." *Resource Defense Fund v. County of Santa Cruz* (1982) 133 Cal.App.3d 800, 806. Under the General Plan, the City Council is not free to disregard the Project's inherent conflict with the adjacent land uses, namely an elementary school zone.

O-6

As with the Raising Cane's development, this is simply not an appropriate or lawful Project for this location. The Planning Commission should advise against Project approval. The City Council has full discretion to deny the Project, and we implore it to do so.

II. The DEIR Is Inadequate Under CEQA.

The environmental impact report is "the heart of CEQA." *Laurel Heights Improvement Ass'n v. Regents of University of California* (1988) 47 Cal.3d 376, 392 (citation omitted). It "is an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached […] points of no return. The EIR is also intended 'to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action.' Because the EIR must be certified or rejected by public officials, it is a document of accountability." *Id.* (citations omitted). Where, as here, an EIR fails to fully

O-7

and accurately inform decision makers, and the public, of the consequences of proposed actions, it does not satisfy the basic goals of the statute. *See* CEQA § 21061 ("The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect which a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project.").

As discussed in detail below, the DEIR is replete with serious flaws. It both lacks a legally defensible description of the Project and fails to provide the necessary evidence or analysis to support its conclusions that environmental impacts would be less than significant. In particular, the DEIR completely ignores the proximity of Laurel Elementary and existing traffic and safety issues at and near the Project Site. It likewise dismisses the obvious safety impacts that the Project—which proposes 8,000 square feet of new development, including a 2,000 square foot drive-thru—will have on Laurel students, who, if the Project is approved and constructed, will be forced to navigate yet more dangerous conditions.

O-7 (CONT.)

These "bare conclusions" are insufficient; the DEIR "must contain facts and analysis" to support and explain such conclusions. *Santiago County Water Dist. v. County of Orange* (1981) 118 Cal.App.3d 818, 831. An EIR may conclude that impacts are insignificant only if it provides an adequate analysis of the magnitude of the impacts and the degree to which they are mitigated by the project's design or mitigation measures. *See Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 306-07. If an agency fails to investigate a potential impact, its finding of significance cannot stand. *Id*. Here, the DEIR is legally inadequate and analytically insufficient to support its conclusions that the proposed Project will not have significant and unavoidable impacts, especially to transportation and public safety.

O-8

A. The DEIR's Vague Project Description Precludes Meaningful Public Review of the Project.

In order for an EIR to adequately evaluate the environmental ramifications of a project, it must first provide a comprehensive description of the project itself. "An accurate, stable and finite project description is the *sine qua non* of an informative and legally sufficient EIR." *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal. App. 4th 713, 730 (quoting *County of Inyo v. City of Los Angeles* (1977) 71 Cal. App. 3d 185, 193). As a result, courts have found that even if an EIR is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in the manner required by law. *San Joaquin Raptor*, 27 Cal. App. 4th at 729–30. Furthermore, "[a]n

O-9

accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." *Id*. at 730 (citation omitted). Thus, an inaccurate or incomplete project description renders the analysis of significant environmental impacts inherently unreliable.

The DEIR's Project Description does not come close to meeting these established legal standards. The DEIR offers only vague, uncertain, and inconsistent statements about the end uses of the proposed Project buildings. For example, though the DEIR describes the drive thru facility as a "drive thru restaurant" throughout (*see*, *e.g.*, 3-5, 3-9), the transportation analysis categorically describes it as a "Coffee/Donut Shop with Drive-Thru" (*id.* at 4.12-5; *see also* DEIR Appendix H). This is not a distinction without a difference, especially considering the Project's location and likely impact on Laurel Elementary pedestrians (*see* Section II.C, below). Traffic patterns and volumes may be different for a coffee/donut shop than for a traditional restaurant focusing on lunch and dinner; the former use might create a greater impact during the mornings, for example, as Laurel students arrive at school. As discussed below in Section II.B.2.a, the Institute of Transportation Engineers Trip Generation Manual, on which the DEIR relies to estimate the number of daily vehicle trips the Project will generate, assigns different "trip generation rates" to drive-thru coffee/donut shops and drive-thru fast-food restaurants. "When the particular type of retail business planned for a proposed project will have unique or additional adverse impacts, then disclosure of the type of business is necessary in order to accurately recognize and analyze the environmental effects that will result from the proposed project." *Bakersfield Citizens for Local Control v. City of Bakersfield* (2004) 124 Cal.App.4th 1184, 1213. Without a stable and accurate description of the type of business planned for the drive-thru, the Project's true impacts cannot be analyzed. *San Joaquin Raptor*, 27 Cal.App.4th at 729–30.

O-9 (CONT.)

The DEIR similarly fails to identify the future tenants of the Project's proposed buildings, including the drive-thru facility, noting that they "were unknown at the time this EIR was prepared." DEIR at 3-5. But in the drive-thru sector, brand matters: popular restaurants like Chick-Fil-A, Raising Cane's, and In-N-Out are notorious for long queues—sometimes fifty cars long—that spill out of parking lots and on to arterial streets, jamming and diverting traffic.[2] The same is true of coffee and donut drive-thrus like Krispy Kreme and Dunkin Donuts.[3] Here, "recognition of the characteristics of the shopping centers' tenants is a necessary prerequisite to accurate identification and

O-10

[2] Matthew Kang, A Drone's Eye View of LA's Longest Drive-Thru Lines, Eater Los Angeles (May 12, 2020), attached as Exh. 2.
[3] *Id.*

analysis of the environmental consequences that will result from approval of the proposed project[].” *Bakersfield Citizens*, 124 Cal.App.4th at 1213. While identification of a specific tenant name may be unnecessary, to simply state that future tenants are unknown, “without disclosing the type of retailers envisioned for the proposed project is not only misleading and inaccurate, but it hints at mendacity.” *Id.*

O-10 (CONT.)

More fundamentally, though the DEIR contains a nominal “Operational Characteristics” section, that section provides nothing more than expected land uses, associated square footages, and the “anticipated” operating hours for the building containing the sit-down restaurant and retail/medical uses. DEIR at 3-17. This cryptic approach to the Project description makes environmental review nearly impossible. A reasonably complete description of the Project would give the public and decision makers a sense of what operations at the Project Site would actually look like. For example, the DEIR should describe the number of vehicles the drive-thru lane is designed to accommodate, the entry point and direction of the drive-thru lane, an analysis of the possibility of drive-thru queueing spilling out onto Orange and/or Flower Avenue, and the estimated operating hours of the drive-thru facility.[4] Without this information, the DEIR cannot possibly analyze the true impacts of the Project on traffic and safety in and near the Project. This lack of disclosure undermines the DEIR’s core informational purposes. *See San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 653 (EIR “must include detail sufficient to enable those who did not participate in its preparation to understand and to consider” the project).

O-11

B. The DEIR Fails to Adequately Analyze the Project’s Transportation Impacts.

1. The DEIR Uses An Improper Baseline, Thus Rendering the Entire Analysis Inaccurate and Deficient.

In determining whether an environmental impact is significant, an EIR must compare the proposed project to the “baseline physical conditions.” Guidelines § 15125(a); *Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310, 320-21. An incorrect baseline undermines the EIR’s entire analysis, as it “mislead[s] the public as to the reality of the impacts and subvert[s] full consideration of the actual environmental impacts which would result.” *Environmental*

O-12

[4] Indeed, as described in Section II.C.3 below, the City itself has recognized the necessity of this information for purposes of evaluating the Project.

Planning & Information Council v. County of El Dorado (1982) 131 Cal.App.3d 350, 357-58 ("*EPIC*").

Flouting this requirement, the DEIR alternately ignores and inaccurately describes existing traffic and circulation conditions at and near the Project Site. This failure echoes throughout the DEIR's transportation analysis, thereby precluding adequate assessment of the Project's true impacts.

O-12 (CONT.)

(a) The DEIR Ignores Existing Traffic and Circulation Problems At and Near the Project Site.

The DEIR fails entirely to disclose well-documented existing traffic conditions at the site, especially with respect to Laurel Elementary-related traffic. Indeed, the DEIR's only acknowledgment of this school traffic is a passing statement that "Laurel Elementary School pick up and drop off uses driveways connecting with South Flower Avenue across from the Project Site." DEIR at 2-10. The DEIR summarily describes the "Project's proximity to Laurel Elementary School as a potential area of controversy, primarily related to traffic patterns," but this statement inappropriately frames circulation and traffic problems near the Project site as a fictional problem of the public's making rather than a well-documented reality. DEIR at S-4.

O-13

The DEIR's cursory reference to the school driveways across from the Project Site is blatantly incomplete, ignoring longstanding circulation problems associated with Laurel Elementary pick-up and drop-off. For example, it ignores findings contained in the February 22, 2022 Laurel Elementary Circulation and Parking Plan, a collaboration between the City, the Brea Olinda School District, and a third-party engineering consultant "to improve traffic, circulation, parking, and safety" at Laurel ("Laurel Circulation and Parking Plan" or "Plan").[5] That Plan explicitly recognizes that there is "[n]ot enough queue space on site," i.e., that there is not enough space on the Laurel Elementary property to accommodate all the vehicles arriving to drop off and pick up students. *Id.* Relatedly, it notes that "[s]tudents are being picked up and dropped off on public streets," and that there "is limited pedestrian connectivity and barriers for students who walk to school." *Id.*

O-14

[5] *See* Laurel Circulation and Parking Plan, attached as Exh. 3 at 5; *see also* February 16, 2021 City of Brea City Council Staff Report at 2 (noting potential "feasibility study that would examine potential solutions to the drop-off/pick-up circulation issues that Laurel Elementary is currently experiencing"), attached as Exh. 4 [at page marked 00042].

The Plan's findings are consistent with public comments submitted to the City in conjunction with the City's consideration of the Raising Cane's project, nearly all of which describe the traffic problems associated with Laurel pick up and drop off. For example, the owner of Brea Dentistry, located at Gaslight Square, notes the "frantic pace of parents dropping off and picking up children," and that "[s]chool traffic already backs up in an unsafe manner" onto Imperial Highway.[6] He also notes that parents use the Gaslight parking as a secondary parking lot for drop off and pick up.[7] A Laurel parent similarly observes that during pick up and drop off "[t]raffic is stopped well onto Imperial Hwy. with cars and big rigs zooming past and honking."[8] Additional similar comments are described in Section II.C.1 below.[9]

O-15

The DEIR mentions *none* of these issues, rendering fatally flawed its conclusion that the Project's transportation impacts will be less-than-significant. *See* DEIR at 4.12-15. Indeed, without accurately disclosing the existing traffic conditions at and around the Project Site, the DEIR cannot provide an accurate, well supported transportation analysis. *See* Guidelines § 15125; *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, 875 (incomplete description of environmental setting fails to set the stage for a discussion of a project's significant effects). The DEIR may not analyze the Project's potential impacts in a vacuum, without regard to existing environmental conditions at and near the Project Site. *See Laurel Heights*, 47 Cal.3d at 420 ("an EIR cannot be meaningfully considered in a vacuum devoid of reality"). The DEIR's failure to consider existing traffic conditions grossly underestimates the impact the Project will have in an already congested and heavily-trafficked area.

O-16

(b) The DEIR's Estimate of Existing Vehicle Trips at the Project Site is Flawed.

O-17

[6] February 1, 2021 letter from Brooks Larson to Brea City Council, attached as Exh. 5.
[7] *Id.*
[8] February 2, 2021 email to City re NO Raising Cane's, attached as Exh. 6.
[9] "Relevant personal observations of area residents on nontechnical subjects may qualify as substantial evidence." *Pocket Protectors v. City of Sacramento* (2004) 124 Cal.App.4th 903, 928. For example, "an adjacent property owner may testify to traffic conditions based upon personal knowledge." *Keep Our Mountains Quiet v. County of Santa Clara* (2015) 236 Cal.App.4th 714, 730 (quoting *Citizens Assn. for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal.App.3d 151, 173); *see also* Guidelines § 15064(f)(5) ("Substantial evidence" includes "facts [and] reasonable assumptions predicated upon facts.").

The DEIR's inaccurate estimate of existing vehicle trips is similarly deficient. To estimate the number of daily vehicle trips currently generated by the four buildings the Project proposes to demolish, the City's consultant counted vehicles entering and exiting the Project Site driveways on two different days. DEIR 4.12-2. Based on this count, the DEIR concludes that 362 daily vehicle trips are generated by those four buildings. *Id.* However, as the DEIR acknowledges elsewhere, there are two other buildings located at Gaslight Square, one of which is occupied by Brea Dentistry, and the other by Curtis Orthodontics, neither of which the Project will demolish. *Id.* at 2-7. As the DEIR recognizes, both businesses are accessed via the Project Site driveways. *Id.* at 2-2. However, the DEIR assumes, without explanation or support, that *none* of the counted trips were associated with either Brea Dentistry or Curtis Orthodontics. This assumption defies both reality and logic, and artificially inflates the estimated trips generated by the four buildings the Project proposes to demolish.

O-17 (CONT.)

Moreover, though this section of the DEIR states that these four buildings "are occupied and generating traffic" (*id.* at 4.12-2; *see also* DEIR Appendix H1 at 1), the DEIR elsewhere recognizes that two of these four buildings are vacant. *Id.* at 2-7 ("The two buildings located in the southeast and southcentral portion of the Project Site, along Imperial Highway, are vacant."). This further undermines the DEIR's conclusion that all of the counted trips can be attributed to the four buildings; two of the four, being vacant, could not have generated *any* of the trips.

Importantly, the DEIR relies on this inaccurate and inflated baseline trip count to calculate the Project's expected "net new" daily trips. The DEIR estimates that the Project—which does not include the two buildings that will remain in place-- will generate 872 new trips, then subtracts the 362 existing trips to conclude that the Project will generate only 510 "net new" trips. *Id.* at 4.12-6. Because the DEIR did not properly exclude trips to Brea Dentistry and Curtis Orthodontics, and likewise failed to consider that two of the four buildings on the Project site are vacant, the existing trip count attributable to the buildings to be replaced is likely far lower than 362. Thus, the number of "net new" trips is likely far higher than 872.[10] This inaccuracy undermines the DEIR's entire transportation analysis, "mislead[s] the public as to the reality of the impacts[,] and subvert[s] full consideration of the actual environmental impacts which would result." *EPIC*, 131 Cal.App.3d at 357-58.

O-18

[10] The lower the existing trip count, the higher the "net new" trip count will be, and vice versa. For example, if the existing trip count is actually 110, the "net new" trips will be 762 (872-110).

2. The DEIR's Estimate of Project-Generated Vehicle Trips is Similarly Flawed.

(a) The DEIR's Reliance on ITE Trip Generation Rates Likely Underestimates the Project's Actual Traffic Demand.

The DEIR estimates that the Project will generate 872 two-way vehicle trips per day. DEIR at 4.12-6. This figure relies on the Institute of Transportation Engineers ("ITE") Trip Generation Manual, which assigns certain "trip generation rates" to different land use categories. *Id.* at 4-12.5. The DEIR applies three ITE categories and associated trip generation rates to the Project: "Strip Retail" for the 3,600 square feet of retail/medical space; "High Turnover (Sit-Down) Restaurant" for the 2,400 square feet of sit-down restaurant space; and "Coffee/Donut Shop with Drive-Thru Window" for the 2,000 square foot drive-thru building. *Id.* While the first two categories appear to match the actual proposed uses at the Project site, the third—"Coffee/Donut Shop"—does not. There is no indication in the DEIR's project description or elsewhere that the drive-thru building will be a coffee/donut shop. To the contrary, the DEIR describes this building throughout as a "drive-through restaurant." DEIR at 3-5; *see also id.* at 3-9. Thus, it is likely that a different ITE trip generation rate applies, e.g. the rate associated with the ITE category "Fast-Food Restaurant w/ Drive-Thru." The DEIR fails to justify or explain the use of the coffee/donut shop rate in its calculations.

O-19

Even with an accurate ITE code, the corresponding trip generation rates may underestimate actual traffic demand depending on the tenant of the drive-thru facility. The City's Traffic Engineer previously recognized this issue when considering the proposed Raising Cane's drive-thru project, noting that the actual demand for a popular chain like Raising Cane's likely exceeded the ITE trip generation rate.[11] The City likewise asked the Raising Cane's applicant to collect "real-world empirical data from three existing sites [to] be used to not only establish the demand for the drive-through but

O-20

[11] August 3, 2020 City Traffic Engineer Comments on Raising Cane's Brea Traffic Scoping Letter at 1, attached as Exh. 7. In response to the City's comments, the Raising Cane's applicant increased the applicable ITE trip generation rate by one standard deviation, an adjustment that nearly doubled the rate. *Compare* December 2020 Kimley-Horn and Associates, Inc. Focused Transportation Assessment for the Raising Cane's Project in the City of Brea, at 13, attached as Exh. 8, with July 29, 2020 Kimley-Horn and Associates, Inc. letter to Paige Montojo re Scoping Letter Agreement for Focused Traffic Analysis for the Proposed Raising Cane's Project in the City of Brea at Attachment 2, attached as Exh. 9.

to also establish traffic demand for use in the circulation analysis."[12] This is yet another reason why the DEIR's failure to identify a drive-thru tenant results in an adequate analysis of the Project's impacts (*see* Section II.A above). The City's point regarding the Raising Cane's project is equally true here. The DEIR may not simply rely on ITE trip generation rates when there is substantial evidence—from the City's own history at this site—that those rates may underestimate Project-generated traffic.[13]

O-20 (CONT.)

(b) The DEIR's Pass-By Reductions Are Inappropriate and Contradicted by Previous City Findings.

The DEIR further minimizes its estimate of Project-generated vehicle trips by applying "pass-by" reductions to each of the estimated trip figures for each ITE land use category. DEIR at 4.12-5. Theoretically, this reduction accounts for trips already on the road and headed to a different destination that merely visit the Project on the way to their ultimate destination. *Id.* Though such pass-by trips are hypothetically possible, the DEIR provides *no* support for or explanation of the extremely high reductions applied: 25% for the sit-down restaurant and retail/medical trips, and 50% for the drive-thru trips. *Id.*

Moreover, the City's Traffic Engineer has already concluded that a 50% reduction for drive-thru trips at Gaslight Square site is "not appropriate" based on the site's access.[14] In particular, when considering the proposed Raising Cane's, the Traffic Engineer noted "the lack of driveway on Imperial Highway," resulting in access only from "two local streets, and no direct access to the site from the south."[15] Considering these access restrictions, the Traffic Engineer concluded that "[a] more appropriate pass-

O-21

[12] Exh. 7 at 1.

[13] The DEIR's trip generation estimate is flawed for the additional reason that it calculates trips according to the drive-thru and sit-down restaurant buildings' square footage only (2,000 and 2,400 s.f., respectively), ignoring the square footage of their patios (615 and 481 s.f., respectively), which would accommodate diners. *See* DEIR at 3.8 (depicting square footage of patio for drive-thru and sit-down restaurants), 4.12-6 (applying trip generation rates to building square footage only). When considering the Raising Cane's application, the City directed the applicant to calculate trip generation including patio square footage. Exh. 8 at 12. Appropriately including the patio areas here results in over 325 additional new daily drive-thru trips ((2.615 [t.s.f.] x 533.57 [coffee/donut shop drive-thru rate] = 1395.2) – 1068 [estimated trips using 2 t.s.f.] = 327.28) and 50 additional new daily sit-down trips ((2.881 [t.s.f.] x 107.20 [high turnover sit-down restaurant rate] = 308.8) – 258 [estimated trips using 2.4 t.s.f.] = 50.8).

[14] Exh. 7 at 2.

[15] *Id.*

by reduction would be *35% or less*."[16] This Project proposes no changes to site access. *See* DEIR at 3-9 ("Vehicular access to the Project Site would be accommodated by two existing driveway entrances from South Orange Avenue and South Flower Avenue."). Therefore, the Traffic Engineer's conclusions apply to this Project as well.[17]

Finally, even assuming that some amount of pass-by reduction is appropriate, that reduction can only tell us about existing traffic on Imperial Avenue, where the "pass-by" cars are presumably driving. By contrast, very few pass-by cars are driving on Flower Avenue, a local, residential street used primarily by residents and others accessing Laurel Elementary. Thus, application of the pass-by percentage might accurately reflect the number of truly new trips generated on Imperial Avenue, but wholly underestimate the number of truly new trips generated on Flower Avenue.

Once again, the City has already recognized this very issue: in response to the Raising Cane's application, the City's Traffic Engineer directed that "all pass-by trips must be added back into the circulation analysis *to account for turning movements on Imperial Highway and Birch Street and to clearly show traffic increases on both Orange Avenue and Flower Avenue*."[18] It is precisely this increased traffic on Flower Avenue, which directly abuts Laurel Elementary, along with the turns off Imperial Highway that will add to the difficult conditions around the school, that are together the focus of concern for SAFE and many other stakeholders who oppose the Project. The DEIR cannot accurately analyze the Project's transportation (and safety) impacts without considering this increased traffic.

O-21 (CONT.)

(c) The DEIR's Estimate of Net New Trips Fails to Account for Project-Generated Employees.

As noted above, the DEIR estimates that the Project will generate 510 "net new" trips per day. DEIR at 4.12-5. Elsewhere, the DEIR states that the Project will generate

O-22

[16] *Id.* (emphasis added).
[17] Unsurprisingly, reducing the pass-by rate for the Project's drive thru trips to 35%, consistent with the Traffic Engineer's conclusion, results in a much higher net new trip count. Whereas a 50% reduction eliminates 534 of the estimated 1,068 estimated daily drive-thru trips, a 35% reduction more appropriately eliminates only 374 trips, resulting in 1032 net new trips as opposed to 872. *See* DEIR Appendix H-1 at 4. Moreover, as explained in footnote 13, any pass-by percentages applied to the drive-thru and sit-down restaurant trips should apply to the number of trips generated according to the total square footage of those facilities, including patios.
[18] Exh. 7 at 2 (emphasis added).

611 employees. *Id.* at 3-18. It is difficult to understand how the Project could generate 120% more employees than trips; employees, like Project patrons, must travel to the Project site. Even if not all 611 employees will be working every single day, the DEIR must explain how and to what extent employee trips impact the overall trip count. In any case, the DEIR does not explain this apparent discrepancy, nor does its trip generation estimate (or pass-by reduction rates) appear to account for employees.[19] This failure adds to the problems described above, rendering the DEIR's analysis of the Project's transportation impacts inherently flawed.

O-22 (CONT.)

3. The DEIR Fails to Disclose Significant Impacts from the Project's Conflicts with Applicable Transit Policies.

The DEIR's first transportation impact threshold asks whether the Project would "conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities." DEIR at 4.12-5. The DEIR further lists out a number of regional transportation and General Plan policies, asserting that the Project would be consistent with these land use documents. As shown below, many of these conclusions are unsupported. The proposed Project's inconsistencies with relevant transit plans and policies are significant impacts that should have been disclosed, analyzed, and mitigated, if possible.

General Plan Policy	Inconsistency
Policy CD-11.1: Maintain a circulation system that is based upon and is in balance with the Land Use Element of the General Plan.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-8. The Project will bring dangerous levels of traffic to a school zone and will draw heavy arterial-level traffic onto residential streets *because* of the "Site's private driveways with South Flower Avenue and South Orange Avenue." This disruption to Brea's residential streets and public facilities does not serve the General Plan's intention of allowing people to "circulate within their community from home to

O-23

[19] The DEIR similarly fails to either quantify or account for trips generated by Project vendors, many of whom will be arriving in trucks that would add to safety hazards. DEIR at 4.2-14.

	school, work, or shopping with ease and safety." General Plan at 2-39.
Policy CD-11.2: Establish Level of Service goals for designated City streets, and ensure that new development maintains these service levels.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-8. As discussed elsewhere in this letter, the DEIR's projection of 510 new daily traffic trips contains numerous analytical flaws. *See* Sections II.B.1.b and II.B.2.c. The DEIR's significance conclusions related to the Project's vehicular-related air pollutant emissions are likewise erroneous. *See* Section II.D. These inadequate analyses cannot be relied upon to demonstrate that "the Project has no reasonable potential of causing a significant environmental effect associated with LOS goals." DEIR at 4.12-8.
Policy CD-11.3: Plan neighborhood streets, pedestrian walks, and bicycle paths as a system of fully connected routes throughout the City.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-8. The proposed Project would have the effect of drawing arterial-level traffic onto neighborhood streets used by residents and school children. The DEIR claims that there would be no conflict because the Project would include bike racks for future employees, which is demonstrably not the same as a "bicycle path," but even that meager provision ignores the fact that the increased traffic from the Project's drive-thru would make the area less safe for cyclists as well.
Policy CD-11.4: Protect residential streets from arterial street traffic.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-8 to 4.12-9. The ingress/egress to the Project site is via driveways facing residential streets (Flower and Orange), which means that

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(CONT.)

	the arterial traffic will *have* to enter these residential streets to access the Project. The DEIR argues that there are "several access points to the residential area," but this is irrelevant. *Id.* This policy does not ask whether residential areas will still be accessible, but whether arterial street traffic will enter the residential road, which will happen here due to the orientation of the Project site. Moreover, if the City pursues the Flower Avenue Closure alternative, even more arterial traffic would have to come through residential streets to get to and from the Project site.
Policy CD-11.5: Use traffic calming measures in residential neighborhoods where warranted and appropriate to enhance safety for pedestrians.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-9. The DEIR points to proposed measures to "block vehicular access to the alley that runs through the middle of the residential area between the Project Site and Birch Street," but this is only one aspect of pedestrian safety for the neighborhood. *Id.* The Project fails to include a number of other "traffic calming measures," including increased safety measures for surrounding pedestrian crosswalks. *See* Section II.C.2.
Policy CD-11.6: Utilize creative methods to reduce congestion and improve circulation.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-9. Indeed, rather than listing any creative methods included in the Project, the DEIR analysis simply states that the Project would not adversely alter the circulation system. As explained above, this assertion is not supported.

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(CONT.)

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Policy CD-11.10: Work with the Brea Olinda Unified School District to establish safe routes to all schools and to facilitate better circulation surrounding schools in the A.M. and P.M. peak traffic periods.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-9. The DEIR claims that the City is coordinating with the School District, but there is no evidence in the DEIR to support this. For instance, the Project fails to incorporate recommendations and findings from the February 2022 Laurel Elementary Circulation and Parking Plan. There is no evidence or discussion of efforts made to make the Project safe for the Laurel Elementary community. The consistency discussion also references a potential Flower Avenue Closure alternative, which would *not* make the Project safer for the school community, as discussed further in Section II.G.3.
Policy CD-11.11: Examine alternative methods such as traffic calming, landscaping, provision of bike/transit lanes to slow traffic, improve street capacity, and increase safety.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-9 to 4.12-10. Because the DEIR fails to disclose and analyze the Project's significant transportation and safety impacts, it fails to include any safety measures to mitigate these impacts. As discussed further in Section II.G.3., the Project's consideration of a Flower Avenue Closure would actually increase most of the Project's impacts.
Policy CD-12.5: Require new developments to incorporate transit-oriented design features, as appropriate.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-10. A drive-thru restaurant relies on the extensive use of automobiles. *See* DEIR at 4.12-11 (Project will have "limited ability to promote alternative transportation modes…[as] a drive-thru restaurant…is inherently auto-oriented."). Though people could theoretically walk, bike, or

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	take public transit to the area, the drive-thru business model is undeniably car-centered and would not be transit oriented.
Policy CD-12.6: Balance accommodations for automobiles, transit, bicycles, and pedestrians in the design of new streets and streetscape improvements.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-10. A drive-thru restaurant relies on the extensive use of automobiles. *See id.* at 4.12-11 (Project will have "limited ability to promote alternative transportation modes…[as] a drive-thru restaurant…is inherently auto-oriented."). Though people could theoretically walk, bike, or take public transit to the area, the drive-thru business model is undeniably car-centered and would not be transit or pedestrian oriented. Moreover, as discussed below in Section II.G.3, the Flower Avenue Closure alternative would not improve pedestrian safety.
Policy CD-13.4: Require new developments to provide for the use of alternative modes of transit via internal trails or travel ways—public or private—for pedestrians and vehicles other than cars. New developments shall include such features as well-designed sidewalks and parkways, bike lanes and paths, and dedicated bus turn-outs.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-11. A drive-thru restaurant relies on the extensive use of automobiles. *See id.* (Project will have "limited ability to promote alternative transportation modes…[as] a drive-thru restaurant…is inherently auto-oriented."). Though people could theoretically walk, bike, or take public transit to the area, the drive-thru business model is undeniably car-centered and would not be transit oriented. Moreover, as discussed below in Section II.G.3, the Flower Avenue Closure alternative would not improve pedestrian safety. The DEIR's claim that this policy has been satisfied because the

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(CONT.)

	Project will keep existing sidewalks is unavailing.
Policy CD-1.9: Encourage new development that is organized around compact, walkable, mixed-use neighborhoods and districts to conserve open space resources, minimize infrastructure costs, and reduce reliance on the automobile.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-11. *See* Section II.E.1, *infra*.
Policy CD-4.2: Improve transportation, pedestrian, and visual connections between Downtown and the rest of the community.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-12. A drive-thru restaurant relies on the extensive use of automobiles. *See id.* (Project will have "limited ability to promote alternative transportation modes…[as] a drive-thru restaurant…is inherently auto-oriented."). Though people could theoretically walk, bike, or take public transit to the area, the drive-thru business model is undeniably car-centered and would not be transit or pedestrian oriented.
Policy CD-4.3: Utilize traffic calming measures as appropriate to improve safety and access.	The DEIR's assertion of no conflict is unsupported. DEIR at 4.12-12. The DEIR points to proposed measures to "block vehicular access to the alley that runs through the middle of the residential area between the Project Site and Birch Street," but this is only one aspect of pedestrian safety for the neighborhood. *Id.* The Project fails to include a number of other "traffic calming measures," including increased safety measures for surrounding pedestrian crosswalks. *See* Section II.C.2. The DEIR's consideration of the Flower Avenue Closure would also not improve safety for pedestrians. *See* Section II.G.3.

O-23 (CONT.)

C. Because the DEIR Fails to Adequately Analyze the Project's Safety Impacts, Its Conclusion That Those Impacts Will Be Less-Than Significant Is Unsupported.

Under CEQA, increased safety risks to pedestrians can constitute significant traffic- and transportation-related impacts. Guidelines, Appx. G, § XVII(c) (project has significant transportation impact if it would "[s]ubstantially increase hazards due to . . . incompatible uses"); *see also*, *e.g.*, *City of Long Beach v. Los Angeles Unified School Dist.* (2009) 176 Cal.App.4th 889, 914-16 (EIR adequately analyzed traffic-related pedestrian safety impacts).

Given the Project's direct proximity to Laurel Elementary, the DEIR's analysis of the Project's safety impacts is wholly inadequate. The DEIR fails to even consider the well-documented existing safety-related conditions near the Project Site. It likewise dismisses rather than analyzes the Project's near-certain impacts on the safety of the Laurel Elementary students and caregivers who walk to and from school every day. Moreover, as described below, the DEIR's failure to adequately analyze the Project's safety impacts ignores both common sense and documented research showing that auto-oriented land uses such as drive-thrus pose a serious risk to child pedestrians.

O-24

1. The DEIR Fails to Consider Existing Safety Hazards Near the Project Site and Laurel Elementary.

The DEIR fails to provide an accurate baseline description of the Project Site's existing safety hazards. As described above in Section II.A, the DEIR fails to even mention the existing circulation problems near the Project Site and at the intersection of Flower Avenue and Imperial Highway. It likewise fails to discuss or even reference the well-documented existing pedestrian safety issues in the area. For example, as noted above, in February 2021, the City partnered with the School District "on a feasibility study that would examine potential solutions to the drop-off/pick-up/circulation issues that Laurel Elementary is experiencing."[20] The resulting February 2022 study—the Laurel Circulation and Parking Plan—identified numerous existing safety issues near the Project Site, including that Laurel students are currently "being picked up and dropped

O-25

[20] Exh. 4 at 7.

off on public streets," and that there "is limited pedestrian connectivity and barriers for students who walk to school."[21]

O-25 (CONT.)

Moreover, when the City previously considered the Raising Cane's project, hundreds of neighbors and Laurel Elementary parents and teachers submitted comments related to existing pedestrian safety risks. For example, a Flower Avenue resident noted that the location of Laurel Elementary's pick-up and drop-off zone causes "enormous traffic jam[s]" on the corner of Imperial Highway and Flower Avenue, and that this is "very dangerous" for children on foot near that intersection.[22] A Laurel parent commented that "the lack of caution from drivers on Flower Ave, on top of the scary backup and near-collision-misses at [the Laurel Elementary] drop off & pick up line (from Imperial Hwy) is already frightening."[23] Another parent offered a similar observation:

> At school pickup, the drive-up line wraps around the corner and onto Imperial. This already is dangerous as cars crowd the unmanned crosswalk (while children are crossing!) at Flower and Imperial. If you have ever seen this line you know the constant fear of being rear ended, all the honking that occurs and the semi trucks trying to maneuver around the line.[24]

O-26

The DEIR makes absolutely no reference to these existing hazards near the Project site and Laurel Elementary, which the Project—proposing more than 4,400 square feet of new retail, including a 2,000 square foot drive-thru restaurant—can only exacerbate. The DEIR's failure to recognize existing risks to pedestrians near the Project Site inappropriately and inaccurately minimizes the Project's impacts.

2. THE DEIR Fails to Consider the Project's Safety Impacts On Laurel Elementary Students and Caregivers.

Despite the well-documented existing hazards near the Project Site, and the Project's direct adjacency to Laurel Elementary, the DEIR's so-called "safety analysis" fails to even consider Project-generated traffic's likely safety impact on Laurel students

O-27

[21] Exh. 3 at 5.
[22] January 25, 2021 email to City re: Opposition to the city's recommendation of Raising Cane's drive thru, attached as Exh. 10.
[23] February 1, 2021 email to City re Please help our kids – my reasons for opposing the proposed Raising Cane's Drive-Thru, attached as Exh. 11.
[24] January 31, 2021 email to City re Please vote no for Raising Cane's next to Laurel, attached as Exh. 12.

and caregivers. Instead, it inexplicably focuses on whether the Project will generate *new* pedestrian traffic, and whether those future Project-using pedestrians will use existing sidewalks and crosswalks. DEIR at 4.12-14; *see also* DEIR Appendix I at 6-7. Indeed, the DEIR contains just three short assertions referencing Laurel student safety, which it repeats throughout the document:

> Pedestrian and bicyclist activity in the in the [sic] Project site vicinity is light with [the] exception of the Laurel Elementary School admission/dismissal times. During school admission and dismissal times, school crossing guards facilitate pedestrian movements at the intersections of South Flower Avenue & Birch Street and Flower Avenue & Imperial Highway. DEIR at 4.12-14.
>
> The City of Brea is coordinating with the Brea Olinda Unified School District and with Laurel Elementary School regarding the Project regarding the assurance of student safety during both construction and operation of the Project. DEIR at 4.12-9.
>
> With the closure of the intersection of South Flower Avenue at Imperial Highway, it is expected that [the South Flower Avenue Closure] Alternative would provide a safer environment for pedestrians in the Project area. DEIR at 6-15; *see also id.* at 4.12-11 (Flower closure alternative would "potentially improve pedestrian safety associated with Laurel Elementary School").

The DEIR's dismissal of Laurel-related pedestrians as an "exception" that need not be considered is both unseemly and insufficient. *See* DEIR at 4.12-14. It is these very pedestrians—small children and the people who walk them to school—who are likely to be *most* affected by the Project. Yet the DEIR fails to even remotely consider how and to what extent increased traffic at the Project Site will increase risks to their safety.

Moreover, the reference to crossing guards is both misleading and inaccurate. Though there are crossing guards aiding pedestrians at the intersection of Flower Avenue and Birch Street, there are no crossing guards at Flower Avenue and Imperial Highway, the intersection directly in front of Laurel where school pick-up and drop-off is concentrated. Because most Project patrons will likely access the Project from Imperial Highway, and because of the heavy presence of Laurel-related pedestrians and vehicles at Flower Avenue and Imperial Highway, the Project will have a greater safety impact at that intersection than at the intersection of Flower Avenue and Birch. Additionally, as the City knows, nearly a third of Laurel students live south of Imperial Highway, and must

O-27 (CONT.)

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therefore cross that busy road to get to school.[25] That there are guards at Flower Avenue and Birch says nothing about increased risks to those students and caregivers crossing Imperial Highway. The DEIR's reference to crossing guards likewise dismisses risks to guards themselves, who, if the Project is approved, will be forced to contend with increased traffic in an already dangerously congested area. In any case, the DEIR's mere reference to crossing guards is inadequate to demonstrate as a factual matter that the Project's safety impacts will be less than significant.

O-28 (CONT.)

The same is true of the DEIR's vague reference to "coordination" between the City, the Brea Olinda Unified School District and Laurel Elementary regarding Project-related student safety. *See* DEIR at 4.12-9. If the Project will have safety impacts on Laurel Elementary students, the DEIR must provide detailed information about those impacts, list enforceable, concrete actions that could minimize the impacts, and identify alternatives. *See* CEQA § 21061; *see also Laurel Heights*, 47 Cal.3d at 392 (purpose of an EIR is to "demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the . . . implications of its action") (citation omitted). Without more, the DEIR's reference to "coordination" regarding student safety tells the public *nothing* about the Project's safety impacts, their significance, and whether or how such "coordination" might minimize them.

O-29

Finally, the DEIR's finding that the South Flower Closure Alternative would "provide a safer environment for pedestrians" (DEIR at 6-15) belies both the DEIR's failure to discuss the Project's safety impacts and its finding that those impacts would be less than significant. It begs multiple questions that the DEIR does not answer, let alone substantively consider. For example, how and to what extent will the Project affect "pedestrian safety associated with" Laurel Elementary? How, why, and to what extent would the closure of Flower Avenue lessen those impacts? The purpose of project alternatives under CEQA is to identify alternatives that would avoid or substantially lessen the proposed project's significant impacts. Pub. Resources Code § 21100(b)(4); Guidelines § 15126(d). The DEIR's inclusion of an alternative that would "potentially improve pedestrian safety associated with Laurel Elementary School" (DEIR at 4.12-11) thus necessarily indicates that the Project will cause a safety impact that the alternative is designed to avoid or lessen. The DEIR's utter failure to identify and analyze this impact violates CEQA.

O-30

3. The DEIR Withholds Highly Relevant Evidence Regarding the Project's Potential Safety and Traffic Impacts.

O-31

[25] Laurel Elementary School Student Residency Exhibit A, attached as Exh. 13.

The City itself has previously recognized the need to analyze the Project's safety and traffic impacts. In March 2022, the City's Public Works Department directed the Project applicant to retain a traffic engineering firm to conduct a "Transportation and Circulation Study," including: (a) review of the intersection of Imperial Highway and Flower Avenue "for operational & safety measures"; (b) "a queuing analysis for the drive through based on the anticipated occupant for the drive through restaurant space"; and (c) a section "address[ing] traffic and parking operations for the proposed project during the arrival and dismissal periods for Laurel Elementary School."[26] The Public Works Department further directed that "[t]he proposed project should not result in any queuing on the public right-of-way and within the school zone at any time."[27] In May 2022, the Applicant's consultant responded to those comments, noting in part that the requested "[t]raffic study will be included as part of the CEQA process."[28]

O-31 (CONT.)

However, the DEIR neither contains nor references the requested study. Moreover, on March 2, 2023, the City's Community Development Director, Jason Killebrew, confirmed via email with SAFE representatives that the City has prepared a "Traffic Analysis for the Gaslight Square project" that is "currently in draft form and under review," and that the analysis includes "an evaluation of circulation in and around the project site."[29] Mr. Killebrew further referenced the analysis as "[o]utside of CEQA."[30] It is unclear whether the study described by Mr. Killebrew is the same as the study requested by the Public Works Department in March 2022. Regardless, the City's request for and preparation of a traffic study for the Project are evidence that such a study is needed to fully evaluate the Project's likely transportation and safety impacts. Both indicate that the DEIR's transportation and safety analysis is incomplete and inadequate.[31] "CEQA's procedures, which include the preparation of an EIR, 'are

[26] March 23, 2022 City of Brea Public Works Department Memorandum re: 255 E. Imperial Highway (PLN-2022-00011) 1st Review Comments, at 4, attached as Exh. 14.
[27] *Id.*
[28] May 4, 2022 Kimley-Horn and Associates, Inc. Comment Response Letter – 1st Entitlement Submittal Comments, at 6, attached as Exh. 15.
[29] March 2, 2023 email from Jason Killebrew to Diane Sites re 2023 New Traffic Study – in/around Laurel Elementary Magnet School?, attached as Exh. 16.
[30] *Id.*
[31] Again, the Raising Cane's application is instructive. For that project, City demands and comments culminated in a 30-plus page Traffic Impact Study that included an LOS analysis, a trip generation and distribution analysis, analysis of the project's potential effects on traffic volume at nearby intersections, a signal warrant analysis for nearby

intended to assist public agencies in *systematically identifying* both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.'" *King & Gardiner Farms, LLC v. County of Kern* (2020) 45 Cal.App.5th 814, 851 (quoting Pub. Resources Code § 21002) (emphasis added). As the DEIR acknowledges, transportation impacts are environmental impacts under CEQA. *See* DEIR at 4.12 *et seq*. It is thus entirely improper and contrary to CEQA's purpose for the City to suggest that a robust analysis of the Project's transportation and safety impacts can be conducted "outside of CEQA."

Finally, the DEIR's failure to mention the study—indeed, the City's decision to release the DEIR before the study could be completed and incorporated—violates CEQA's disclosure requirements, which "require[] an EIR to reflect a good faith effort at full disclosure." *San Joaquin Raptor Rescue Center*, 149 Cal.App.4th at 653. The City's failure to include this relevant information "precludes informed decisionmaking and informed public participation, thereby thwarting the goals of the EIR process." *Id.* This error is prejudicial regardless of whether a different outcome would result if the City had disclosed the study. *Id.* Moreover, the existence of the draft study contradicts the DEIR's assertion that it "addresses the environmental issues that are known by the City, and were identified in the comment letters that the City of Brea received on this EIR's NOP" with respect to Laurel-related traffic and circulation concerns. DEIR at S-4. The City appears to be playing hide the ball with the precise issue that the DEIR identifies as an "area of controversy." DEIR at S-4. Here, a "good faith effort at full disclosure" requires the City to incorporate the results of the traffic study into its transportation and safety analysis. *San Joaquin Raptor Rescue Center*, 149 Cal.App.4th at 653.

O-31 (CONT.)

4. The DEIR's Safety Analysis Ignores the Inherent and Well-Documented Risk That Auto-Oriented Land Uses Pose to Small Children.

The DEIR's failure to recognize or even consider the Project's predictable safety impacts flouts a common sense fact: **it is inherently unsafe to mix school children with fast-moving, heavy traffic**. There is myriad evidence supporting this conclusion.[32]

O-32

intersections, and a detailed drive-thru queuing analysis. *See* Exh. 8. This is precisely the type of information needed here to fully assess the Project's transportation and safety impacts, and in any case the DEIR provides no explanation that would warrant its exclusion.

[32] *See*, *e.g.*, January 2012 Safe Routes to School Guide at 3-66, attached as Exh. 17 ("High-speed motor vehicles pose a serious threat to the safety of children who are

Research shows that child pedestrians are "particularly vulnerable to vehicle collisions due to less developed cognitive abilities than adults and more often exhibit risky pedestrian behavior."[33] Specifically, children lack the ability to judge the speed of oncoming traffic, have difficulty seeing cars in their peripheral visions, and are less capable than adults of using their auditory senses to assess their ability to cross streets safely.[34]

Research also shows that pedestrians generally are more likely to be struck by cars near auto-oriented land uses, including gas stations and drive-thrus.[35] Given that children's cognitive abilities render them more vulnerable to collisions, it is logical to assume that risks near auto-oriented land uses are even greater for children.[36] Indeed, in a study of child pedestrian-vehicle collision "hot spots" in Portland, Oregon, land uses in areas where children were struck most often were characterized by "auto-oriented retail . . . namely gas stations and fast-food drive thrus."[37]

A separate study of the top 34 pedestrian facility "hot spots" in the United States found that 97% were multilane roadways, 70% required pedestrians to cross five or more lanes, over 75% had speed limits over 30 mph, and nearly all had adjacent commercial land uses.[38] Each of these characteristics is present at the intersection of Imperial Highway and Flower Avenue. The addition of an auto-oriented drive-thru at Gaslight Square will only compound existing risks at the site, making the area even more dangerous to pedestrians generally, and Laurel Elementary students in particular.

O-32 (CONT.)

crossing streets."); *see also* Exh. 1 at 36 (noting high correlation between traffic volumes and child-pedestrian vehicle collisions); *see also* National Cooperative Highway Research Program (NCHRP) 17-87, Guide to Pedestrian Analysis at 39, attached as Exh. 18 (pedestrian crash-contributing factors include vehicle speed, land use type, and "[s]pecial populations, such as school-aged children, older adults, and persons with disabilities").

[33] Exh. 1 at 9; *see also* Building Safer Routes to School, United States Department of Transportation at 1, attached as Exh. 19 ("Children face unique limitations when crossing roads. Because of their small body size and developing minds, they often have difficulty detecting and judging speed and safe gaps in traffic.").

[34] Exh. 1 at 9.

[35] *Id.* at 43.

[36] *Id.*

[37] *Id.* at 43-44.

[38] Goodman, D., Hillman, T., Ciabotti, J., & Gelinne, D. (2022). Arterial Roads and Pedestrian Safety. Pedestrian and Bicycle Information Center, at 20, attached as Exh. 20.

Other southern California cities have taken notice of the safety risks posed by drive-thrus. In nearby Long Beach, the city recently published guidelines for drive-thru restaurants; one goal of the guidelines is to "[l]ocate drive-through facilities away from schools."[39] And in Santa Barbara, the city initiated public nuisance proceedings against the owner of a Chick-fil-A drive-thru.[40] A related memorandum written by Santa Barbara's transportation engineer notes that the drive-thru line can block one lane of the adjacent arterial street for up to 90 minutes on weekdays and 155 minutes on Saturdays.[41] The report further observes that queued vehicles block the path of pedestrian travel, forcing pedestrians to deviate from their normal path and through tightly spaced vehicles.[42] In addition to increasing the risk of pedestrian and vehicle collisions, this "creates a challenging condition for pedestrians with disabilities and mobility challenges."[43] It is easy to imagine a similar scenario here, as vehicles queueing in the Project drive-thru spill out onto Imperial Highway and, especially, Flower Avenue, blocking pedestrian access paths, and making conditions especially dangerous for children walking to and from Laurel Elementary.

O-32 (CONT.)

The DEIR utterly fails to contend with the clear fact that the increased, auto-oriented traffic generated by the Project will substantially increase the risk that Laurel Elementary students will be struck by vehicles. In any case, no adequate CEQA analysis can change this, nor can any mitigation measure render these safety impacts less-than significant. "***Regardless of design***, previous research has shown ***where there is more traffic near [a] higher density of children more child pedestrian-vehicle collisions will occur***."[44] The most effective way to reduce the number of child pedestrian-vehicle collisions is, unsurprisingly, "[e]liminating commercial uses that favor automobiles over pedestrians near areas where child pedestrians are likely to be."[45]

D. The DEIR Fails to Adequately Analyze the Project's Air Quality Impacts.

O-33

[39] October 2019 City of Long Beach Design Guidelines for Drive-Through Facilities, at 9, attached as Exh. 21.
[40] June 7, 2022 City of Santa Barbara Council Agenda Report at 1, attached as Exh. 22.
[41] January 11, 2022 City of Santa Barbara Public Works Department Memorandum re Traffic Conditions Associated with Chick-fil-A Queuing at 2, attached as Exh. 23.
[42] *Id.* at 3.
[43] *Id.*
[44] Exh. 1 at 44 (emphasis added).
[45] *Id.*

Consistent with its failure to consider the Project's clear land use, traffic, and safety impacts, the DEIR likewise fails to adequately analyze the Project's air quality impacts. It completely and inexplicably ignores the role that the proposed drive-thru will play in this calculation. For example, it states:

> According to [South Coast Air Quality Management District's] Localized Significance Threshold ("LST")] methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., transfer facilities and warehouse buildings). The proposed project *does not include such uses*, and thus, due to the lack of significant stationary source emissions, no long-term localized significance threshold analysis is needed.

DEIR at 4.2-14 (emphasis added). It is hard to understand the conclusion that the Project, which proposes a 2,000 square foot drive-thru, will not "attract[] mobile sources that may spend long periods queuing and idling at the site." *Id.* Indeed, that is precisely what drive-thru restaurants do: they bring cars to one place to form a line while customers wait in the idling vehicles to place their orders, pay, and pick up their food. The DEIR must conduct a long-term localized significance threshold analysis, or otherwise explain its unsupported conclusion that the proposed drive-thru is not a use that will attract queuing and idling mobile sources.

O-33 (CONT.)

The DEIR similarly dismisses the proposed drive-thru's role in the emission of operational pollutants:

> During long-term operation of the Project, there is no reasonable circumstance in which the on-site uses proposed would have the potential to emit substantial air pollutant concentrations. A 6,000 s.f. commercial building with a 2,400 s.f. sit-down restaurant and 3,600 s.f. of retail or medical offices uses and a 2,000 s.f. drive-through restaurant are not the types of uses known for emitting operational pollutants.

DEIR at 4.2-19. Again, this assertion defies both logic and reality: drive-thru restaurants are exactly the kinds of uses known for emitting operation pollutants. This fact is well-supported. For example, in a study that measured pollution levels at drive-thrus every fifteen minutes for two weeks, researchers found that Nitrogen Dioxide (NO_2) emissions

exceeded standards in as many as 61% of recorded measurements.[46] As the DEIR recognizes, NO_2 and other Nitrogen Oxides (NO_x) "are major contributors to smog formation and acid deposition" and may cause "numerous adverse health effects." DEIR at 4.2-3. The DEIR likewise notes that Nitrogen Oxides are "created during combustion processes," *i.e.*, as when vehicle engines burn fossil fuels. *Id.*

In addition to Nitrogen Oxides, numerous other toxic pollutants are produced when vehicles idle, including Carbon Dioxide (CO2), Carbon Monoxide (CO), and Volatile Organic Compounds (VOCs).[47] In fact, the U.S. Department of Energy estimates that idling for even ten seconds "uses more fuel and produces more emissions that contribute to smog and climate change than stopping and restarting your engine does.[48] Thus, vehicle idling "may result in enormous health and environmental consequence."[49] This is especially true for children "because vehicle emissions are more concentrated near the ground, where children breathe."[50] Likewise, "children's lungs are more susceptible to damage than adults' lungs are."[51] For this reason, the U.S. Department of Energy notes that schools offer "unique" public health protection opportunities, focusing especially on anti-idling campaigns targeting school buses.[52] It is unfortunate and ironic that here, parents, teachers, and other concerned members of the public must focus their energies on keeping the City from needlessly and inexplicably *adding* to the emission of pollutants near Laurel Elementary, when they should be focused instead on measures and campaigns to *decrease* those emissions.

O-33 (CONT.)

Even the "fast-casual" restaurant industry recognizes the air quality issues associated with drive-thrus. In 2021, QSR Magazine, a leading quick-service and fast-

[46] Anitha Chinnaswamy, Drive-throughs are busier than ever during the pandemic – but they're hotspots for air pollution, The Conversation (October 16, 2020), attached as Exh. 24.
[47] Hill, et. al, An Evaluation of the Effects of Drive-Through Configurations on Air Quality at Fast Food Restaurants, J Civil Environ Eng 2016, 6:3 at 1, attached as Exh. 25; *see also* Joe Cortright, Drive-thrus are ruining cities and helping kill the planet, City Commentary (July 12, 2021), attached as Exh. 26 (calculating based on U.S. Department of Energy data that ten minutes of idling produces a pound of carbon).
[48] U.S. Department of Energy, Idling Reduction for Personal Vehicles, attached as Exh. 27.
[49] Exh. 25.
[50] Exh. 27.
[51] *Id.*
[52] *Id.*

casual industry publication, published an article titled "The Environment and Drive-Thrus: Not an Idle Concern Anymore."[53] The article noted that customers spend an average of 11 minutes idling in drive-thru queues, and recognized that "[i]dling engines contribute to emissions and increased fuel consumption."[54] It further noted the U.S. Department of Energy estimate that "eliminating idling would be the same as taking 5 million vehicles off the roads."[55]

O-33 (CONT.)

"Conclusory comments in support of environmental conclusions are generally inappropriate." *Laurel Heights*, 47 Cal.3d at 404. And yet this is exactly what the DEIR does; it relies on conclusory and wholly unsupported assumptions—that the proposed drive-thru will not attract idling and queuing mobile sources, and that vehicles queuing at the proposed drive thru will not emit operational pollutants—to conclude both that no further analysis is warranted and that the Project's air quality impacts will be less-than significant. Because the DEIR lacks the analysis needed for the public to fully understand the Project's impacts, it is inadequate as a matter of law. *See Sierra Club v. County of Fresno* (2018) 6 Cal.5th 502, 511.

O-34

E. The DEIR Fails to Adequately Disclose and Analyze the Project's Land Use Impacts.

Pursuant to CEQA, the EIR should identify any inconsistencies between a proposed project and applicable general, specific, or regional plans. Guidelines, § 15125(d). Section X of Appendix G to the CEQA Guidelines further requires agencies to consider whether a project will cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. Guidelines, App. G, § XI(b). Here, the DEIR reaches the conclusion that the Project's land use impacts will be less than significant. DEIR at 4.10-12. Yet, as detailed below, this determination is wholly unsupported. The DEIR's land use impacts will be significant, unavoidable, and potentially devastating if the Project is approved.

O-35

1. The DEIR's Analysis Regarding the Project's General Plan Consistency is Incomplete and Unsupported.

The DEIR begins first with a discussion of relevant General Plan policies. Relying on a myopic understanding of the Project, the DEIR then determines that the Project

O-36

[53] *See* Exh. 28.
[54] *Id.*
[55] *Id.*

would not conflict with any of those policies. As detailed in the chart below, those determinations are unsupported and directly contract evidence in the City's possession.

General Plan Policy	Inconsistency
Policy CD-1.2: Maintain a land use structure that balances the provision of jobs and housing with available infrastructure and public and human services.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-5. The proposed Project would disrupt the land use balance by bringing a commercial use (drive-thru) that creates a significant safety risk to the public service (school) located directly across from it. This Project favors commercial land use at direct and significant expense to a public service land use.
Policy CD-1.9: Encourage new development that is organized around compact, walkable, mixed-use neighborhoods and districts to conserve open space resources, minimize infrastructure costs, and reduce reliance on the automobile.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-5. Inclusion of bicycle facilities and retention of existing sidewalks does not negate that a drive-thru restaurant would *increase* reliance on the automobile. Extensive use of automobiles is inherent to the drive-thru business model, and does not encourage walkable neighborhoods. *See* DEIR at 4.12-11 (Project will have "limited ability to promote alternative transportation modes…[as] a drive-thru restaurant…is inherently auto-oriented.").
Goal CD-19: Encourage active and inviting street environments that include a variety of uses within Commercial and Mixed Use areas.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-6. The Project's significant danger to pedestrian safety will not encourage "active and inviting street environments" for school children, care givers, or other pedestrians walking in the area.
Policy CD-23.2: Provide opportunities for mixed-use, office, manufacturing, and retail development that respond to market and community needs in terms of size, location, and cost.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-6. Locating a drive-thru restaurant with all of its traffic and pedestrian safety risks across from an elementary school drop-off/pick-up zone

O-36 (CONT.)

SHUTE, MIHALY & WEINBERGER LLP

General Plan Policy	Inconsistency
	is not responsive to "community needs" in terms of location.
Policy CD-23.4: Encourage new development along highly visible corridors that is pedestrian oriented and includes a mixture of retail, residential, and office uses.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-6. A drive-thru restaurant is not "pedestrian oriented." This business model relies on the extensive use of automobiles, which present direct safety risks to pedestrians using nearby crosswalks. *See* DEIR at 4.12-11 ("a drive-thru restaurant…is inherently auto-oriented.").
Housing Policy 1.4: Community Building – Encourage residential and mixed-use developments that focus on building community, incorporating outdoor features as living space, as well as providing a mix of amenities that benefit the surrounding neighborhood.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-6. Locating a drive-thru restaurant with all of its traffic and pedestrian safety risks across from an elementary school drop-off/pick-up zone does not "buil[d] community," but, in fact, endangers its members through increased pedestrian safety risk. This does not "benefit the surrounding neighborhood."
Goal CR-13: Encourage the expansion and retention of local-serving retail businesses (e.g., restaurants, family medical offices, drug stores) to reduce the number and length of automobile trips to comparable services located in other jurisdictions.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-7. The proposed Project would be in direct conflict with this goal, as it would increase the number of automobile trips to the Project Site, which would not be "local-serving," given the resulting safety impacts to the Laurel community.
Policy CR-13.5: Encourage alternative modes of transportation, such as walking, biking, and public transportation to reduce emissions associated with automobile use.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-7. A drive-thru restaurant relies on the extensive use of automobiles. *See* DEIR at 4.12-11 (Project will have "limited ability to promote alternative transportation modes…[as] a drive-thru restaurant…is inherently auto-oriented."). Though people could theoretically walk, bike, or take public transit to the area, the drive-thru business

O-36
(CONT.)

General Plan Policy	Inconsistency
	model is undeniably car-centered and will not reduce emissions.
Policy PS-3.1: Ensure that pedestrian safety is enhanced and maintained through the inclusion of well-designed streets, sidewalks, crosswalks, traffic control devices, and school routes throughout Brea.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-7. As discussed extensively above, the Project will have significant negative impacts on pedestrian safety, making the whole area more dangerous for school children and their caregivers. The street design, sidewalks, crosswalks (or lack thereof), traffic control devices (or lack thereof), and school route all weigh heavily against the Project, which will decrease pedestrian safety.

O-36 (CONT.)

The DEIR's analysis of Project consistency with the 2020 SCAG Regional Transportation Plan and Sustainable Communities Strategy is similarly flawed.

RTP/SCS Goals	Inconsistency
Goal Statement G2: Improve mobility, accessibility, reliability, and travel safety for people and goods.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-10. Locating a drive-thru restaurant with all of its traffic and pedestrian safety risks across from an elementary school drop-off/pick-up zone does not improve travel safety for school staff, children and their caregivers.
Goal Statement G3: Enhance the preservation, security, and resiliance of the regional transportation system.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-10. The DEIR asserts "there are no components of the Project that would result in substantial safety hazards to motorists or pedestrians" (*id.* at 4.10-9), but overwhelming evidence demonstrates that locating a drive-thru restaurant with all of its traffic and pedestrian safety risks across from an elementary school drop-off/pick-up zone will result in substantial hazards.

O-37

Goal Statement G6: Support healthy and equitable communities.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-10. The proposed Project would endanger Laurel Elementary students, including those who have to travel farther to attend the school as part of Laurel's magnet program.
Goal Statement G9: Encourage development of diverse housing types in areas that are supported by multiple transportation options.	The DEIR's assertion of "no conflict" is unsupported. DEIR at 4.10-10. The proposed Project does not have a housing component and would not encourage development of diverse housing types.

O-37 (CONT.)

Piggybacking on its unsupported "no conflict" findings, the DEIR attempts to further excuse this blatantly inappropriate Project by arguing that "[i]nconsistency with a goal or policy of an applicable plan is not itself an environmental impact [though s]uch an inconsistency may be read to indicate a likelihood of an environmental impact or to support such a conclusion." DEIR at 4.10-4. This misstates CEQA's land use significance threshold, and ignores the fact that the City may not lawfully approve a project that is inconsistent with its General Plan and zoning requirements. Guidelines, Appx. G(XI)(b); Section III, *infra*.

O-38

The DEIR further fails to recognize the sweeping, widespread incompatibility of locating a busy drive-thru across from an already over-trafficked elementary school pick-up/drop-off zone. This is not a mild inconsistency here and there with a plan's more aspirational statements, but rather a fundamental, pervasive unsuitability of the Project for this location that the DEIR refuses to acknowledge. Mischaracterizing the Project as "community-serving," when it would actually make the area decidedly more dangerous for the community's most vulnerable members, does not negate the truth of the Project's impacts. As discussed, the Project's fundamental incompatibility with the adjacent school zone has significant impacts on traffic, pedestrian safety, and air quality that the DEIR totally ignores. Because of this and the widespread inconsistency between the City's land management documents and the proposed Project, the DEIR's conclusion that the Project's land use impacts will be less than significant is inaccurate and unsupported. If approved, the Project's land use impacts will be significant, unavoidable, and dangerous to young children and their caregivers.

O-39

2. The DEIR's Analysis Regarding the Project's Consistency with the Brea City Code is Incomplete and Unsupported.

O-40

With respect to the Project's proposed zoning change, the DEIR asserts "[t]he Project would not conflict with any development regulations and design standards in the Zoning Ordinance pertaining to the Mixed-Use III zone, and there are no components of the Project's proposed Zone Change that would result in impacts to the environment that are not already evaluated and disclosed by this EIR. Impacts would be less than significant." DEIR at 4.10-9. This claim is unsupported and ignores conflicts between the proposed Project and Brea City Code that make Mixed-Use III zoning inappropriate for the Project Site.

As a preliminary matter, this Project is not the type of project intended under Mixed-Use III zoning. Thus, even with the proposed zone change, the Project would remain inconsistent with the City code. Mixed-Use III zoning is intended to revitalize deteriorated commercial corridors on arterials "by allowing the development of neighborhood-serving commercial uses." City Code § 20.258.010(A)(3)(a). For all the reasons described above, this Project will not be "neighborhood-serving," but will instead serve drivers from other neighborhoods while introducing significant harms and impacts to the neighborhood and the residents, students, staff, and other community members who need access to Flower Avenue. Indeed, with the ingress/egress driveways accessible via Flower Avenue and Orange Avenue, the Project will have the effect of bringing arterial-level outside traffic onto residential streets as customers enter and exit the drive-thru. *See* DEIR at 2.10. And the majority of that traffic will come from people who are not neighborhood residents, thereby sacrificing rather than serving the neighborhood—all in the name of ill-considered commercial gain. Mixed-Use III zoning is supposed to provide an appropriate buffer and transition between busy, arterial streets and residential areas behind them. Instead, this Project will take much of the extra traffic and danger associated with heavy commercial use and arterial streets and bring those impacts further into a school zone and residential area.

O-40 (CONT.)

The Project is also inconsistent and incompatible with a number of specific provisions related to Mixed-Use III zoning, including:

Code Provision	**Inconsistency**
Section 20.258.030(A)(4)(a): MU-III parcels of one (1) acre or greater in total new area shall provide a vertical and/or horizontal mix of nonresidential and residential uses.	The DEIR describes the Project as redeveloping a total of 0.95 acres. DEIR at 1-2. However, SAFE obtained information from City staff that contradicts these numbers. In a February 1, 2023 email, City staff identified the two parcels as equaling a combined 62,642 square feet,

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Code Provision	Inconsistency
	or 1.44 acres.[56] This means the Project would violate City Code requirements for a MU-III development of its size for failing to include a residential use.
Section 20.258.030(D)(1): MU-III development project shall be designed and constructed to: (a) Be pedestrian in its focus; (b) Allow for vehicles to park once; (c) Be compatible with and complement adjacent land uses; and (d) Maintain the scale and character of development along…Imperial Highway, and provide a transition to the adjacent residential uses in the surrounding area.	The proposed Project does not meet MU-III design standards. A drive-thru restaurant is decidedly focused on automobile traffic, not pedestrians. It would allow for a steady stream of vehicles to drive through and idle on the Project Site, with very few cars actually parking on site. A drive-thru restaurant is not compatible with the adjacent elementary school land use because it significantly decreases pedestrian safety and increases traffic. Given the existing traffic issues at the Imperial Highway and Flower Avenue intersection, the proposed drive-thru is out of scale and inappropriate for this site.
Section 20.258.030 (Table 2-8): MU-III has a maximum floor area ration (FAR) of 1.00 for nonresidential uses.	The FAR for the Project's current zoning is 1.5. The DEIR asserts that the new Project will have a FAR "that is less than what occurs on the Site under existing conditions," but does not provide the new FAR or clearly analyze whether it will be under the MU-III limit of 1.0. DEIR at 4.2-17.

O-41 (CONT.)

The Project also appears to be inconsistent with City of Brea Transportation Impact Guidelines, although the DEIR makes such consistency impossible to evaluate conclusively. The DEIR provides that its transportation analysis relied on the City's Transportation Impact Analysis Guidelines ("TIA Guidelines") (DEIR at 4.12-1) and likewise incorporates those guidelines by reference (DEIR at 7-3). However, in contrast

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[56] February 1, 2023 Email from Cecilia Madrigal-Gonzalez to Diane Stites re Parcel sized in Gaslight Square?, attached as Exh. 29.

to every other document the DEIR incorporates by reference, the DEIR does not provide a link to the TIA Guidelines, nor do they appear to be available on the City's website. In March 2022, the City's Public Works Department directed the Project applicant to "retain a Traffic Engineering firm to conduct a Transportation & Circulation Study including an LOS analysis of the proposed project in accordance with the City of Brea Transportation Impact Analysis Guidelines." Exh. 13 at 4 (emphasis added). As discussed above in Section II.C.3, the DEIR does not include or reference a Transportation & Circulation study or LOS analysis (see DEIR at 4.12-8). Thus, the Project appears to be inconsistent with this aspect of the TIA Guidelines. Because the DEIR does not attach or provide access to the TIA Guidelines, consistency with additional requirements contained in that document cannot be evaluated.

O-42 (CONT.)

3. The DEIR's Land Use Analysis Fails to Address the City's Inability to Make the Requisite Findings for the Proposed Conditional Use Permit.

The DEIR's land use impacts analysis fails to analyze or even mention the Project's current conditional use permit, issued in November 1988 ("1988 CUP"). The 1988 CUP explicitly prohibits "[f]ast food and sit-down restaurants" in recognition that those uses would not be "desirable for the development of the community" and would be "detrimental to existing uses," including the adjacent Laurel Elementary School.[57] The Project proposes issuance of a new conditional use permit ("CUP 2022-03"), which would permit the proposed drive-thru restaurant within a Mixed Use III zoning.

In deciding whether to issue a conditional use permit, the City must consider a number of factors "in determining the appropriateness of a location with respect to adjacent uses," including traffic, noise, other problems incidental to operation, the effect that such use may have on safety and welfare, and the compatibility of the use with the neighborhood or the community. City Code § 20.408.030(A) (Conditional Use Permit). None of the factors that led the City to prohibit fast food and sit-down restaurants in 1988 have substantially changed; if anything, the traffic and safety issues related to Laurel Elementary have worsened in the last 35 years. The DEIR's land use analysis does not address this current prohibition or explain how it will justify the changed land use under these factors. *San Joaquin Raptor Rescue Center*, 149 Cal.App.4th at 670 ("an EIR [must] reflect a good faith effort at full disclosure").

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For instance, the City Code requires the Planning Commission to make the following findings in approving a conditional use permit. For all the reasons present in

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[57] Brea City Council Resolution No. P.C. 33-56 at 2, 3, 6, attached as Exh. 30.

1988 and for all the reasons described above, the Planning Commission will not be able to do so.

Code Provision	Inconsistency
§ 20.408.030(D)(2): Planning Commission, in approving a conditional use permit, shall find as follows: [t]hat said use(s) with any conditions to be imposed is necessary or desirable for the development of the community, in harmony with the various elements or objectives of the General Plan, and not detrimental to existing uses…	The Planning Commission cannot find that the drive-thru is "necessary or desirable" for the development of the community. There is no evidence to support a finding of necessity, and the Laurel Elementary community and other residents have been extremely vocal about the undesirability of locating a drive-thru directly across from an elementary school that already suffers from dangerous traffic issues. This type of vehicle-intensive land use is in direct tension with and detrimental to the existing, adjacent school zone.
§ 20.408.030(D)(3): Planning Commission, in approving a conditional use permit, shall find as follows: [t]hat the site is adequate in size and shape to accommodate the proposed development and all of the yards, setbacks, walls or fences, landscaping, and other features required to bring about conformity with the other elements in the neighborhood.	The Planning Commission cannot find that the site is an adequate size to accommodate the proposed drive-thru, which will bring increased traffic to an already over-trafficked intersection.
§ 20.408.030(D)(4): Planning Commission, in approving a conditional use permit, shall find as follows: [t]hat the proposed site relates to streets and highways which are properly designed and improved to carry the type and quantity of traffic generated or to be generated by the proposed development.	The Planning Commission cannot find that Flower Avenue is properly designed and improved to carry the type and quantity of traffic that would be generated by the proposed drive-thru, especially when the street is already overburdened by Laurel Elementary School traffic during drop off/pick up times.
§ 20.408.030(D)(5): Planning Commission, in approving a conditional use permit, shall find as follows: [t]hat with the conditions stated in the permit,	The Planning Commission cannot find that the proposed drive-thru use will not adversely affect the public health, safety, and general welfare of the Laurel

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(CONT.)

the uses will not adversely affect the public health, safety, or general welfare.	Elementary community. As recognized in 1988 and as described in detail above, the proposed Project will have grave and significant safety risks to the public, especially to young children in the area.

O-44 (CONT.)

In sum, the DEIR's failure to address the Project's myriad, fundamental land use incompatibilities violates CEQA. *See, e.g., Endangered Habitats League, Inc. v. County of Orange* (2005) 131 Cal.App.4th 777, 783, 796 (EIR inadequate for failing to identify and discuss project's inconsistency with general plan's traffic policy).

F. The DEIR's Failure to Identify the Project's Significant Impacts Means it Also Fails to Provide Any Feasible Mitigation to Lessen these Impacts.

Under CEQA, a public agency must adopt any feasible measure that avoids or substantially lessens a project's significant environmental impacts. Pub. Resources Code §§ 21002, 21002.1(b); *Sierra Club*, 6 Cal.5th at 526. Accordingly, a fundamental purpose of the EIR is to identify all feasible mitigation for the project's significant effects. *King and Gardiner Farms*, 45 Cal.App.5th at 852 (agencies generally must adopt feasible mitigation to reduce significant effects to a level of insignificance); §§ 21002.1(a), 21061. If an agency rejects a proposed measure as infeasible, the rejection must be supported by substantial evidence and free of legal error. § 21168.5.

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Here, because the DEIR fails to adequately disclose and analyze the Project's significant transportation, public safety, air quality, and land use impacts, it also neglects to consider any feasible mitigation measures that might reduce these significant impacts. This omission further violates CEQA.

G. The DEIR Fails to Adequately Analyze Alternatives to the Project.

A proper analysis of alternatives is essential to comply with CEQA's mandate that significant environmental damage be avoided where feasible. Pub. Resources Code § 21002 (projects should not be approved if there are feasible alternatives that would substantially lessen environmental impacts); Guidelines §§ 15002(a)(3), 15021(a)(2), 15126(f). Every EIR must describe a range of alternatives to the proposed project that would feasibly attain the project's basic objectives while avoiding or substantially lessening the project's significant impacts. Pub. Resources Code § 21100(b)(4); Guidelines § 15126(d). Therefore, the discussion of alternatives must focus on project alternatives that are capable of avoiding or substantially lessening the significant effects

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of the project, even if such alternatives would impede to some degree the attainment of the project objectives or would be more costly. Guidelines; *see also Watsonville Pilots Assn. v. City of Watsonville* (2010) 183 Cal.App.4th 1059, 1089 ("[T]he key to the selection of the range of alternatives is to identify alternatives that meet most of the project's objectives but have a reduced level of environmental impacts.").

The DEIR does not analyze a single alternative that would both meet the Project's objectives and reduce impacts. DEIR at 6-17. This is not for lack of options. As discussed below, the DEIR failed to analyze the most obvious alternative: a no-drive-thru project, which would meet the Project's objectives and reduce the Project's safety and transportation impacts. The DEIR's failure to analyze an adequate range of alternatives violates CEQA. *Watsonville Pilots*, 183 Cal.App.4th at 1086.

O-46 (CONT.)

1. The DEIR's Failure to Adequately Describe the Project and Analyze Project Impacts Undermines the Alternatives Analysis.

As a preliminary matter, the DEIR's failure to disclose the severity of the Project's wide-ranging impacts or to accurately describe the Project necessarily distorts the document's analysis of Project alternatives. As a result, the alternatives are evaluated against an inaccurate representation of the Project's impacts. The City may have identified additional or different alternatives if the Project impacts had been properly analyzed and if the Project had been accurately described. As discussed throughout this letter, the DEIR fails to adequately evaluate the severity and extent of the Project's transportation, safety, air quality, and land use and planning impacts. An accurate accounting of the Project's impacts would significantly alter the substance and conclusions of the DEIR's alternatives analysis.

O-47

2. The DEIR Improperly Fails to Consider a No-Drive-Thru Alternative.

The DEIR analyzes three alternatives: 1) No Project Alternative; 2) General Plan Consistency Redevelopment Alternative ("GP Consistency Alternative"); and 3) South Flower Avenue Closure Alternative ("Flower Closure Alternative"). DEIR at 6-2. The GP Consistency Alternative proposes construction of two 6,500 square foot office buildings on the southern 0.95-acre portion of the Project Site, consistent with the site's existing land use and zoning designations. *Id.* at 6-8. The DEIR recognizes this alternative as environmentally superior, but notes that it does not meet any Project objectives. *Id.* The Flower Closure Alternative considers development consistent with the proposed Project, but proposes to close Flower Avenue at its intersection with Imperial Highway, east of the Project Site. *Id.* at 6-2.

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Beyond the GP Consistency and No Project Alternatives, the DEIR fails to contemplate an alternative that does not include a drive-thru component. However, as described above, the proposed drive-thru will cause and contribute to a number of significant transportation, safety, and air quality impacts. Therefore, a no-drive-thru alternative would substantially lessen these impacts. Among other things, it would generate fewer new vehicle trips, eliminate the auto-oriented land use associated with child-pedestrian vehicle collisions, and eliminate the likelihood of dangerous drive-thru queuing along Flower Avenue and Imperial Highway. Given a non-drive-thru alternative's ability to reduce the Project's significant safety and transportation impacts and the longstanding public opposition to siting a drive-thru across the street from Laurel Elementary School, the DEIR's failure to consider this alternative violates CEQA.

A non-drive-thru alternative could also readily meet all four of the Project's objectives:

- Expand economic development in the City of Brea by re-developing an underutilized property with in-demand commercial uses within a portion of the City that is planned for long-term commercial and mixed-use development.
- Provide a mix of commercial uses that are easily accessible to local residents and passers-by on SR-90 to assist in meeting the growing and evolving shopping demands of local residents in the City of Brea.
- Provide a gathering place for City residents and visitors that includes shopping and other retail services in an aesthetically appealing environment.
- Develop a commercial center near the Downtown Brea area which allows for a broad range of retail, office, or service-oriented business activities.

DEIR at 3.1. An alternative that eliminates the proposed drive-thru while still keeping the other components of the Project would satisfy all of these objectives. Even if a no-drive-thru alternative might achieve the Project's objective to a "lesser extent" than the Project—which is not clearly the case—this is not sufficient to eliminate it from consideration. *See Mira Mar Mobile Community v. City of Oceanside* (2004) 119 Cal.App.4th 477, 489.

The DEIR's failure to consider a no-drive thru alternative is especially egregious in light of the Project's close proximity to Laurel Elementary and repeated requests from SAFE, neighbors, Laurel parents and teachers, and other members of the public to keep auto-oriented and heavy traffic-generating land uses away from the school. The DEIR's

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(CONT.)

GP Consistency Alternative—which by apparent design meets none of the Project's objectives—is a strawman response to public concern regarding a drive-thru at the Project Site. *See Watsonville Pilots Assn. v. City of Watsonville* (2010) 183 Cal.App.4th 1059, 1089 ("The purpose of an EIR is *not* to identify alleged alternatives that meet few if any of the project's objectives so that these alleged alternatives may be readily eliminated.") (emphasis in original).

"A potentially feasible alternative that might avoid a significant impact must be *discussed* and *analyzed* in an EIR so as to provide information to the decision makers about the alternative's potential for reducing environmental impacts." *See Habitat & Watershed Caretakers v. City of Santa Cruz* (2013) 213 Cal.App.4th 1277, 1304 (emphasis in original). In this case, where the proposed Project presents very real dangers to Laurel Elementary students, caregivers, and teachers, it is especially important that the DEIR analyze alternatives that could avoid or lessen the Project's impacts. *See* Guidelines § 15126.6(c). The DEIR's failure to analyze a no-drive thru alternative violates CEQA. *See Habitat & Watershed Caretakers*, 213 Cal.App.4th at 1304-05; *see also Watsonville Pilots*, 183 Cal.App.4th at 1088 (city's failure to analyze reduced development alternative that met project objectives violated CEQA).

O-48 (CONT.)

3. Because the Flower Closure Alternative is Infeasible and Would Increase Environmental Impacts, It Is Not a Reasonable Alternative.

For an alternative to be considered, it must be able to substantially reduce the Project's significant environmental impacts or offer substantial environmental advantages over the proposed project. *See Watsonville Pilots,* 183 Cal.App.4th at 1089; *Cleveland Nat'l Forest Foundation v. San Diego Ass'n of Governments* (2017) 17 Cal.App.5th 413, 436. However, as the DEIR recognizes, the Flower Closure Alternative, which would close Flower Avenue at Imperial Highway, *increases* impacts under 10 of the 14 analyzed environmental impact categories. DEIR at 6-17. For example, this Alternative would increase Vehicle Miles Traveled "due to longer trips associated with rerouting." *Id.* at 6-15. It would also require vehicles typically accessing Flower Avenue from Imperial Highway to be rerouted to other nearby streets, creating more traffic on Brea Boulevard, Orange Avenue, and other local streets near the Project site. *Id.* at 6-15-16. As the DEIR notes, this rerouting could reduce collisions at Imperial Highway and Flower, but "increase collision frequency on Orange Avenue, Birch Street, and/or the South Flower Avenue access on Birch Street." *Id.* at 6-16. Accordingly, the DEIR concludes this alternative "would have a greater safety impact than the proposed Project." *Id.*

O-49

Though the DEIR fails to specifically recognize or analyze it, this Alternative would likewise wreak havoc on Laurel Elementary pick up and drop, much of which consists of vehicles turning north on Flower Avenue from Imperial Highway to access the school. It is unclear how this school traffic would be rerouted, especially considering the findings contained in the Laurel Circulation and Parking Plan, which recognizes that there is already "[n]ot enough queue space on site," and that "[t]he site is constrained due to the historic nature of the building and proximity to a major highway."[58]

In addition to substantially reducing a proposed project's impacts, reasonable alternatives must also be feasible. Guidelines § 15126.6 (EIR "shall describe a range of reasonable alternatives to the project . . . which would feasibly attain most of the basis objectives of the project"). An alternative is feasible if it is "capable of being accomplished in a successful manner within a reasonable period of time." Pub. Resources Code § 21061.1. The South Flower Alternative is not feasible for a number of reasons. As the DEIR notes, implementation of the Alternative's "offset cul-de-sac" design would require the City to obtain an easement over Laurel Elementary School grounds. DEIR at 6-12. There is no indication that the Brea Olinda Unified School District would agree to grant such an easement, especially considering that the Alternative would create such major problems with Laurel pick-up and drop-off. The DEIR provides no indication or evidence that the necessary right-of-way could be attained at all, let alone within a "reasonable period of time." Pub. Resources Code § 21061.1. It is therefore not a reasonable alternative.[59]

O-49 (CONT.)

4. The DEIR's Rejection of an Alternative Site Analysis Is Unsupported.

"Reason requires that the agency charged with the duty to protect the environment compare impacts at feasible alternative locations." *Citizens of Goleta Valley v. Board of Supervisors* (1988) 197 Cal.App.3d 1167, 1180. This is especially true where, as here, a project proposes to change a site's land use designation. Practice Under the California

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[58] Exh. 3 at 5.

[59] Moreover, as discussed above in Section II.C, the DEIR fails to describe the rationale for selecting this alternative. *See* Guidelines, § 15126.6(c). Though the DEIR nominally provides that it would "potentially improve pedestrian safety associated with Laurel Elementary School" (DEIR at 4.12-11), it offers no description or analysis of the Laurel-related pedestrian safety impacts associated with the Project and/or how the South Flower Closure Alternative would improve those impacts as compared to the Project.

Environmental Quality Act (2d ed Cal CEB), § 15.26 ("A proposed change in allowed uses raises a policy question of whether the site is appropriate for the new use.").

The DEIR dismisses the need for an analysis of alternative sites, reasoning in part that development at an alternative location would likely result in similar or greater environmental impacts. DEIR at 6-3. This conclusion is unsupported and contradicted by substantial evidence that the Project will have significant, site-specific impacts on pedestrian safety near the Project Site. See Section II.C, above. To put it bluntly: at what potential alternative site is there an elementary school in *closer* proximity, or *more* schoolchildren walking to and from school adjacent to the site? What significant impacts could be of greater concern than the safety of Brea's children? The DEIR's failure to acknowledge the glaring problems with locating a drive-thru at *this* site obscures the obvious conclusion that the City should consider whether another site is a better fit.

O-50 (CONT.)

The DEIR's reasoning that "there are no other properties available for purchase by the Project Applicant in the City of Brea that are zoned for mixed use with similar accessibility to a State Route" is similarly unpersuasive. DEIR 6-3. As an initial matter, the Project Site itself is not zoned for mixed use, hence the necessity of a zone change and General Plan amendment. DEIR at 3-5. It is therefore inappropriate to write-off alternative sites on the basis that they are not already zoned consistent with the Project. *Save Round Valley Alliance v. County of Inyo* (2007) 157 Cal.App.4th 1437, 1459 ("mere fact that an alternative would require an amendment to the general plan or a change in zoning designation is an insufficient basis for rejecting an alternative"). Moreover, at least one court has rejected the argument that a city may avoid alternative site analysis based on a contention that there are no feasible sites available for purchase by an applicant property owner. *See Citizens of Goleta Valley*, 197 Cal.App.3d at 1179-80. In that case, the court found that though a proposed visitor-serving development which required zoning and general plan changes was desirable, "[w]hether its location should be the [proposed site] or elsewhere depends upon the relative merits and demerits remaining after maximum amelioration of environmental impacts." *Id.* at 1179. The court reasoned that the "goal of CEQA" is "[s]erving the public purpose *at minimal environmental expense* . . . Ownership of the land used and the identity of the developer are factors of lesser significance." *Id.* (emphasis added).

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III. The Proposed Project Fails to Comply with the General Plan and Zoning Code.

In addition to creating significant CEQA land use impacts, the Project's myriad General Plan inconsistencies violate State Planning and Zoning Law (Gov't Code § 65000 et seq.), which requires that development decisions be consistent with the

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jurisdiction's general plan. *See, e.g.*, Gov't Code §§ 65860, 66473.5, 66474, 65359, 65454. Thus, "[u]nder state law, the propriety of virtually any local decision affecting land use and development depends upon consistency with the applicable general plan and its elements." *Resource Defense Fund v. County of Santa Cruz* (1982) 133 Cal.App.3d 800, 806. Accordingly, "[t]he consistency doctrine [is] the linchpin of California's land use and development law." *Families Unafraid to Uphold Rural El Dorado County v. Board of Supervisors* (1998) 62 Cal.App.4th 1332, 1336 (citation omitted).

It is an abuse of discretion to approve a project that "frustrate[s] the General Plan's goals and policies." *Napa Citizens for Honest Government v. Napa County* (2001) 91 Cal.App.4th 342, 379. The project need not present an "outright conflict" with a general plan provision to be considered inconsistent; the determining question is instead whether the project "is compatible with and will not frustrate the General Plan's goals and policies." *Id.* Here, the proposed Project does more than just frustrate the General Plan's goals. It is directly inconsistent with numerous provisions in the General Plan—a violation of State Planning and Zoning Law. As discussed above in Sections II.B.3 and II.E.1, the DEIR's claims regarding the Project's General Plan consistency are baseless. The Project is fundamentally antithetical to the location of the Project Site and its surrounding land uses, and may not be approved under State Planning and Zoning law.

O-52 (CONT.)

Moreover, a city's land-use approvals must comply with the city's own ordinances. *Robison v. City of Oakland* (1968) 268 Cal.App.2d 269, 274. Indeed, it is a "cardinal principle" of California land-use law that "land-use permits must be consistent with zoning." *Land Waste Management v. Contra Costa County Bd. of Supervisors* (1990) 222 Cal.App.3d 950, 959. As discussed above in Sections II.E.2 and II.E.3, the Project is not consistent with the proposed new zoning for the site, and the City cannot make the findings required for a conditional use permit.

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For all of the foregoing reasons, we respectfully submit that the City cannot lawfully certify the DEIR or approve the Project. The DEIR is deeply flawed, fails to inform the public of the full impacts of the Project, and cannot support the findings required by CEQA. Before considering this Project further, the City must fully analyze the Project's numerous significant impacts, develop adequate, enforceable mitigation measures, and analyze a reasonable range of alternatives that would avoid or substantially lessen impacts. As currently proposed, this ill-advised Project must be denied.

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SHUTE, MIHALY & WEINBERGER LLP

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP



Gabriel M.B. Ross

SHUTE, MIHALY & WEINBERGER LLP

RESPONSES TO COMMENT LETTER O:
Safer Avenues for Everyone (SAFE)

O-1: This introductory comment introduces SAFE, discusses their mission, and expresses general concern that the DEIR fails to adequately disclose, analyze, and mitigate the Project's significant impacts, including those to transportation and public safety. As demonstrated in the below responses, the DEIR's conclusions that the Project's impacts would be less than significant are supported by facts, reasonable assumptions based on facts, and expert opinion supported by facts. The Project's impacts are appropriately determined to be less than significant after the application of feasible mitigation measures and no additional mitigation is warranted.

O-2: SAFE provides a description of the proposed Project. The comment is acknowledged.

O-3: SAFE expresses general concern that the DEIR does not disclose or acknowledge the severity of the Project's impacts and provides an opinion that approving a drive-thru across from an elementary school could result in significant impacts that cannot be avoided through mitigation, and cites one study from 2012 in the State of Oregon about a correlation of traffic volumes to frequency of child-vehicle collisions. As is documented in several of the comment letters received on the DEIR including from the BOUSD itself (see comment letter B), the traffic congestion issues experienced at Laurel Elementary School stem from existing conditions and the drop-off and pick-up process including use of the South Flower Avenue public right-of-way for pick ups and drop offs. The frustrations and concerns expressed relate to the existing baseline condition, which are irrelevant to the proposed Project.

SAFE is referred to the draft Laurel Elementary School Traffic Circulation and Parking Study that the BOUSD attached to their comment letter and that is dated February 27, 2022. The Study identifies 27 recommendations to address the existing condition, which are a mix of physical and operational improvements separated into quick-action, short-term, and long-term approaches to improve parking and student pick-ups and drop-offs. Existing operations at the school including pick-up and drop-off patterns were considered as part of the Project's *Safety Study* included as DEIR Technical Appendix I, which concludes that the Project's transportation safety impacts would be less than significant under the environmental topics pertinent to CEQA. The DEIR also includes an alternative (refer to DEIR Subsection 6.3.6) that evaluates the potential closure of South Flower Ave at Imperial Highway as an alternative means to improve transportation safety. This alternative and other potential improvement recommendations are addressed in the *Safety Study* and also in the Project's *Traffic Study* dated April 5, 2023 that was prepared by professional traffic engineers at Urban Crossroads. Considering all available and relevant information, the DEIR, Subsection 4.12, *Transportation*, and Technical Appendices H1 and I conclude that the Project would not have a significant environmental effect related to transportation safety based on the site-specific conditions of the Project site and vicinity, which are not comparable to conditions in the commenter's cited 2012 study from the State of Oregon.

O-4: SAFE expresses opinion that the City Council can and should exercise its discretionary authority to deny the Project and makes reference to a previous project that was proposed at the Project Site. The commenter's opinion is acknowledged.

O-5: SAFE states that the traffic conditions at Imperial Highway and Flower Avenue have not improved, that the number of students and staff that walk to school has not decreased, and makes an unsupported speculative conclusion the proposed Project's impacts on transportation and public safety will be worse. Refer to DEIR, Subsection 4.12, *Transportation*, which assesses potential transportation impacts resulting from implementation of the Project, and based on a *Trip Generation Assessment* (DEIR Technical Appendix H1), a *Safety Study* (DEIR Technical Appendix I), and a *VMT Screening Analysis* (DEIR Technical Appendix H2) prepared for the Project, appropriately concludes that that the Project's transportation impacts would be less than significant under the CEQA Statute and Guidelines. Also, although not required by CEQA for the reasons stated on DEIR page 4.12-1, a *Traffic Study* for the Project dated April 5, 2023, is included in the City's administrative record for the Project and will be considered by the City when deliberating on the Project, but is not a basis for the Project's environmental impacts under CEQA.

O-6: SAFE suggests that the City Council deny the Project on the grounds of environmental impacts and General Plan inconsistency. First, the DEIR appropriately concludes that the proposed Project would not result in any significant and unmitigated impacts after the application of feasible mitigation measures. Second, the DEIR, Subsection 4.10, *Land Use and Planning*, provides a detailed description of the City of Brea General Plan and as summarized in Table 4.10-1, concludes that the Project would be consistent with or otherwise not in conflict with applicable General Plan goals and policies related to environmental effects. A discussion of zoning is also included in DEIR Subsection 4.10, page 4.10-9, which concludes the Project would not conflict with any development regulations and design standards in the Zoning Ordinance pertaining to the proposed Mixed Use III zone.

O-7: SAFE claims that the DEIR is inadequate under CEQA and that it lacks a legally defensible description of the Project, fails to provide the necessary evidence or analysis to support its conclusions that the environmental impacts would be less than significant, and dismisses the obvious safety impacts that the Project will have on students. The commentor expands on these claims in comments O-8 through 57 and the commenter is referred to Responses O-8 though O-57.

O-8: SAFE contends that the DEIR contains bare and unsupported conclusions, which is incorrect. The Draft EIR is supported by 11 technical studies (see DEIR Technical Appendices A through J) and over 130 reference sources cited in EIR Section 7.0, *References*. The DEIR's conclusions are supported by facts and analysis and the DEIR is legally adequate and analytically sufficient to support its conclusions.

O-9: SAFE opines that the DEIR's project description is vague and precludes meaningful public review of the Project because it does not disclose the end users of the proposed Project's buildings. The description of the Project is not vague and includes all of the requirements of a project description required under CEQA Guidelines Section 15124. The project applicant is proposing the Project on a

speculative basis, meaning that the occupants/operators of the proposed buildings are not known at this time. This is very typical in the commercial development business because building tenants will not usually commit to a building and sign a lease for a building that is not yet entitled/approved. The Project is not proposed as a built-to-suit project, meaning that any number of building users could lease the buildings for which the building and site design fits the user's operating characteristics and needs. Reasonable assumptions have been made in the DEIR and its technical analyses about the expected operating characteristics of the building users, based on the proposed building types and design. When it is difficult to forecast future actions or events, an EIR may rest its analysis on reasonable assumptions. *State Water Resources Control Bd. Cases* (2006) 136 CA4th 674, 797. An EIR also may rely on reasoned predictions by experts, which include the expertise of the Project applicant and technical experts in projecting the building user types for the proposed buildings. *City of Long Beach v City of Los Angeles* (2018) 19 CA5th 465, 481. Forecasts in an EIR also may be based on the assumption that the project will be developed in a way that conforms to applicable legal requirements, including the City's Municipal Code that regulates permissible uses and operating characteristics in the Mixed Use III zone. *Citizens for a Sustainable Treasure Island v City & County of San Francisco* (20 14) 227 CA4th 1036, 1067.

O-10: SAFE repeats that the DEIR fails to identify the future tenants of the Project's buildings and that the type of retailers envisioned for the proposed Project should be disclosed. As discussed above in Response O-9, the Project applicant does not have any tenants committed to the buildings; also, commercial buildings frequently re-tenant over time; as such, the analysis in the DEIR studies the typical operating characteristics of a sit-down restaurant, retail/medical building, and fast-food restaurant with drive-thru, which for analytical purposes is studied as a drive-thru coffee/donut shop (see Draft EIR Table 4.12-2) because the Institute of Transportation Engineers (ITE) Trip Generation Manual applies a higher traffic trip rate to a drive-thru coffee/donut shop (533.57 trips per 1,000 sf. of building space; ITE Code 937) than it does to a general fast-food with drive-thru restaurant (470.95 trips per 1,000 s.f. of building space; ITE Code 934), thus ensuring a conservative and more impactful basis of Project impact.

O-11: SAFE states that the DEIR contains a nominal operational characteristics section and requests additional information about the Project's expected operations and particularly related to vehicle trip generation and operation of the drive-thru lane. As stated in Responses O-8 and O-9, the DEIR made reasonable assumptions about the Project's expected operating characteristics. Nonetheless, in response to this comment, DEIR Subsection 3.4.2, *Operating Characteristics*, has been supplemented in the Final EIR with the following information. The addition of this text is not new information and merely supplements and amplifies information that was disclosed in the DEIR. The DEIR disclosed the Project's Site Plan including the drive-thru lane design detail on Figure 3-6 and disclosed the Project's trip generation characteristics in Table 4.12-2.

> According to the Project's *Trip Generation Memo* (DEIR Technical Appendix H1) and the Project's *Traffic Study* dated April 5, 2023, prepared by Urban Crossroads, and appended to the Final EIR, it is expected that 1,522 vehicle trips per day would access the new buildings proposed at the Project Site (761 inbound and 761 outbound), and that 650 of those trips (325

inbound and 325 outbound) would stop at the site as they are already passing by the site and would not be a net new trip to the circulation network. As such, the Project would generate 872 new trips (1,522 – 650 = 872). Because the existing uses on the Project Site that are proposed to be demolished are calculated to generate 362 trips per day, the net new number of trips calculated to be generated by the Project are 510 trips per day (255 inbound and 255 outbound) of which 75 trips would occur during the AM peak hour (7-9 a.m.), 21 trips would occur during the mid-day peak hour (over the Laurel Elementary School dismissal period) and 46 trips would occur during the PM peak hour (4-6 p.m.). Vehicles would enter and exit the Site at existing driveways connecting with South Flower Avenue and Orange Avenue, with 65 percent of the vehicles expected to use the South Flower Avenue driveway and 35 percent of the vehicles expected to use the Orange Avenue driveway. These trips would be in addition to trips accessing the two on-site buildings that are proposed to remain and would not be demolished.

Under existing conditions, the South Flower Avenue & Imperial Highway intersection is congested and operates and Level of Service (LOS) F; the addition of Project traffic would add to the congestion and improvements would be required to bring the intersection to an acceptable LOS. As presented in the Project's *Traffic Study*, options to improve the intersection include the installation of a traffic signal, implementing a right-in/right-out access restriction for the northern leg of South Flower Avenue at Imperial Highway, or closing the northern leg of South Flower Avenue at Imperial Highway in a cul-de-sac. None of these improvements are proposed by the Project applicant as part of the proposed Project, but would be considered by the City during its deliberations on the proposed Project. (Refer to DEIR Subsection 6.2.3, which analyzes a *South Flower Street Closure Alternative*).

As shown on Figure 3-6, the Project's proposed drive-thru lane internal to the site at the drive-thru restaurant is designed to provide approximately 257 feet of storage length for vehicles. Approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. Based on the proposed site plan, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles can be accommodated in the 110 feet from the order board to drive isle. Per City of Brea Municipal Code Section 20.08.040, Off-Street Parking and Loading, "Drive through" or "Drive in" restaurants are required to provide a minimum of 160 feet of stacking space, as measured from the pick-up window, for each drive through lane. The Project's site plan accommodates a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet. As such, the Project more than meets City standards for drive-thru lane capacity.

O-12: SAFE suggests that the DEIR uses an inaccurate baseline to evaluate the Project's transportation impacts. The City disagrees and affirms that an accurate baseline was used as explained in Responses O-13 to O-18.

O-13: SAFE claims that the DEIR ignored existing traffic and circulation problems, especially related to Laurel Elementary School-related pick-up and drop-off traffic. The DEIR and its technical analyses did not ignore the baseline condition. Although, the draft Laurel Elementary School Traffic Circulation and Parking Study attached to comment letter B was not specifically referenced in the DEIR because it is draft study and not yet approved and although level of service (LOS) based impacts were removed as a basis of determining a project's significant environmental effects under CEQA by the California Natural Resources Agency (CNRA) in December 2018 and replaced with a vehicle miles traveled (VMT) evaluation metric, the baseline of Laurel Elementary School's congested pick-up and drop-off conditions were nonetheless considered. In fact, a South Flower Avenue Closure Alternative is included in the DEIR on pages 6-12 to -16 to specifically address congestion relief at the South Flower Avenue & Imperial Highway intersection. In response to this comment, the following text is added to the FEIR under Subsections 2.6.8 and 4.12.1. The addition of this text is not new information and merely supplements and amplifies information that was disclosed in the DEIR. The DEIR disclosed the location of Laurel Elementary School, that students walk to and from school, that crossing guards are present, and that there is associated traffic congestion, prompting the DEIR's inclusion of a "South Flower Avenue Closure Alternative" (DEIR pages S-4, 1-5 to 1-11, 2-1, 2-10, 4.10-7, 4.12-9).

> Under existing conditions, traffic congestion occurs around Laurel Elementary School east of the Project Site during student pick-up and drop-off times. As documented in a draft Laurel Elementary School Traffic Circulation and Parking Study prepared by Kittelson & Associates and dated February 27, 2022 (refer to Comment B-19) the goals of the Study are to recommend improvements that would facilitate enhanced pedestrian safety, reduce queueing within the public right-of-way, and add additional parking for the school's staff, parents, guardians, and visitors. The draft Study identifies 27 recommendations, which are a mix of physical and operational improvements, but the Study is not yet approved. Kittelson reported that based on their observations and interviews with BOUSD staff in 2021, pick-up and drop-off activities usually occur on South Flower Avenue, in the school's parking lot, and in the front of the school. Queues from Flower Avenue were reported by Kittelson to spill onto Birch Street and Imperial Highway. Teachers also have observed that some adults try to pick up students on Imperial Highway (Kittelson, 2022). This is an existing condition, unrelated to existing operations at the Project site, although it is known that vehicles waiting for student pick up trespass onto the Project Site to park and wait for student pick up. The existing conditions, including at the mid-day peak hour during school dismissal hours, are documented in the Project's *Traffic Study*, prepared by Urban Crossroads and dated April 5, 2023 (Urban Crossroads, 2023g).

O-14: SAFE states that the DEIR's cursory reference to the school driveways across from the Project Site is incomplete and lacking information about longstanding circulation problems associated with Laurel Elementary pick-up and drop-off. The commenter is referred to Response O-13, which explains that text has been added to the FEIR to more thoroughly explain the baseline condition. The commenter also is referred to the Project's *Traffic Study*, prepared by Urban Crossroads and dated April 5, 2023, which includes detailed information on existing traffic volumes (Urban Crossroads, 2023g).

O-15: SAFE states that the Laurel Elementary Circulation and Parking Plan's findings are consistent with the public comments submitted to the City on a project that was previously proposed on the Project site that included a proposed Raising Cane's restaurant. The comments are noted, and consistent with Response O-13 and the Project's *Traffic Study*, which acknowledges the baseline condition and the fact that vehicles waiting for student pick up trespass onto the Project Site to park and wait for student pick up.

O-16: SAFE asserts that the DEIR does not mention the issues presented in the Laurel Elementary Circulation and Parking Plan, suggesting that as a result, the DEIR presents flawed conclusions and underestimates Project's impact on a congested and heavily-trafficked area. The City disagrees that the conclusions are flawed. The Project's *Safety Study* relies on accurate baseline data, including hour-by-hour traffic counts collected at area intersections in September and December 2022 when Laurel Elementary School was in session. A daytime peak hour also was assessed in recognition of the school's dismissal schedule. The commenter is referred to the over 350 pages of traffic count data reported for vehicles, pedestrians, and bicycles, attached as Appendix B to the *Safety Study*. This data provides an objective and accurate reporting of the baseline condition, including existing queuing issues at the intersections of South Flower Avenue & Imperial Highway and South Flower Avenue & East Birch Street. Human behaviors noted in this comment, including shouting, frantic emotions, and horn honking during school pick up and drop off times are noted.

O-17: SAFE incorrectly states that the DEIR's estimate of existing vehicle trips at the Project Site is flawed because it assumes that that none of the counted vehicle trips were associated with either Brea Dentistry or Curtis Orthodontics which are to remain on the Project Site. As stated in the Project's *Traffic Study* prepared by Urban Crossroads and dated April 5, 2023:

> The Project includes the demolition of 4 existing buildings in order to redevelop the site with the proposed uses. These 4 buildings are currently occupied and generating traffic. In an effort to understand the existing traffic associated with the current uses, traffic counts were collected at the driveways on September 20 and 21, 2022 (Tuesday and Wednesday). Laurel Elementary was in session on these dates, although Wednesday is an early release day where school still starts at 8:00 AM but releases at 1:25 PM (regular release is at 2:10 PM). A summary of the count data collected is shown on Appendix 1.1. <u>It should be noted that the site also includes two other buildings that will remain on the site and traffic associated with these uses have **not** been included in the driveway data collected</u> [emphasis added]. The two buildings that are to remain are located on Assessor's Parcel Number (APN) 319-292-31 and APN 319-292-33. (Urban Crossroads, 2023g, p. 45).

O-18: SAFE again incorrectly asserts that the DEIR relies on inaccurate and inflated baseline trip counts, assuming that Brea Dentistry and Curtis Orthodontics trips were not excluded. These trips attributed to uses that will remain on the Site were properly excluded, as explained in Response O-17.

O-19: SAFE questions why the ITE trip rate for coffee/donut shop was used for the proposed fast food restaurant. As discussed previously in Responses O-9 and O-10, the Project applicant does not have

any tenants committed to the buildings. For analytical purposes in the EIR, the proposed fast-food restaurant with drive-thru is studied as a drive-thru coffee/donut shop (see Draft EIR Table 4.12-2) because the Institute of Transportation Engineers (ITE) Trip Generation Manual applies a higher traffic trip rate to a drive-thru coffee/donut shop (533.57 trips per 1,000 sf. of building space; ITE Code 937) than it does to a general fast-food with drive-thru restaurant (470.95 trips per 1,000 s.f. of building space; ITE Code 934). Peak hour rates also are higher. By use of ITE Code 937 instead of ITE Code 934, the higher trip rate was used, ensuring that the EIR studied the more impactful potential use of the building.

O-20: SAFE states that some fast food operators generate more traffic than would be predicted by use of an ITE Code. The DEIR evaluates the proposed Project based on reasonable assumptions and foreseeable actions, as required by CEQA. The number of vehicle trips that the Project is expected to generate is based on the Project's design and recommendations from the Institute of Transportation Engineers (ITE) in their *Trip Generation Manual* (11th Edition), which relies on surveyed data from other similar buildings and which is reasonable and reliable information. The City of Brea and nearly every CEQA lead agency across California relies on the ITE Trip Generation Manual as the source of reliable and reasonable assumptions for development projects and particularly projects with speculative users/tenants such as the proposed Project. The ITE Trip Generation Manual identifies that if a restaurant has outdoor seating, its area is not included in the overall gross floor area. Seating indoors and outdoors will be identified by a future tenant. ITE identifies that if a restaurant has significant outdoor seating, then the number of seats may be a more reliable independent variable for determining trip generation as opposed to the use of gross floor area. However, the trip generation rates for the coffee/donut shop restaurant land use during the peak hours are based on a limited number of surveyed sites (data points) and there is no weekday daily rate available based on number of seats. As such, gross floor area would appear to be the best available trip generation rate to use in this case for the proposed coffee/donut shop with drive-through restaurant use. An EIR is not required to include an analysis of an unlikely worst-case scenario and need only evaluate impacts that are a reasonably foreseeable consequence of the project. *High Sierra Rural Alliance v County of Plumas* (2018) 29 CA5th 102, 122.

O-21: SAFE opines that the DEIR's pass-by reduction assumptions are inappropriate. The commenter is referred to Response O-11, which explains that regardless of the pass-through percentage assumption, the DEIR's analyses and the *Safety Study* assume that 1,522 vehicle trips per day would access the Project Site and use the Project Site's driveways, in addition to trips traveling two and from the two existing buildings that would not be demolished. The Safety Study evaluates the circulation of vehicles, pedestrians, and bicyclists within the study area. The existing conditions of the circulation network are reviewed in accordance with the *California Manual on Uniform Traffic Control Devices* (CA MUTCD) and City Municipal Code standards in addition to the potential increase in traffic mix (vehicles, pedestrians, and bicyclists). The pass-by reductions applied to the proposed retail, restaurant, and coffee-shop uses are reduced by approximately 40% over the average pass-by reductions identified by the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021). The ITE identifies a 43% pass-by reduction for sit-down restaurant use and 40% for retail, however, both of these uses have been limited to 25% in the traffic study. The ITE identifies a 90-98% pass-by reduction for the coffee/donut shop with drive-through window use which has been limited to 50% in

the traffic study. The Traffic Engineer previously indicated a pass-by trip reduction of 35% or less for the prior Raising Cane's use, which is approximately a 30% reduction over the ITE recommended 50-55% pass-by reduction for a fast-food restaurant with drive-through window use. As such, the Project's pass-by reduction can be considered more conservative since the pass-by applied in the traffic study has been reduced by up to 40% from the ITE recommended percentages. Although the site does not have direct access to Imperial Highway, it is not unreasonable to assume that there would be pass-by trips from Imperial Highway accessing the site on both Orange and Flower. Consistent with the ITE pass-by reduction methodology, the pass-by reduction trips have only been accounted for at off-site intersections. In other words, the pass-by reduction has been added back at the driveways on Orange and Flower in addition to the intersections of Orange and Flower along Imperial Highway (although typically it would only be added back to the driveways only). Therefore, the intersection operations analyses conducted at the Project driveways and the two intersections of Orange and Flower on Imperial Highway is conservative as it adds back the Project trips turning into and out of Orange and Flower (does not underestimate traffic volume or potential deficiencies).

O-22: SAFE confuses the calculations of total trips for the new proposed buildings, net new trips, and number of projected employees. The commenter is referred to Response O-11, which explains that 1,522 vehicle trips per day are projected to access the new proposed buildings. In comparison, 611 employees are expected to be employed at the Project Site, including in the two buildings that would not be demolished, which is a reasonable projection based on the average number of employees per acre for retail/service uses reported by the Southern California Association of Governments (DEIR page 3-18). The ITE rates used to calculate trips expected from the proposed sit-down restaurant, retail/medical building, and fast-food restaurant with drive-thru, represent total trips and are inclusive of employee, vendor, and visitor trips.

O-23: SAFE contends that the DEIR fails to disclose Project-related inconsistencies with applicable transportation policies found in the City's General Plan. The City disagrees and finds the Project to be consistent with the Community Development Element of the City's General Plan as demonstrated on DEIR pages 4.12-8 to -12. Also, it is well-established that a project does not have to be consistent with each and every goal or policy in a plan to be found consistent with the overall intent of the plan. Determination of consistency requires only that the proposed project be "compatible with the objectives, policies, general land uses, and programs specified in" the applicable plan. (Cal. Gov. Code § 66473.5.) The courts have interpreted this provision as requiring that a project be "in agreement or harmony with the terms of the applicable plan, not in rigid conformity with every detail" of it. (*San Franciscans Upholding the Downtown Plan v. City & County of San Francisco* (2002) 102 Cal.App.4th 656, 678; see also *Friends of Lagoon Valley v. City of Vacaville* (2007) 154 Cal.App.4th 807.)

O-24: SAFE opines that the DEIR fails to adequately analyze the Project's safety impacts. The City disagrees and the commenter is referred to Responses O-3, O-5, O-13, O-14, O-16, and O-21.

O-25: SAFE repeats Comments O-13 and O-14 and is referred to Responses O-13 and O-14.

O-26: SAFE partially repeats Comments O-15 and O-16 and is referred to Responses O-15 and O-16.

O-27: SAFE asserts that the DEIR and Project's *Safety Analysis* do not thoroughly enough evaluate the Project's potential effects on pedestrian safety but does not provide any substantial evidence to present a counter argument that the Project would create a significant impact. Of note, the commenter acknowledges that there are existing pedestrian safety concerns that are caused by Laurel Elementary School's student pick up and drop off operations east of the Project Site. This is an existing condition that is unrelated to the Project Site or the proposed Project.

Complaints, fears, and suspicions about a project's potential environmental impacts do not constitute substantial evidence. See *San Joaquin Raptor/Wildlife Rescue Ctr. v County of Stanislaus* (1996) 42 CA4th 608 (conclusory statement about cumulative impact was not substantial evidence); *Lucas Valley Homeowners Ass'n v County of Marin* (1991) 233 CA3d 130 (expressions of generalized concerns and fears about traffic and parking impacts, and anecdotal statements about parking problems at another facility, are not substantial evidence); *Leonoff v Monterey County Bd. of Supervisors* (1990) 222 CA3d 1337 (opponents' subjective concerns and unsubstantiated opinions about dangerous traffic conditions are not substantial evidence); *Perley v Board of Supervisors* (1982) 137 CA3d 424 (neighbors' unsubstantiated fears and concerns about project's impacts lacked objective basis for challenge and did not constitute substantial evidence).

O-28: SAFE points out a typographical error in the DEIR and speculates that the Project's traffic would create significant safety impacts where school crossing guards are present. The DEIR correctly disclosed the location of school crossing guards on DEIR page 4.12-2 as positioned at the intersections of Brea Boulevard & Imperial Highway and Birch Street & South Flower Avenue, but inadvertently and incorrectly identified the intersection of Flower Avenue & Imperial Highway as having a crossing guard on DEIR page 4.12-14. The following correction has been made in the FEIR.

> During school admission and dismissal times, school crossing guards facilitate pedestrian movements at the intersections of South Flower Avenue & Birch Street and ~~Flower Avenue~~ Brea Boulevard & Imperial Highway (DEIR page 4.12-14).

The Project's *Safety Study* contains sufficient information and expert opinion substantiating that the Project would not cause a significant impact to transportation safety, including pedestrian safety. The commenter basis its contentions on speculation and does not provide substantial evidence to support a counterargument. Also refer to Response O-28.

O-29: SAFE refers to the consistency statement given for General Pan Policy CD-11-6, which reads "Work with the Brea Olinda Unified School District [BOUSD] to establish safe routes to all schools and to facilitate better circulation surrounding schools in the A.M. and P.M. peak traffic periods." The response about City coordination with the BOUSD infers reference to the draft Laurel Elementary School Traffic Circulation and Parking Study dated February 27, 2022, which was attached to Comment Letter B, and to the Project's *Safety Study*, which evaluates three options to improve LOS at the South Flower Avenue & Imperial Highway intersection even though LOS is not considered a metric for evaluating environmental effects under CEQA. Because the Project's impacts to transportation

safety would be less than significant as demonstrated in the EIR and the Project's *Safety Study*, mitigation measures are not required.

O-30: SAFE makes a circular argument contending that inclusion of the DEIR's South Flower Closure Alternative implies that the Project has a significant transportation safety impact, which is incorrect. The Project does not result in any significant and unavoidable impacts on the environment and as such, an evaluation of alternatives is not needed at all; CEQA only requires an examination of alternatives that reduce or avoid significant impacts (CEQA Guidelines Section 15126.6). Regardless, the DEIR included a range of alternatives in EIR Section 6.0, *Alternatives*, to foster informed decision-making and public participation. The alternatives presented in the DEIR address conditions that the public expressed interest in as part of the EIR's NOP comment period (keeping the Site's existing zoning and General Plan designations in place and addressing congestion at the South Flower Avenue & Imperial Highway intersection).

O-31: SAFE requests a copy of the Project's *Traffic Study*. Urban Crossroads prepared a *Traffic Study* for the Project dated April 5, 2023, which is included in the City's administrative record for the Project and is added as Technical Appendix H3 to the Final EIR (Urban Crossroads, 2023g). The *Traffic Study* was prepared for informational purposes; a level of service (LOS) based traffic study is not required to determine the significance of transportation impacts as explained on DEIR page 4.12-1. The California Natural Resources Agency (CNRA) adopted changes to the CEQA Guidelines in December 2018, which stipulate that vehicle miles traveled (VMT) is the appropriate metric to evaluate a project's transportation impacts. As of December 2018, when the revised CEQA Guidelines were adopted, automobile delay, as measured by "level of service" (LOS) and other similar metrics, does not constitute a significant environmental effect under CEQA. The Project's *Traffic Study* will be considered by the City when deliberating on the Project but is not a basis for the Project's environmental impacts under CEQA and thus was not required to be circulated for public review with the DEIR. The DEIR appropriately attached the Project's *Trip Generation Memo*, *VMT Screening Analysis*, and *Safety Study* as Appendices H1, H2, and I to the DEIR which were made available for public review during the DEIR public review period.

O-32: SAFE states that the DEIR's safety analysis ignores research showing that fast-moving traffic and auto-oriented land uses pose safety risks to small children and cites a study from Oregon which showed child pedestrian-vehicle collision hotspots in auto-oriented retail areas. First, the proposed Project is not reasonably expected to result in in increased vehicle speeds. Related to the proposed drive-thru, drive-thru operations involve relatively low speeds and low speeds and stopped vehicles are an inherent necessity to order, pay for, and pick up items in a drive thru lane. Posted speed limits on all public streets would remain and all drivers are required by law to abide by posted speed limit.

As explained in the Project's *Traffic Study*, improvements would be needed to address the cumulative LOS deficiencies identified for the Flower Avenue & Imperial Highway intersection under Opening Year Cumulative (2024) and General Plan Buildout traffic conditions Three improvements were considered and evaluated in the *Safety Study* and *Traffic Study* for the intersection of Flower Avenue & Imperial Highway: signalization, restriction of the north leg of Flower Avenue to right-in/right-out

access only (similar to the south leg), or closure of Flower Avenue north of Imperial Highway via a cul-de-sac. Although not required to address an environmental effect under CEQA, the City is aware of the need for an improvement at this intersection and will deliberate upon the potential improvements addressed in the Project's *Traffic Study* during its consideration of the proposed Project.

O-33: SAFE claims that the DEIR's air quality analysis should have analyzed potential air pollutant impacts to human health resulting from queuing and idling of mobile sources in the proposed drive-thru lane. During the Project's operation, there is no reasonable potential that the Project, including idling vehicles in the drive-thru lane, would produce air pollution to a level that would significantly impact school children because vehicular tailpipe emissions have improved significantly and it would take thousands of idling cars over a short period of time to cause Clean Air standards to be exceeded. As noted in the DEIR and underlying air quality impact analysis (DEIR Technical Appendix B) and associated trip generation summary (DEIR Technical Appendix H1), the Project would generate 1,068 daily vehicular trips for the drive-thru use (without accounting for pass-by trips) – even if 25% of the total daily vehicular trips occurred during a one-hour period (which is very unlikely due to operational constraints), that would result in 267 vehicular trips occurring during a peak period. Furthermore, although not required, as stated in the DEIR and underlying technical air quality impact analysis (see DEIR Technical Appendix B, page 37), a new supplemental localized significance assessment for Project operations has been conducted using CalEEMod. CalEEMod was utilized to determine the on-site emissions associated with both on-site travel and on-site idling from all the Project's uses. The results of the analysis indicate that the Project would result in a maximum of 1.52 pounds per day of NOx, 12.90 pounds per day of CO, 0.06 pounds per day of PM10, and 0.03 pounds per day of PM2.5 emissions. As such, emissions from NOx, CO, PM10, and PM2.5 are well below the applicable localized thresholds of 147 pounds per day for NOx, 762 pounds per day for CO, 6 pounds per day for PM10, and 2 pounds per day for PM2.5. A summary of the localized emissions and associated thresholds is presented at Table F-3, *Localized Significance Summary Operations,* below, and added as FEIR Technical Appendix B2.

Table F-4 Localized Significance Summary Operations

Localized Significance Summary Operations				
	NO_X	CO	PM_{10}	$PM_{2.5}$
Maximum	**1.52**	**12.90**	**0.06**	**0.03**
SCAQMD Localized Threshold	147	762	6	2
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Source: (Urban Crossroads, 2023g)

Further, the vehicle fleet in California is aggressively transitioning to zero emission (ZE) vehicles, which will virtually eliminate tailpipe emissions in the future. The California Air Resources Board (CARB) adopted Advanced Clean Cars II requirements in 2022 that impose low-emission and zero-emission vehicle standards for model years 2026-2035. By 2035 all new passenger cars, trucks and SUVs sold in California will be zero emission. The Advanced Clean Cars II regulations take the state's already growing zero-emission vehicle market and robust motor vehicle emission control rules and

augments them to meet more aggressive tailpipe emissions standards and ramp up to 100% ZE vehicles.[5]

O-34: SAFE cites *Sierra Club v. County of Fresno* and states that the DEIR relies on conclusory and unsupported assumptions in its conclusion that no further analysis is warranted regarding the drive-thru's air pollutant emissions and the less than significant air quality impacts. The commenter is referred to Response O-33, which supplies substantial evidence that the Project would result in a less than significant air pollutant impact on human health.

O-35: SAFE introduces its contention that the DEIR fails to adequately disclose and analyze the Project's land use impacts. The City disagrees. The DEIR, Subsection 4.10, *Land Use and Planning*, provides a detailed description of the City of Brea General Plan and as summarized in Table 4.10-1, concludes that the Project would be consistent with or otherwise not in conflict with applicable General Plan goals and policies related to environmental effects. A discussion of zoning is also included in DEIR Subsection 4.10, page 4.10-9, which concludes the Project would not conflict with any development regulations and design standards in the Zoning Ordinance pertaining to the Mixed Use III zone.

O-36: SAFE opines that the DEIR's analysis regarding the Project's general plan consistency is incomplete and unsupported. The City disagrees and finds the Project to be consistent with the City's General Plan as demonstrated on DEIR pages 4.10-5 to 4.10-8. Also refer to Response O-23.

O-37: SAFE opines that the DEIR's analysis regarding the Project's consistency with SCAG's *SoCalConnect* is flawed. The City disagrees and finds the Project to be consistent with *SoCalConnect* as demonstrated on DEIR pages 4.10-9 to 4.10-11. Also refer to Response O-23

O-38: SAFE indicates that the City may not approve a project that is inconsistent with the City's General Plan and zoning requirements. The Project includes a proposed General Plan Amendment and Change of Zone (DEIR page 3-5). The proposed Project would be consistent with the proposed General Plan designation of Mixed Use III and zoning designation of Mixed Use III. Also refer to Response O-35.

O-39: SAFE contends that the DEIR failed to recognize the incompatibility of locating a busy drive-thru across from an already over-trafficked elementary school pick-up/drop-off zone, mischaracterizes the Project, and surmises that the Project's land use impacts would be significant, unavoidable, and dangerous. The information presented in the DEIR and these responses to comments demonstrate that the Project would not have any significant and unavoidable impacts. The commenter is referred to Responses O-13, O-16, O-27, and O-32.

O-40: SAFE cites the DEIR and states that its analysis regarding the Project's consistency with the Brea City Code is incomplete, unsupported, and ignores conflicts between the Project and the City Code. The City has determined that the Project is consistent with the Mixed Use III Zone, and the Project applicant

[5] California Air Resources Board, Advanced Clean Cars Program. https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/advanced-clean-cars-ii

is seeking a CUP for the drive-thru use. In its consideration of the proposed CUP and its associated conditions of approval, the City would ensure that the drive thru use is a compatible land use.

O-41: SAFE claims that the Project is inconsistent and incompatible with a number of specific provisions related to Mixed-Use III zoning and provides examples. The City disagrees for the reasons set forth in the DEIR and FEIR, in the Project's staff reports that will be presented to the Planning Commission and City Council, and in the Project's administrative record.

O-42: SAFE requests a copy of the Project's *Traffic Study* and the City's TIA guidelines. Urban Crossroads prepared a *Traffic Study* for the Project dated April 5, 2023, which is included in the City's administrative record for the Project and is added as Technical Appendix H3 to the Final EIR (Urban Crossroads, 2023g). The City's TIA guidelines also have been added to the Project's administrative record and are available for public review by contacting the City Planning Division. Also refer to Response O-31.

O-43: SAFE asserts that the DEIR's land use analysis fails to address the Project's CUP Findings. Draft Findings addressing the Project's CUP will be presented in a staff report to the City's Planning Commission and City Council for consideration. The Planning Commission will make recommendations concerning the Project to the City Council and the City Council is the final decision-making authority on the Project, including the body that will deliberate upon and make CUP Findings. Ability to meet the Findings is a matter within the authority of the City Council that is separate and apart from analysis found in the CEQA compliance document.

O-44: SAFE provides City Code provisions and contends that the Planning Commission will not be able to approve the Project in accordance with the cited provisions. The Project will be subject to a public hearing by the Planning Commission, and the Planning Commission will make recommendations to the City Council. The Planning Commission's primary function is to study proposed developments that may have an impact on the community's growth and environment and to ensure that proposed developments will meet the City of Brea's technical, environmental, and aesthetic standards.[6]

O-45: SAFE makes an unsupported claim that the DEIR should have found the Project to result in significant impacts related to transportation, public safety, air quality and land use, thereby imposing mitigation to lessen the impacts. The commenter does not cite any facts, reasonable assumptions based on facts, or expert opinion supported by facts in support of the comment. Pursuant to CEQA Guidelines Section 15064, an effect shall not be considered significant in the absence of substantial evidence. As such, no revisions to the DEIR are warranted and additional mitigation measure are not required to be applied.

O-46: SAFE cliams that the DEIR fails to adequately analyze alternatives to the Project because it does not analyze an alternative that would both meet the Project's objectives and reduce impacts such as a no drive-thru alternative. As concluded by the DEIR, the Project does not result in any significant and

[6] City of Brea. Website. Planning Commission. https://www.ci.brea.ca.us/522/Planning-Commission

unavoidable impacts on the environment and as such, an evaluation of alternatives is not needed at all; CEQA only requires an examination of alternatives that reduce or avoid significant impacts (CEQA Guidelines Section 15126.6). Regardless, the DEIR included a range of alternatives in EIR Section 6.0, *Alternatives*, to foster informed decision-making and public participation. The alternatives presented in the DEIR address conditions that the public expressed interest in as part of the EIR's NOP comment period (keeping the Site's existing zoning and General Plan designations in place and addressing congestion at the South Flower Avenue & Imperial Highway intersection).

O-47: SAFE claims that the DEIR's failure to adequately describe the Project and analyze Project impacts related to transportation, safety, air quality, and land use and planning undermines the alternatives analysis. The City disagrees. As concluded by the DEIR, the Project does not result in any significant and unavoidable impacts on the environment and as such, an evaluation of alternatives is not needed.

O-48: SAFE states that the DEIR improperly fails to consider a no drive-thru alternative which would substantially lessen transportation, safety, and air quality impacts and meet the Project's objectives. As concluded by the DEIR, the Project does not result in any significant and unavoidable impacts on the environment and as such, an evaluation of alternatives is not required.

O-49: SAFE states that the South Flower Avenue Closure Alternative is not a reasonable alternative because it is infeasible and would increase environmental impacts, and does not provide any indication that the BOUSD would provide the necessary right-of-way within a reasonable amount of time. The commenter is referred to Comment Letter B from BOUSD, in which the School District does not object to the South Flower Avenue Closure Alternative and requests to coordinate on future improvements. As concluded by the DEIR, the Project does not result in any significant and unavoidable impacts on the environment and as such, an evaluation of alternatives is not required. The alternatives presented in the DEIR address conditions that the public expressed interest in as part of the EIR's NOP comment period (keeping the Site's existing zoning and General Plan designations in place and addressing congestion at the South Flower Avenue & Imperial Highway intersection).

O-50: SAFE claims that the DEIR's rejection of an alternative site analysis is unsupported and contradicted by substantial evidence that the Project will have significant site-specific impacts on pedestrian safety near the Project Site. The City disagrees. As concluded by the DEIR, the Project does not result in any significant and unavoidable impacts on the environment and as such, an evaluation of alternatives is not needed.

O-51: SAFE comments on the DEIR's Alternative Sites Analysis text, stating that the DEIR's reasoning that there are no other properties available for purchase by the Project Applicant in the City of Brea that are zoned for mixed use with similar accessibility to a State Route is unpersuasive and that it is inappropriate to dismiss alternative sites on the basis that they are not already zoned consistent with the Project. Yet, the commenter does not suggest any alternative sites for the Project. As concluded by the DEIR, the Project does not result in any significant and unavoidable impacts on the environment and as such, an evaluation of alternatives including an evaluation of alternative sites, is not required. CEQA requires an evaluation of alternatives that reduce a project's significant effects on the

environment, and all of the Project's impacts after mitigation would be reduced to below a level of significance.

O-52: SAFE claims that Project fails to comply with the general plan and zoning code. The City disagrees for the reasons set forth herein, in the Project's staff reports that will be presented to the Planning Commission and City Council, and in the Project's administrative record. The Project includes a proposed General Plan Amendment and Change of Zone (DEIR page 3-5). The proposed Project would be consistent with the proposed General Plan designation of Mixed Use III and zoning designation of Mixed Use III. Also refer to Response O-35.

O-53: SAFE states that the City cannot make the findings required for a conditional use permit because it claims the Project is not consistent with the proposed new zoning for the Site. The City disagrees for the reasons set forth herein, in the Project's staff reports that will be presented to the Planning Commission and City Council, and in the Project's administrative record. The Project includes a proposed General Plan Amendment and Change of Zone (DEIR page 3-5). The proposed Project would be consistent with the proposed General Plan designation of Mixed Use III and zoning designation of Mixed Use III. Also refer to Response O-35.

O-54: SAFE concludes by stating that the City cannot certify the DEIR or approve the Project because it claims the DEIR is flawed, fails to inform the public of the full impacts of the Project, and cannot support the findings required by CEQA. The City disagrees for the reasons set forth above in responses to Comments O-1 through O-53. The commenter's opinions are acknowledged.

O-55: SAFE provides 30 exhibits. The exhibits are acknowledged.

F.3 ADDITIONS, CORRECTIONS, AND REVISIONS TO THE DEIR

Substantive changes made to the text, tables, and/or exhibits of the DEIR in response to public comments are itemized in Table F-5, *Errata Table of Additions, Corrections, and/or Revisions to the DEIR*. Additions are shown in Table F-5 as underline text and deletions shown as ~~stricken~~ text. Minor changes to the DEIR (e.g., corrections of non-substantive typographical errors) are not listed in Table F-5. No corrections or additions made to the DEIR are considered substantial new information requiring recirculation or additional environmental review under CEQA Guidelines Section 15088.5.

Table F-5 Errata Table of Additions, Corrections, and/or Revisions to the DEIR

Page(s)	Section(s)	Additions, Corrections, and/or Revisions to the DEIR
x	*Table of Contents*	Based on comments received, two technical appendices were added: Appendix B1 Air Quality Impact Analysis Appendix B2 Localized Significance Thresholds (LST) Model Results Appendix H3 Traffic Study
3-18	*3.0, Project Description*	Based on comment from Safer Avenues for Everyone (SAFE), the following text has been added to the FEIR to amplify the Project Description in Subsection 3.4.2 and bring forward information from the technical appendices: According to the Project's *Trip Generation Memo* (DEIR Technical Appendix H1) and the Project's *Traffic Study* dated April 5, 2023, prepared by Urban Crossroads, and appended to the Final EIR, it is expected that 1,522 vehicle trips per day would access the new buildings proposed at the Project Site (761 inbound and 761 outbound), and that 650 of those trips (325 inbound and 325 outbound) would stop at the site as they are already passing by the site and would not be a net new trip to the circulation network. As such, the Project would generate 872 new trips (1,522 – 650 = 872). Because the existing uses on the Project Site that are proposed to be demolished are calculated to generate 362 trips per day, the net new number of trips calculated to be generated by the Project are 510 trips per day (255 inbound and 255 outbound) of which 75 trips would occur during the AM peak hour (7-9 a.m.), 21 trips would occur during the mid-day peak hour (over the Laurel Elementary School dismissal period) and 46 trips would occur during the PM peak hour (4-6 p.m.). Vehicles would enter and exit the Site at existing driveways connecting with South Flower Avenue and Orange Avenue, with 65 percent of the vehicles expected to use the South Flower Avenue driveway and 35 percent of the vehicles expected to use the Orange Avenue driveway. These trips would be in addition to trips accessing the two on-site buildings that are proposed to remain and would not be demolished. Under existing conditions, the South Flower Avenue & Imperial Highway intersection is congested and operates and Level of Service (LOS) F; the addition of Project traffic would add to the congestion and improvements would be required to bring the intersection to an acceptable LOS. As presented in the Project's *Traffic Study*, options to improve the intersection include the installation of a traffic signal, implementing a right-in/right-out access restriction for the northern leg of South Flower Avenue at Imperial Highway,

Table F-5 Errata Table of Additions, Corrections, and/or Revisions to the DEIR

Page(s)	Section(s)	Additions, Corrections, and/or Revisions to the DEIR
		or closing the northern leg of South Flower Avenue at Imperial Highway in a cul-de-sac. None of these improvements are proposed by the Project applicant as part of the proposed Project, but would be considered by the City during its deliberations on the proposed Project. (Refer to DEIR Subsection 6.2.3, which analyzes a *South Flower Street Closure Alternative*). As shown on Figure 3-6, the Project's proposed drive-thru lane internal to the site at the drive-thru restaurant is designed to provide approximately 257 feet of storage length for vehicles. Approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. Based on the proposed site plan, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles can be accommodated in the 110 feet from the order board to drive isle. Per City of Brea Municipal Code Section 20.08.040, Off-Street Parking and Loading, "Drive through" or "Drive in" restaurants are required to provide a minimum of 160 feet of stacking space, as measured from the pick-up window, for each drive through lane. The Project's site plan accommodates a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet. As such, the Project more than meets City standards for drive-thru lane capacity.
2-10 and 2-11; 4.12-1 and 4.12-2	*2.0, Environmental Setting;* *4.12, Transportation*	Based on comment from Safer Avenues for Everyone (SAFE), the following text has been added to the FEIR to expand and amplify the Environmental Setting and Transportation texts in Subsection 2.6.8 and Subsection 4.12.1: Under existing conditions, traffic congestion occurs around Laurel Elementary School east of the Project Site during student pick-up and drop-off times. As documented in a draft Laurel Elementary School Traffic Circulation and Parking Study prepared by Kittelson & Associates and dated February 27, 2022 (refer to comment B-19) the goals of the Study are to recommend improvements that would facilitate enhanced pedestrian safety, reduce queueing within the public right-of-way, and add additional parking for the school's staff, parents, guardians, and visitors. The draft Study identifies 27 recommendations, which are a mix of physical and operational improvements, but the Study is not yet approved. Kittelson reported that based on their observations and interviews with BOUSD staff in 2021, pick-up and drop-off activities usually occur on South Flower Avenue, in the school's parking lot, and in the front of the school. Queues from Flower Avenue were reported by Kittelson to spill onto Birch Street and Imperial Highway. Teachers also have observed that some adults try to pick up students on Imperial Highway (Kittelson, 2022). This is an existing condition, unrelated to existing operations at the Project site, although it is known that vehicles waiting for student pick up trespass onto the Project Site to park and wait for student pick up. The existing conditions, including at the mid-day peak hour during school dismissal hours, are documented in the Project's *Traffic Study*, prepared by Urban Crossroads and dated April 5, 2023 (Urban Crossroads, 2023g).

Table F-5 Errata Table of Additions, Corrections, and/or Revisions to the DEIR

Page(s)	Section(s)	Additions, Corrections, and/or Revisions to the DEIR
4.12-15	*4.12, Transportation*	Based on comment from Safer Avenues for Everyone (SAFE), the following correction has been made in FEIR Subsection 2.6.8 and Subsection 4.12.4: During school admission and dismissal times, school crossing guards facilitate pedestrian movements at the intersections of South Flower Avenue & Birch Street and ~~Flower Avenue~~ Brea Boulevard & Imperial Highway.
7-1 and 7-2	*7.0, References*	Based on comments received, two technical appendices were added: Appendix B1: Urban Crossroads, 2023a. *Brea Gaslight Square, Air Quality Impact Analysis, City of Brea*. January 23, 2023. Appendix B2: Urban Crossroads, 2023g. *Brea Gaslight (Operational LSTs) Detailed Report*. March 27, 2023. Appendix H3: Urban Crossroads, 2023h. *Brea Gaslight Square (PLN 2022-00011) Traffic Analysis*. April 5, 2023.

F.4 NO RECIRCULATION OF DEIR REQUIRED

CEQA Guidelines Section 15088.5 describes the conditions under which a DEIR that was circulated for public review is required to be re-circulated for additional public review and comment. CEQA Guidelines Section 15088.5 states that new information added to a DEIR is not significant unless the DEIR is changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse effect of the project or a feasible way to mitigate or avoid such an effect (including a feasible project alternative) that the project's proponents have declined to implement. "Significant new information" requiring recirculation includes, for example, a disclosure showing that:

1. A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented;
2. A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance;
3. A feasible project alternative or mitigation measure considerably different from the others previously analyzed would clearly lessen the significant environmental impacts of the project, but the project's proponents decline to adopt it; and/or
4. The DEIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

Based on the comment letters received by the City of Brea and the responses thereto (presented in Subsection F.2, above) and the minor revisions made to the DEIR (presented in Subsection F.3, above), there were no public comments or changes to the text or analysis presented in the DEIR that resulted in the identification of any new significant environmental effect or a substantial increase in the severity of an environmental effects that were disclosed in the DEIR. The minor revisions to the DEIR merely clarified and amplified information that was already disclosed in the DEIR. Additionally, the DEIR was fundamentally and basically adequate, and all conclusions within the DEIR were supported by evidence provided within the DEIR or the

administrative record for the proposed Project. Furthermore, public comment letters on the DEIR did not identify any alternatives to the proposed Project considerably different from those analyzed in the DEIR that would substantially lessen the significant environmental impacts of the proposed Project while still attaining the Project's basic objectives. Based on the foregoing, recirculation of the DEIR is not warranted according to the guidance set forth in Section 15088.5 of the CEQA Guidelines.

Changed Pages of the DEIR

APPENDICES (BOUND SEPARATELY)

Appendix A	Notice of Preparation and Written Comments on the NOP
Appendix B1	Air Quality Impact Analysis
Appendix B2	Localized Significance Thresholds (LST) Model Results
Appendix C	Energy Analysis
Appendix D	Geotechnical Investigation
Appendix E	Greenhouse Gas Analysis
Appendix F1	Hydrology Report
Appendix F2	Preliminary Water Quality Management Plan
Appendix G	Noise Analysis
Appendix H1	Trip Generation Memo
Appendix H2	VMT Screening Analysis
Appendix H3	Traffic Study
Appendix I	Safety Study
Appendix J	Sewer Capacity Memorandum

CNEL on the south side of Imperial Highway near Flower Avenue to a low of 57.0 CNEL at Laurel Elementary School. (Urban Crossroads, 2023d, p. 22) Refer to EIR Subsection 4.11, *Noise*, for a more detailed discussion of the Project Site's existing noise setting.

2.6.8 TRANSPORTATION

The primary regional travel routes serving the Project area are I-5, located approximately 6.1 miles southeast of the Project Site and I-605 located approximately 11.7 miles west of the Project Site. The Project Site abuts South Orange Avenue to the west, South Flower Avenue to the east, and Imperial Highway, a truck route, to the south. There is one driveway connection from the Project Site to South Orange Avenue and one driveway connection from the Project Site to South Flower Avenue. There are no driveway connections from the Project Site to Imperial Highway. Imperial Highway is a heavily traveled road and becomes congested at peak hours. Laurel Elementary School pick up and drop off uses driveways connecting with South Flower Avenue across from the Project Site.

There are no exiting bicycle facilities along the roadways that abut the Project Site. The only existing bike lanes in immediate vicinity are along Brea Boulevard, north of Birch Street. Brea Boulevard is currently striped with Class II (on-street, striped) bike lanes. Based on the City's Active Transportation Plan (ATP), Birch Street and Brea Boulevard, south of Birch Street, are proposed to have bikeway improvements in the future. Sidewalks for pedestrians are located along South Orange Avenue, South Flower Avenue, and Imperial Highway (Google Earth, 2022). During normal drop-off and pick-up hours for Laurel Elementary School there are school crossing guards positioned at the intersections of Brea Boulevard/Imperial Highway and Birch Street/South Flower Avenue. There are also crosswalks at South Orange Avenue/Imperial Highway, South Flower Avenue/Imperial Highway, and Birch Street/South Orange Avenue.

Public transit service in the region is provided by Orange County Transportation Authority (OCTA), a public transit agency that serves every city in Orange County. There is an existing bus route, Route 143, located along Brea Boulevard, northwest of the Project Site. The closet bus stop along this route on Brea Boulevard is located approximately 0.1-mile northwest of the Project Site at the intersection of Brea Boulevard and Imperial Highway. (OCTA, 2022)

Under existing conditions, traffic congestion occurs around Laurel Elementary School east of the Project Site during student pick-up and drop-off times. As documented in a draft Laurel Elementary School Traffic Circulation and Parking Study prepared by Kittelson & Associates and dated February 27, 2022 (refer to comment B-19) the goals of the Study are to recommend improvements that would facilitate enhanced pedestrian safety, reduce queueing within the public right-of-way, and add additional parking for the school's staff, parents, guardians, and visitors. The draft Study identifies 27 recommendations, which are a mix of physical and operational improvements, but the Study is not yet approved. Kittelson reported that based on their observations and interviews with BOUSD staff in 2021, pick-up and drop-off activities usually occur on South Flower Avenue, in the school's parking lot, and in the front of the school. Queues from Flower Avenue were reported by Kittelson to spill onto Birch Street and Imperial Highway. Teachers also have observed that some adults try to pick up students on Imperial Highway (Kittelson, 2022). This is an existing condition, unrelated to existing operations at the Project site, although it is known that vehicles waiting for student pick

up trespass onto the Project Site to park and wait for student pick up. The existing conditions, including at the mid-day peak hour during school dismissal hours, are documented in the Project's *Traffic Study*, prepared by Urban Crossroads and dated April 5, 2023 (Urban Crossroads, 2023g).

Refer to EIR Subsection 4.12, *Transportation*, for a more detailed discussion of the Project Site's existing transportation setting.

2.6.9 Utilities and Service Systems

The City of Brea provides water service to the Project area, obtained from its regional wholesaler Municipal Water District of Orange County (MWDOC). Under existing conditions, water mains are installed beneath South Orange Avenue and South Flower Avenue. Wastewater treatment services for the Project area is provided by Orange County Sanitation District (OC San). The City does not own or operate wastewater treatment facilities but owns and operates the wastewater collection system in its service area that sends all wastewater to OC San for treatment and disposal. Wastewater is treated at OC San treatment plants in Fountain Valley (Plant No. 1) and Huntington Beach (Plant No. 2). Solid waste from the Project Site is expected to be disposed at the Olinda Alpha Landfill.

2.6.10 Vegetation Communities

The Project Site is entirely developed and does not support any natural vegetation. No sensitive species are anticipated to occur given the developed/disturbed condition of the Site. Vegetation on the Project Site is limited to landscaping of ornamental trees, shrubs, and grass.

Refer to EIR Subsection 4.3, *Biological Resources*, for a more detailed discussion of the Project Site's existing biological setting including a description of plant species and vegetation communities.

2.6.11 Wildlife

No sensitive animal species are anticipated to occur on the Project Site given its developed/disturbed nature.

Refer to EIR Subsection 4.3, *Biological Resources*, for a more detailed discussion of wildlife potential on and around the Project Site.

2.6.12 Rare and Unique Resources

As required by CEQA Guidelines Section 15125(c), the environmental setting should place special emphasis on resources that are rare or unique to that region and would be affected by the Project. Based on the existing conditions of the Project Site and surrounding areas described above and discussed in more detail in Section 4.0, *Environmental Analysis*, the Project Site does not contain any resources that are rare or unique to the region.

According to information published by the Southern California Association of Governments, retail/service uses generate an average of approximately 325 employees per acre. Accordingly, and including the existing parking areas in the northern portion of the Project Site that would serve the proposed buildings, the Project is conservatively expected to generate approximately 611 employees (1.88 acres x 325 employees/acre = 611 employees). (SCAG, 2001, Table II-B).

According to the Project's *Trip Generation Memo* (DEIR *Technical Appendix H1*) and the Project's *Traffic Study* dated April 5, 2023, prepared by Urban Crossroads, and appended to the Final EIR, it is expected that 1,522 vehicle trips per day would access the new buildings proposed at the Project Site (761 inbound and 761 outbound), and that 650 of those trips (325 inbound and 325 outbound) would stop at the site as they are already passing by the site and would not be a net new trip to the circulation network. As such, the Project would generate 872 new trips (1,522 – 650 = 872). Because the existing uses on the Project Site that are proposed to be demolished are calculated to generate 362 trips per day, the net new number of trips calculated to be generated by the Project are 510 trips per day (255 inbound and 255 outbound) of which 75 trips would occur during the AM peak hour (7-9 a.m.), 21 trips would occur during the mid-day peak hour (over the Laurel Elementary School dismissal period) and 46 trips would occur during the PM peak hour (4-6 p.m.). Vehicles would enter and exit the Site at existing driveways connecting with South Flower Avenue and Orange Avenue, with 65 percent of the vehicles expected to use the South Flower Avenue driveway and 35 percent of the vehicles expected to use the Orange Avenue driveway. These trips would be in addition to trips accessing the two on-site buildings that are proposed to remain and would not be demolished.

Under existing conditions, the South Flower Avenue & Imperial Highway intersection is congested and operates and Level of Service (LOS) F; the addition of Project traffic would add to the congestion and improvements would be required to bring the intersection to an acceptable LOS. As presented in the Project's *Traffic Study*, options to improve the intersection include the installation of a traffic signal, implementing a right-in/right-out access restriction for the northern leg of South Flower Avenue at Imperial Highway, or closing the northern leg of South Flower Avenue at Imperial Highway in a cul-de-sac. None of these improvements are proposed by the Project applicant as part of the proposed Project, but would be considered by the City during its deliberations on the proposed Project. (Refer to DEIR Subsection 6.2.3, which analyzes a *South Flower Street Closure Alternative*).

As shown on Figure 3-6, the Project's proposed drive-thru lane internal to the site at the drive-thru restaurant is designed to provide approximately 257 feet of storage length for vehicles. Approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. Based on the proposed site plan, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles can be accommodated in the 110 feet from the order board to drive isle. Per City of Brea Municipal Code Section 20.08.040, Off-Street Parking and Loading, "Drive through" or "Drive in" restaurants are required to provide a minimum of 160 feet of stacking space, as measured from the pick-up window, for each drive through lane. The Project's site plan accommodates a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet. As such, the Project more than meets City standards for drive-thru lane capacity.

4.12 TRANSPORTATION

This Subsection assesses potential transportation impacts resulting from implementation of the Project. In accordance with Senate Bill (SB) 743 and as further discussed under Subsection 4.12.2 below, the California Natural Resources Agency (CNRA) adopted changes to the CEQA Guidelines in December 2018, which identify that starting on July 1, 2020, vehicle miles traveled (VMT) is the appropriate metric to evaluate a project's transportation impacts. As of December 2018, when the revised CEQA Guidelines were adopted, automobile delay, as measured by "level of service" (LOS) and other similar metrics, no longer constitutes a significant environmental effect under CEQA. Lead agencies in California are required to use VMT to evaluate project-related transportation impacts.

To inform the content of the impact analysis in this Subsection, two reports were prepared by Urban Crossroads, 1) titled, "Brea Gaslight Square Trip Generation Assessment," dated January 20, 2023 (Urban Crossroads, 2023e), and 2) titled "Brea Gaslight Square Safety Evaluation," dated January 23, 2023 (Urban Crossroads, 2023f). Other information sources relied upon include a VMT screening analysis (Brea, 2022d), the City's General Plan (Brea, 2003a), the City's Active Transportation Plan (Brea, 2020a) and the City's Transportation Impact Analysis Guidelines (Brea, 2020b).

4.12.1 EXISTING TRANSPORTATION SETTING

A. Existing Roadway System

The primary regional travel routes serving the Project area are Interstate 5 (I-5), located approximately 6.1 miles southwest, Interstate 10 (I-10), located approximately 10.7 miles north, Interstate 605 (I-605), located approximately 11.7 miles west, and State Route 57 (SR-57), located approximately 0.8-mile southeast. Locally, the Project Site is located immediately north of and adjacent to Imperial Highway, west of South Orange Avenue, and east of South Flower Avenue. The Brea General Plan classifies Imperial Highway as a Smart Street, which are arterials with enhanced traffic-carrying capacity (Brea, 2003a, Figure CD-8). Under existing conditions, there are two private driveway connections from the Project Site, one connecting to South Orange Avenue and one connecting to South Flower Avenue. Both driveway access points allow for full turning movements, with no access restrictions.

Under existing conditions, traffic congestion occurs around Laurel Elementary School east of the Project Site during student pick-up and drop-off times. As documented in a draft Laurel Elementary School Traffic Circulation and Parking Study prepared by Kittelson & Associates and dated February 27, 2022 (refer to comment B-19) the goals of the Study are to recommend improvements that would facilitate enhanced pedestrian safety, reduce queueing within the public right-of-way, and add additional parking for the school's staff, parents, guardians, and visitors. The draft Study identifies 27 recommendations, which are a mix of physical and operational improvements, but the Study is not yet approved. Kittelson reported that based on their observations and interviews with BOUSD staff in 2021, pick-up and drop-off activities usually occur on South Flower Avenue, in the school's parking lot, and in the front of the school. Queues from Flower Avenue were reported by Kittelson to spill onto Birch Street and Imperial Highway. Teachers also have observed that some adults try to pick up students on Imperial Highway (Kittelson, 2022). This is an existing condition, unrelated to existing operations at the Project site, although it is known that vehicles waiting for student pick

up trespass onto the Project Site to park and wait for student pick up. The existing conditions, including at the mid-day peak hour during school dismissal hours, are documented in the Project's *Traffic Study*, prepared by Urban Crossroads and dated April 5, 2023 (Urban Crossroads, 2023g).

B. Existing Truck Routes

The City of Brea designates Imperial Highway, located adjacent to the south side of the Project Site, and Brea Boulevard, located approximately 0.1-mile west of the Project Site, as truck routes (Brea, 2015).

C. Existing Transit Services

Public transit service in the region is provided by Orange County Transportation Authority (OCTA), a public transit agency that serves Orange County. Two OCTA bus routes serve the Project Site, both running along Brea Boulevard and Birch Street. The closest bus stop is located along OCTA Route 143 on Brea Boulevard north of Imperial Highway, less than 0.1-mile west of the Project Site. Additional stops along this route are located on Brea Boulevard south of Imperial Highway and on Brea Boulevard south of Birch Street. OCTA Route 129 also runs along Brea Boulevard and Birch Street with stops on Brea Boulevard north of Birch Street and on Birch Street east of Brea Boulevard. (Urban Crossroads, 2023e, p. 30)

D. Existing Bicycle and Pedestrian Facilities

In the Project area, there is one existing Class II (on-street, striped) bicycle lane located along Brea Boulevard, north of Birch Street. Brea Boulevard is currently striped with Class II (on-street, striped) bike lanes. Based on the City's Active Transportation Plan (ATP), Birch Street and Brea Boulevard, south of Birch Street, are proposed to have bikeway improvements in the future. Sidewalks for pedestrians are located along the Project Site's frontages with South Orange Avenue, South Flower Avenue, and Imperial Highway (Google Earth, 2022). Imperial Highway and South Flower Avenue are identified for proposed future pedestrian improvements. (Urban Crossroads, 2023e, p. 25) During normal drop-off and pick-up hours for Laurel Elementary School there are school crossing guards positioned at the intersections of Brea Boulevard/Imperial Highway and Birch Street/South Flower Avenue. There are also crosswalks at South Orange Avenue/Imperial Highway, South Flower Avenue/Imperial Highway, and Birch Street/South Orange Avenue.

E. Existing Project Site Trip Generation

The Project Site currently contains six buildings, of which four are proposed for demolition as part of the proposed Project. These four buildings are occupied and generating traffic. To understand the existing traffic associated with the four buildings, traffic counts were collected at the Project Site driveways on September 20 and 21, 2022 (Tuesday and Wednesday) for vehicles accessing those buildings. Laurel Elementary School was in session on these dates, although Wednesday is an early release day where school starts at 8:00 AM but releases at 1:25 PM (regular release is at 2:10 PM). A summary of the count data collected is provided in Attachment A of *Technical Appendix H1* and is shown below in Table 4.12-1, *Existing Project Site Trip Volume.* As shown, 362 daily trips are generated by the four buildings that are proposed to be demolished as part of the proposed Project.

minimize potential safety hazards (Caltrans, 2021)(FHWA, 2017). Urban Crossroads, a professional transportation engineering firm, reviewed the Project's site plan drawings and determined that no hazardous transportation design features would be introduced within the City public right-of-way through implementation of the Project. Refer to the Project's Transportation Safety Study in *Technical Appendix I*.

Urban Crossroads also reported that pedestrian facilities and good connectivity currently exist along the Project Site's road frontages. There are existing two-way pedestrian ramps and crosswalks along South Orange Avenue, South Flower Avenue, Birch Street, and Imperial Highway. Pedestrians currently use and will continue to use the existing crosswalks along Imperial Highway and Birch Street to cross South Orange Avenue and South Flower Avenue. There are no existing or proposed mid-block crosswalks at South Orange Avenue or South Flower Avenue. The Project driveways are required to be designed when reconstructed to comply with ADA standards and City of Brea standards prior to occupancy of the Project Site's new buildings. (Urban Crossroads, 2023f, p. 6)

Pedestrian and bicyclist activity in the in the Project Site vicinity is light with exception of the Laurel Elementary School admission/dismissal times. During school admission and dismissal times, school crossing guards facilitate pedestrian movements at the intersections of South Flower Avenue & Birch Street and ~~Flower Avenue~~ Brea Boulevard & Imperial Highway. Urban Crossroads in their professional opinion does not expect that addition of the proposed Project would significantly increase pedestrian and bicyclist activity in the area. Based on existing pedestrian activity and existing pedestrian facilities, it is anticipated that pedestrians destined to or from the Project Site will use existing sidewalks and crosswalks. Per California Vehicle Code 21200, cyclists are considered vehicles and have the same responsibilities as motor vehicle drivers (CA Legislative Info, n.d.). It is not anticipated that the proposed Project would increase bike hazards since the roadways are designed to State and City standards. Despite observing the occasional midblock crossing during field visits to the site, most pedestrians use the existing sidewalks and crosswalks in a safe and prudent manner and thus it is anticipated that patrons of the redeveloped Project Site will do so as well. (Urban Crossroads, 2023f, p. 7)

Based on the foregoing information, the Project's construction and operation would not create or substantially increase safety hazards due to a design feature or incompatible use. Impacts would be less than significant.

Threshold d: Would the Project result in inadequate emergency access?

The types of traffic generated during operation of the Project (i.e., passenger cars and trucks) would be compatible with the type of traffic observed along surrounding roadways under existing conditions. In addition, all proposed improvements within the public right-of-way such as reconstruction of the Project's driveway connections with South Flower Avenue and South Orange Avenue would be installed in conformance with City design standards. The Brea Police Department, Brea Fire Department, and Brea Public Works Department have reviewed the Project design features and determined that no hazardous transportation design features would be introduced. Specifically, all Project construction materials and equipment would be stored/staged on the Project Site and would not interfere with emergency vehicles traveling along South Orange Avenue, South Flower Avenue, or Imperial highway. Any Project construction activities that would occur within the South Orange Avenue and South Flower Avenue public right-of-way and requires a partial or full closure of a sidewalk or vehicle travel lane would require a traffic control plan that complies with the *California Manual on Uniform Traffic Control Devices* and that must be approved by the City of Brea to ensure that emergency

7.0 REFERENCES

7.1 PERSONS CONTRIBUTING TO EIR PREPARATION

7.1.1 CITY OF BREA COMMUNITY DEVELOPMENT DEPARTMENT, PLANNING DIVISION

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7.2 DOCUMENTS APPENDED TO THIS EIR

The following reports, studies, and supporting documentation were used in preparing the Brea Gaslight Square Redevelopment Project EIR and are bound separately as Technical Appendices. A copy of the Technical Appendices is available for review at the City of Brea, Planning Division, 1 Civic Center Circle, Brea, California 92821.

Appendix A: Notice of Preparation (NOP) and Written Comments on the NOP.

Appendix B1: Urban Crossroads, 2023a. *Brea Gaslight Square, Air Quality Impact Analysis, City of Brea*. January 23, 2023.

Appendix B2: Urban Crossroads, 2023g. *Brea Gaslight (Operational LSTs) Detailed Report*. March 27, 2023.

Appendix C: Urban Crossroads, 2023b. *Brea Gaslight Square, Energy Analysis, City of Brea*. January 23, 2023.

Appendix D: Terracon Consultants, Inc., 2022. *Geotechnical Engineering Report, Proposed Brea Gaslight Square Development, Brea, Orange County, California*. May 12, 2022.

Appendix E: Urban Crossroads, 2023c. *Brea Gaslight Square, Greenhouse Gas Analysis, City of Brea*. January 23, 2023.

Appendix F1: Kimley Horn and Associates, Inc., 2022a. *Brea Gaslight Square, Technical Hydrology and Hydraulics Memorandum*. May 24, 2022.

Appendix F2: Kimley Horn and Associates, Inc., 2022b. *Preliminary County of Orange/Santa Ana Region Priority Project Water Quality Management Plan (WQMP)*. May 18, 2022.

Appendix G: Urban Crossroads, 2023d. *Brea Gaslight Square, Noise and Vibration Analysis, City of Brea*. January 20, 2023.

Appendix H1: Urban Crossroads, 2023e. *Brea Gaslight Square Trip Generation Assessment*. January 20, 2023.

Appendix H2: City of Brea, 2022d. *VMT Screening Analysis*. July 26, 2022.

Appendix H3: Urban Crossroads, 2023h. *Brea Gaslight Square (PLN 2022-00011) Traffic Analysis*. April 5, 2023.

Appendix I: Urban Crossroads, 2023f. *Brea Gaslight Square Safety Evaluation*. January 23, 2023.

Appendix J: Kimley Horn and Associates, Inc., 2022c. *Sewer Capacity Memorandum for a Proposed Drive-thru Restaurant and a Retail/Medical Office and Restaurant Building at 255 East Imperial Highway and the NEC of East Imperial Highway & Orange Avenue*. May 6, 2022.

7.3 DOCUMENTS INCORPORATED BY REFERENCE

The following reports, studies, and supporting documentation were used in the preparation of this EIR and are incorporated by reference within this EIR. A copy of the following reports, studies, and supporting documentation is a matter of public record and is generally available to the public at the location listed.

Cited As:	***Citation:***
Brea, 2003a	City of Brea, 2003. *Imagine Brea – The City of Brea General Plan*. August 19, 2003. Accessed June 13, 2022. Available on-line: https://www.ci.brea.ca.us/DocumentCenter/View/61/General-Plan?bidId=

Comment Letter O Exhibits

Exhibit Index
March 13, 2023 Shute Mihaly & Weinberger LLP Comments Re: Gaslight Square Redevelopment Project DEIR

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1	The Effects of Land Use Patterns and Street Network Connectivity on the Frequency of Child Pedestrian-Vehicle Collisions: An aggregate analysis in Portland, Oregon, June 2012
2	Matthew Kang, A Drone's Eye View of LA's Longest Drive-Thru Lines, Eater Los Angeles (May 12, 2020)
3	Laurel Circulation and Parking Plan
4	February 16, 2021 City of Brea City Council Staff Report
5	February 1, 2021 letter from Brooks Larson to Brea City Council
6	February 2, 2021 email to City re NO Raising Cane's
7	August 3, 2020 City Traffic Engineer Comments on Raising Cane's Brea Traffic Scoping Letter
8	December 2020 Kimley-Horn and Associates, Inc. Focused Transportation Assessment for the Raising Cane's Project in the City of Brea
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10	January 25, 2021 email to City re: Opposition to the city's recommendation of Raising Cane's drive thru
11	February 1, 2021 email to City re Please help our kids – my reasons for opposing the proposed Raising Cane's Drive-Thru
12	January 31, 2021 email to City re Please vote no for Raising Cane's next to Laurel
13	Laurel Elementary School Student Residency Exhibit A
14	March 23, 2022 City of Brea Public Works Department Memorandum re: 255 E. Imperial Highway (PLN-2022-00011) 1st Review Comments
15	May 4, 2022 Kimley-Horn and Associates, Inc. Comment Response Letter – 1st Entitlement Submittal Comments
16	March 2, 2023 email from Jason Killebrew to Diane Sites re 2023 New Traffic Study – in/around Laurel Elementary Magnet School?
17	January 2012 Safe Routes to School Guide
18	National Cooperative Highway Research Program (NCHRP) 17-87, Guide to Pedestrian Analysis
19	Building Safer Routes to School, United States Department of Transportation
20	Goodman, D., Hillman, T., Ciabotti, J., & Gelinne, D. (2022). Arterial Roads and Pedestrian Safety. Pedestrian and Bicycle Information Center
21	October 2019 City of Long Beach Design Guidelines for Drive-Through Facilities
22	June 7, 2022 City of Santa Barbara Council Agenda Report
23	January 11, 2022 City of Santa Barbara Public Works Department Memorandum re Traffic Conditions Associated with Chick-fil-A Queuing

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24	Anitha Chinnaswamy, Drive-throughs are busier than ever during the pandemic – but they're hotspots for air pollution, The Conversation (October 16, 2020)
25	Hill, et. al, An Evaluation of the Effects of Drive-Through Configurations on Air Quality at Fast Food Restaurants, J Civil Environ Eng 2016, 6:3
26	Joe Cortright, Drive-thrus are ruining cities and helping kill the planet, City Commentary (July 12, 2021)
27	U.S. Department of Energy, Idling Reduction for Personal Vehicles
28	Danny Klein, The Environment and Drive-Thrus: Not an Idle Concern Anymore, QSR (September 15, 2021)
29	February 1, 2023 Email from Cecilia Madrigal-Gonzalez to Diane Stites re Parcel sizes in Gaslight Square
30	Brea City Council Resolution No. P.C. 33-56

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The Effects of Land Use Patterns and Street Network Connectivity on the frequency of Child Pedestrian-Vehicle Collisions: An aggregate analysis in Portland, Oregon

By

Mark Braseth

TERMINAL PROJECT

Presented to the Department of Planning, Public Policy & Management, School of Architecture and Allied Arts,
of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Master of Community and Regional Planning

June, 2012

Committee: Yizhao Yang,PhD (Chair) and Marc Schlossberg, PhD

To my wife and family thank you for supporting and encouraging me to pursue my interests.

Additionally I would like to thank my committee, Dr. Yizhao Yang (chair) and Dr. Marc Schlossberg, for their guidance and expert advice in conducting this study.

Abstract

The rise in childhood obesity rates have led to an increased focus on encouraging children to use active commuting, walking or bicycling, to increase physical activity levels. However, parents often cite traffic safety concerns for not allowing their child to walk to and from school. Unfortunately, risk of being struck by a vehicle is a prominent threat to child pedestrians. Pedestrian-vehicle collisions are the second leading cause of accidental death among children. Moreover, children represent a disproportionate number of pedestrian-vehicle collisions. Nationwide, children, ages 15 and younger, represented 25 percent of all pedestrian-vehicle collisions in 2009. Understanding the impacts of the built environment on child pedestrian-vehicle collisions can lead to policy aimed at reducing total number of child pedestrian-vehicle collisions as well as increasing active commuting among children.

Previous research shows the built environment influences both pedestrian activity and rate of pedestrian-vehicle collisions. However, little is understood of land use patterns and street network connectivity and their impacts on child pedestrian-vehicle collisions. This study seeks to understand how land use patterns and street network connectivity affect child pedestrian-vehicle collisions using an aggregate analysis at the census tract level. Results of the study provide recommendations for land use and transportation planning.

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I. Introduction

Rising rates of childhood obesity have focused on encouraging children to use non-motorized forms of transportation to increase physical activity levels (McDonald 2007). However, parents often cite safety as a factor for not allowing their child to walk to and from school (Schlossberg, Phillips et al. 2005; Schlossberg, Greene et al. 2006; Carver, Timperio et al. 2010). Unfortunately, risk of being struck by vehicle is a prominent threat to child pedestrians. Pedestrian-vehicle collisions is the second leading cause of accidental morbidity among children (McMillan 2005). Additionally, child pedestrians represent a disproportionate number of pedestrian injuries. In 2009 children, ages 15 and younger, represented 25 percent of all pedestrian-vehicle collisions (Administration 2010). These high rates of child pedestrian injuries remain while child pedestrian activity has decreased significantly. In 1969 50 percent of children walked or biked to school (Dellinger and Staunton 2002). In 2002 only 12 percent of children walked or biked to school (Dellinger and Staunton 2002). Planners, public health officials, and public policy professionals are faced with the challenge of increasing the rate of child active commuting while reducing the rate of child pedestrian vehicle collisions.

Research on walkability tells us access to public transit, increased street network connectivity, greater land use mix, and increased density promote walking as a form of transportation (Frank and Pivo 1994; Ewing, Handy et al. 2006; Gebel, Bauman et al. 2009). However, child pedestrians function at a different cognitive than adults (Vinje 1981; Dunbar, Hill et al. 2001; Barton and Morrongiello 2011; Wann, Poulter et al. 2011) and it is unknown how these measurements of the built environment effect the rate of child pedestrian-vehicle collisions.

Previous studies on child pedestrian vehicle collisions have focused on localized “hot-spots” or specific land uses such as recreational facilities and public schools. Few studies have looked at child pedestrian vehicle collisions at an aggregate level and even fewer have assessed measurements of walkability such as land use mix and street connectivity. This study considers factors from previous

research associated with child pedestrian vehicle collisions in addition to two measurements of walkability namely, land use mix and street network connectivity at an aggregate level.

The remaining paper presents a brief summary of the literature, discusses the methods, presents the results, and ends on a discussion of policy implications and future research.

II. Literature Review

Factors influencing child pedestrian vehicle collisions can be broken into five categories, cognitive and behavioral, demographic, socioeconomic, land use, and street design. Cognitive and behavioral factors make children more prone to pedestrian-vehicle accidents than adults (Miller, Austin et al. 2004; Barton and Schwebel 2007; Panter, Jones et al. 2008; Pediatrics 2009; Barton and Morrongiello 2011). Demographic, socioeconomic factors, land use, and street design play a compounding role influencing child pedestrian exposure to traffic and ability to provide safe behavioral cues for both child pedestrian and driver (Posner, Liao et al. 2002; LaScala, Gruenewald et al. 2004; Barton and Schwebel 2007; Barton and Morrongiello 2011). Since planners have more influence on the built environment than cognitive, demographics, or socioeconomic factors this literature review focuses on land use and the street design but briefly touches upon the former subjects. Table 1 displays personal attribute factors—demographics and socioeconomic—and built environment factors found in the literature to influence the rate of child pedestrian vehicle collisions.

Table 1: Influential Variables on the Rates of Child Pedestrian-Vehicle Collisions found in Literature

	Variables	Correlation	Author
Personal attributes	**Demographics**		
	Child density	Positive	(LaScala, Gruenewald et al. 2004)
	Socio economic factors		
	Areas of fewer high income households	Positive	(Cottrill and Thakuriah 2010)
	Lower median income	Positive	(Lascala, Gerber et al. 2000)
	Higher percent of population non-white	Positive	(Cottrill and Thakuriah 2010)
Built Environment	**Land Use**		
	Multifamily residential	Positive	(Agran, Winn et al. 1996)
	Recreational facilities	Positive	(Clifton and Kreamer-Fults 2007)
	Middle schools	Positive	(LaScala, Gruenewald et al. 2004)
	Elementary schools	Negative	(LaScala, Gruenewald et al. 2004)
	High schools	Negative	(LaScala, Gruenewald et al. 2004)
	Street Design		
	Higher Traffic Volume	Positive	(Posner, Liao et al. 2002; Wann, Poulter et al. 2011)
	Higher Operating Speeds	Positive	(Wann, Poulter et al. 2011)
	Arterial roadways	Positive	(Wier, Weintraub et al. 2009)
	Greater transit access	Positive	(Clifton and Kreamer-Fults 2007)
	Street network connectivity	Mixed	(Mecredy, Janssen et al. 2012)

Child Cognitive ability and Behavior

Child pedestrians are particularly vulnerable to vehicle collisions due to less developed cognitive abilities than adults and more often exhibit risky pedestrian behavior. Children lack the cognitive ability to judge the speed of oncoming traffic, report difficulty of spotting vehicles in their periphery vision, and display less capability than adults on using auditory senses to assess the ability to safely cross the street (Barton 2006; Barton and Schwebel 2007; Pediatrics 2009; Barton and Morrongiello 2011; Wann, Poulter et al. 2011). Moreover, children are more likely to choose more risky pedestrian routes and be distracted while crossing the street or playing on the sidewalk (Dunbar, Hill et al. 2001; Barton and Schwebel 2007).

Unsafe pedestrian behavior has been attributed to the main cause of child pedestrian vehicle collisions(Retting, Ferguson et al. 2003). A child darting, running into the road, is often cited as a precursor to a collision. Additionally, studies have found that improper crossing, walking in the road

way, and playing in the street are the highest precursors to pedestrian vehicle crashes (Zegeer, Stutts et al. 2004). One study found a majority, 53 percent, of children were struck crossing at mid-block (Agran, Winn et al. 1994).

Socio Economic Factors

Lower income communities trend higher incidents of pedestrian vehicle collisions (Rivara and Barber 1985; Barton and Schwebel 2007; Cottrill and Thakuriah 2010). Cottrill and Thankuriah (2010) found pedestrian vehicle collisions to be twice as likely to occur in low income areas. Additionally, they found pedestrians struck in lower income areas tend to be younger. The study showed twenty-eight percent of all pedestrians struck in low income areas were under the age of 16 compared to 10 percent in higher income areas (Cottrill and Thakuriah 2010). In part, this phenomenon is explained by higher number of pedestrian trips in lower income areas, thereby increasing pedestrian exposure to traffic (Cottrill and Thakuriah 2010). Still, it has been shown children from lower income families and minority-background tend to select more risky pedestrian routes (Barton and Schwebel 2007).

Built Environment Factors

Land Use

In general pedestrian vehicle collisions occur most often in areas of mixed use, where residential areas are adjacent to commercial (Miranda-Moreno, Morency et al. 2011). Miranda-Moreno (2011) controlled for pedestrian exposure and average daily vehicular traffic and found a marginal correlation between areas of high proportion of commercial land-use, transit access, schools, and the frequency pedestrian-vehicle collisions. However, the marginal increase suggests that the highest contributing factors are traffic volume. Their model showed that a 10 percent decrease in traffic would create a 11 percent decrease in pedestrian vehicle collision (Miranda-Moreno, Morency et al. 2011). Another study highlighted that neighborhood commercial and residential commercial land areas were correlated with higher incidents of pedestrian-vehicle collisions (Wier, Weintraub et al. 2009). Additionally, pedestrian-

vehicle collision research has shown big box retail and commercial strips are correlated with greater pedestrian vehicle collisions while pedestrian oriented retail are correlated negatively with the rate of pedestrian vehicle collisions (Dumbaugh and Li 2011).

Specific to child pedestrian vehicle collisions, few studies have looked at area-wide land uses. Agran, Winn et al. (1996) looked at residential types and found a correlation between child pedestrian vehicle collisions and multifamily residential (Agran, Winn et al. 1996). However, most studies are localized, typically focusing near the child's home or near schools. No studies have assessed the relationship between commercial uses and child pedestrian-vehicle collisions at an aggregate level.

Schools and Recreational Facilities

Active school commuting has been a major policy focus to increase physical activity among children (Miller, Austin et al. 2004; McMillan 2005; Schlossberg, Phillips et al. 2005; Clifton and Kreamer-Fults 2007; Sirard and Slater 2008; Hume, Timperio et al. 2009) this has prompted studies to look at the effect of schools on child pedestrian-vehicle collisions (LaScala, Gruenewald et al. 2004; Boarnet, Anderson et al. 2005; Clifton and Kreamer-Fults 2007). Child pedestrian injuries occurring during in-school months strongly correlate with middle schools but less so with elementary and high schools (LaScala, Gruenewald et al. 2004). LaScala, Gruenewald et al. (2004) suggests this is because middle schools attain more pedestrian trips without the accompaniment of an adult than elementary schools wherein most children are too young to walk to school alone. Moreover, high school students are more likely to drive, or get a ride. If high school students do walk or bike their cognitive abilities are more similar to an adult than a child (LaScala, Gruenewald et al. 2004).

Clifton and Kreamer-Fults (2007) Investigated attributes of school design in relation to child pedestrian-vehicle collisions. They found schools with recreational facilities have high rates and more sever pedestrian injuries. Additionally, they found schools with driveways or turnarounds to have fewer pedestrian injuries (Clifton and Kreamer-Fults 2007).

Other studies have focused on the effectiveness of the federal Safe Routes to School program in improving pedestrian safety. One study found a 20 percent decrease in year to year pedestrian injuries after the implementation of a Safe Routes to School program (Delaney, Newstead et al. 2004). Another study evaluated the California Safe Routes to School to assess if the engineering improvements increased walking. The study showed a significant increase in the number of children walking associated with the engineering improvements (Boarnet, Anderson et al. 2005).

Street Design

Traffic Volume and Speed

Generally where high pedestrian activity occurs adjacent to high traffic volumes pedestrians are struck the most often (Roberts, Norton et al. 1995; Macpherson 1998; Ewing, Schieber et al. 2003; Graham and Glaister 2003; Elvik 2009). This is a pertinent factor for children; Roberts (1995) found increased number of incidences occurred on high traffic streets. Another study looked at the rate of child pedestrian exposure to traffic and found a high correlation (R^2=0.53)(Macpherson 1998). The study evaluated the number of streets crossed and rate of child pedestrian vehicle collision. They found the more streets children had crossed the more likely the child would be struck by a vehicle. Finally, another study conducted an aggregate model on child pedestrian vehicle collisions and found a significant portion of the model is predicted by traffic volume (LaScala, Gruenewald et al. 2004).

While traffic volume predicts rates of pedestrian-vehicle collisions vehicle operating speeds predict severity of injury sustained (Roberts, Norton et al. 1995; Ewing and Dumbaugh 2009; Dumbaugh and Li 2011). A pedestrian struck at forty miles per hour has an 85 percent chance of being killed. The rate of fatality decreases exponentially as speed decreases. For instance when struck at thirty miles an hour a pedestrian has a 45 percent chance of being killed, and at 20 miles per hour or less a five percent chance (Zegeer, United States. Federal Highway Administration. Office of Safety et al. 2002; Ewing and Dumbaugh 2009).

High traffic speeds are particularly dangerous for child pedestrians. Children are shown to be less capable of detecting and avoiding looming objects at speeds greater than 20 miles per hour than adults (Wann, Poulter et al. 2011). This is a necessary ability in order to make safe crossing decisions particularly at unmarked crosswalks and where no crossing indicators exist.

Street type

A majority of pedestrians are struck at high traffic volume arterials (Agran, Winn et al. 1994; Roberts, Norton et al. 1995; Elvik 2009; Miranda-Moreno, Morency et al. 2011). For children, ages 15 and under, the street type they are struck depends on their age (Agran, Winn et al. 1994). The median age struck at intersections on arterial streets is 10, the median age struck at midblock on local streets is age 6, median age of those struck in parking lots is age 4, and median age struck in driveways is age 2 (Agran, Winn et al. 1994).

Transit Access

Several studies have also highlighted areas with a high number of transit stops have higher incidents of pedestrian vehicle collision (Wier, Weintraub et al. 2009; Cottrill and Thakuriah 2010; Miranda-Moreno, Morency et al. 2011). All studies that have found this correlation have suggested the higher incident rates are likely due to increased pedestrian activity. Wier (2011) found a correlation of pedestrian vehicle collision along arterial roadways without transit lines, suggesting that traffic volumes are more influential than transit access.

Network Connectivity

The influence of street network connectivity on pedestrian vehicle collisions is mixed. One study has shown the greater street connectivity improves the safety of child pedestrians (Mecredy, Janssen et al. 2012). Mecredy et al (2012) looked at youth street injuries both child pedestrians and cyclists. The increase safety in gridded streets is mainly attributed to increase safety in cyclist (Mecredy, Janssen et al. 2012). One possible reason is lower street connectivity funnels children to high traffic major arterials;

whereas a gridded street pattern disperses traffic and gives children more local street options (Mecredy, Janssen et al. 2012)**.** Other studies have shown Lower Street connectivity is safer. In particular cul-de-sacs have been shown to be safer for children at play (Southworth and Ben-Joseph 2004). It is argued however, that children who grow up in a cul-de-sac forego the lessons in how to safely cross the street because they are not exposed to that task (Cozens and Hillier 2008).

Urban Form and Child Pedestrian Activity

Research on child pedestrian activity show the built environment has a profound effect on influencing pedestrian trips (Schlossberg, Greene et al. 2006; Panter, Jones et al. 2008; Panter, Jones et al. 2010; Loon and Frank 2011). Panter, Jones et al. (2008) conducted a systematic review of the literature on urban form and child pedestrian activity. Their analysis revealed children were more likely to walk where land use mix is greater –at least one commercial use and at least one recreation facility— and if lived in a high residential density neighborhood (Panter, Jones et al. 2008). Another study found children were more likely to walk school if the route entailed greater intersection density (Schlossberg, Greene et al. 2006).

Research question

The following sections presents the method used to answer the underlying question driving the study.

1. How do street design and land use patterns affect the frequency of child pedestrian vehicle collisions?

Specifically this study is interested in the effect of greater land use mixes on child pedestrian vehicle collisions and the effect of street network density on child pedestrian-vehicle collisions I ask:

   a. Does street network density affect the rate of child pedestrian-vehicle collisions?
   b. Does greater land use mix increase the rate of child pedestrian vehicle collisions?

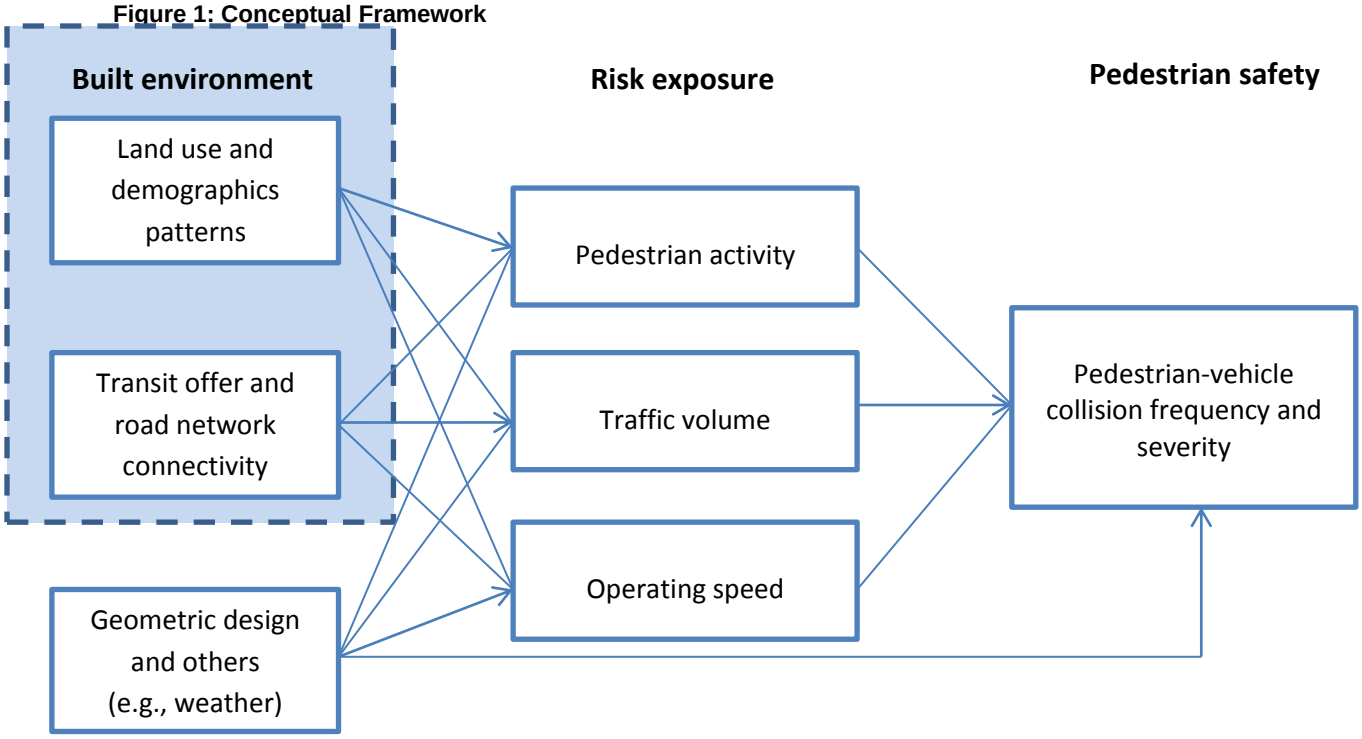
III. Methods

Conceptual Framework

Figure 1 displays a visual conceptual framework created by Miranda-Moren, Morency et. Al. (2011). Previous research demonstrates the built environment has direct and indirect effects on the rate and severity of pedestrian-vehicle collisions. Land use, demographic patterns, transit access, road network connectivity, and geometric design of streets influence the amount of pedestrian activity, traffic volumes, and operating speeds (Ewing and Dumbaugh 2009; Dumbaugh and Li 2011; Miranda-Moreno, Morency et al. 2011). These factors in turn assess the rate and severity of pedestrian-vehicle collisions. Geometric design is the only variable that has a direct impact on the rate and severity of pedestrian vehicle collisions. This is because street design has the direct capability of limiting either pedestrian or vehicle access and influencing operating speeds (Ewing and Dumbaugh 2009; Miranda-Moreno, Morency et al. 2011).

This study focuses on land use and demographic patterns, and road network connectivity highlighted in the blue box of figure 1. It assumes that land use patterns, demographics, and road network connectivity affect child pedestrians different than adults therefore tests these attributes solely on child pedestrians.

Figure 1: Conceptual Framework



By: (Miranda-Moreno, Morency et al. 2011)

Research Design

The study is a two-step process. First, an aggregate analysis of child pedestrian-vehicle collisions at the census tract level is conducted. Variables, determined from previous research on child pedestrian-vehicle collisions and walkability, are used to create a multivariate linear regression model. Next, the model is applied to local "hot spots," high incident areas of child pedestrian-vehicle collisions. A systematic area analysis was conducted at these hot spots using Geographic Information Systems and on-site investigation. The on-site investigation was used to determine the model fit at a smaller unit of analysis.

Study Area

This study focuses on Portland, OR, a city known for its pedestrian-friendly environment. It is ranked 12th most walkable city in the U.S. by walkscore.com. In addition the people of Portland Oregon

are known for their embrace of non-motorized transportation. Portland boasts the highest rate of persons commuting by bike to work, 5.44 percent, the highest in the nation (Bureau 2010).

Additionally, Portland's urban form is generally supportive of walking. One unique urban form quality of Portland is its short blocks, 250 sq. ft. by 250 sq. ft.. Shorter blocks typically translate to more intersections per sq. mi. a measurement that has been cited to encourage walking as a form of transportation (Berrigan, Pickle et al. 2010). Furthermore, Portland, Oregon has some of the most progressive policy on traffic calming in the U.S. (Ewing and Brown 2009).

Level of analysis occurs at the census tract level. This level of analysis was chosen because of its similar size to neighborhoods. In addition the level of analysis has been used prior in aggregate level analysis and proven effective (Wier, Weintraub et al. 2009). Aggregate analysis is more effective at the census tract level than block group and block level when the sample size is not robust, because it allows for greater aggregation and less study areas with zero data. Conducting an area level model can become increasingly unreliable where study boundaries contain zero data (Wier, Weintraub et al. 2009). Additionally, American Community Survey is more accurate at the census tract level than the block group and block level (Wier, Weintraub et al. 2009).

Data Source

Pedestrian Vehicle Collisions

Pedestrian vehicle collisions were collected from the Oregon Department of Transportation (ODOT). Data received includes all collisions from 2000-2010. Only collisions involving child pedestrians 15 and younger were included in the study.

Pedestrian-vehicle collisions were compiled by ODOT from police reports. Collisions reported from 2007 to 2010 provided latitude and longitude data. Collisions reported from 2000 to 2006 did not have latitude and longitude data. Instead, pedestrian-vehicle collisions were marked by the street it occurred on, nearest intersection, direction from intersection and distance from intersection the

incident occurred. Using this data each collision occurring between 2000 and 2006 was manually mapped based on the measurements and intersections provided.

GIS Layers and Shapefiles

GIS layers and shapefiles were collected from the Regional Land Information Database (RLID) managed by the metropolitan planning organization (MPO) Metro. GIS layers and shapefiles used include street center lines, parcel data, schools, recreational facilities, and transit stops.

The census tract shapefile was sourced from the U.S. Census Bureau web site.

Demographic Data

Demographic data is from the 2010 decennial census and 2006-2010 American Community Survey. Population total, race, and ethnicity data came from the 2010 decennial census while percent of population at or below the poverty line, median income, percent unemployed, total vehicles available, and educational attainment came from the 2006-2010 American Community Survey. Demographic data is compiled at the census tract summary level.

Measures and Variables

Dependent Variable

The dependent variable is constructed by total collisions per total miles of roadway within each census tract. Roadways considered were those only accessible by both motorized vehicle and pedestrians—highways and freeways were not included. Weighting the collisions by miles of roadway helps to adjust for the varying sizes of census tracts. This dependent variable is used commonly in pedestrian- vehicle collision studies. In particular this dependent variable is the same used in LaScala, Greuenewald et al. (2004) who conducted an aggregate level study of child pedestrian vehicle collisions.

Children were defined as ages 15 and younger. This age group was chosen because it has been described as the most vulnerable group and legally dependent on foot travel for transportation (Roberts, Norton et al. 1995; McMillan 2005; Administration 2010)

Independent Variables

Table 2 displays all variables considered in the study and their unit of measurement. Variables are broken into four categories mirroring the literature, demographics, socioeconomic factors, land use and street design. Note control variables are marked with an asterisk.

Table 2: Independent Variables

Independent Variables	Measurement	Author
Demographics		
**Percent of population 17 and younger density*	Total population 17 and younger per sq. mi.	LaScala, Greuenwald et. Al. (2004)
Socio Economic Factors		
**Median income*	Median income	Cottrill (2010)
**Percent of population at or below the poverty line*	Population at or below the poverty line by total population	Cottrill (2010)
**Percent of population Asian*	Population Asian by total population	LaScala, Greuenwald et. Al. (2004)
**Percent of population Black*	Population black by total population	LaScala, Greuenwald et. Al. (2004)
**Percent of population Hispanic*	Population Hispanic by total population	Cottrill (2010)
**Percent of population non white*	Population non-white by total population	Cottrill (2010)
**Vehicles per capita*	Total number of vehicles available by total population	
**Percent of population unemployed*	Total number of unemployed by total population sixteen and older	LaScala, Greuenwald et. Al. (2004)
**Education attainment*	Total number of population 25 and older with a bachelors or higher by total population	LaScala, Greuenwald et. Al. (2004)
Built Environment		
**Percent of land area dedicated to single family housing*	Total sq. ft. of single family residential by total land area	Agran (1996)

**Control variable*

Table 2 Continued: Independent Variables

Independent Variables	Measurement	Author
Percent of land area dedicated to multifamily residential	Total sq. ft. of multifamily residential by total land area	Agran (1996)
Percent of land area dedicated to commercial use	Total sq. ft. of commercial by total land area	Agran (1996)
**Percent of land area dedicated to recreational facility*	Total sq. ft. of recreational facility by total land area	Clifton & Kreamer-Fults (2007)
**Recreational facility density*	Total number of recreational facilities per sq. mi.	Clifton & Kreamer-Fults (2007)
**School density*	Total number of schools per sq. mi.	Wier, Weintraub et. Al. (2009)
**High school density*	Total number of high schools per sq. mi.	LaScala, Greuenwald et. Al. (2004)
**Middle schools density*	Total number of middle schools per sq. mi.	LaScala, Greuenwald et. Al. (2004)
**Elementary school density*	Total number of elementary schools per sq. mi.	LaScala, Greuenwald et. Al. (2004)
Land use mix	Dissimilarity index using four land uses single family residential, multifamily residential, commercial, and recreational facilities	
Street Design		
3 and 4 way intersection density	Total number of 3 and 4 way intersections per sq. mi.	Mecredy (2012)
4 way intersections density	Total number of 4 way intersections per sq. mi.	Mecredy (2012)
Dead end density	Total number of dead ends per sq. mi.	Mecredy (2012)
**Percent of roadway classified as primary arterial*	Total number miles of primary arterial per total miles of roadway	Dumbaugh (2011)
**Percent of roadway classified as arterial*	Total number miles of arterial per total miles of roadway	Dumbaugh (2011)
**Percent of roadway classified as minor road*	Total number miles of minor roads per total mile of roadway	Dumbaugh (2011)

**Control variable*

Control and test Variables

Control variables were determined from previous child pedestrian-vehicle collision studies. All demographic and socio economic variables are used as control variables. Also, schools, roadway classification, and transit access are used as control variables.

Test variables include percent of land area dedicated to single family residential, multifamily residential, and commercial in addition to land use mix and road network connectivity measurements.

Analysis Process

GIS

Using ArcGIS 10 child pedestrian-vehicle collisions were geocoded using latitude and longitude data and intersection data. Using a spatial join the collisions were added to the census tract that contained the crash points. The collisions were then divided by the total miles of roadway within each census tract to obtain the dependent variable.

Demographic variables were pulled from the census and joined to the census tracts using ArcGIS join table feature. Demographic variables were downloaded from the new American Fact Finder from the census bureau website.

Built environment variables were calculated in ArcGIS 10. Land use types were isolated from the parcel data shapefile using select by attribute, selecting one land use at a time and exporting the data to its own shapefile. This process was repeated for single family residential, multifamily residential, and commercial. Note industrial uses were left out because little pedestrian activity is associated with industrial uses. Once each shapefile was created a spatial join was used to assign land uses to the census tract they fell within. Total square feet of each land use type was then divided by total land area within the census tract, this established a percent of specified land use of the total land area.

The calculation of land use mix used total square footage of single family residential, multifamily residential, commercial, and recreational facilities to calculate a dissimilarity index. The equation used is shown below.

Land use mix=$(-1)*[(b_1/a)\ln(b_1/a)+(b_2/a)\ln(b_2/a)+(b_3/a)\ln(b_3/a)+(b_4/a)\ln(b_4/a)]/\ln(n)$

Where:
a=total square feet of all land uses
b_1=total square feet of single family residential
b_2=total square feet of multifamily residential
b_3=total square feet of commercial
b_4=total square feet of recreational facilities
n=4

Schools and recreational facilities were also mapped and spatially joined to the census tracts. Recreational facilities were converted from polygons to points, joined to the censustract they fell within, and then divided by total land area to achieve a measurement of recreational facility density. Only elementary, middle, and high schools were considered. Post high school educational facilities were not considered. Note private schools are included in the dataset. The dataset was then further divided into middle schools, elementary schools, and high schools as defined in the shapefile attributes table.

Street design variables were calculated using the street center lines shapefile in ArcGIS 10. The shapefile provided street type as primary arterial, arterial, and minor roads. Highways and freeways were not considered since these road types were solely accessible by motorized vehicle. The streets were joined to the census tracts using spatial join. Then each street type was calculated as a percent of total streets within each census tract.

Street connectivity used ArcGIS 10 network analysis to convert intersection points to nodes. Using definition queries 1 way intersection, 3 and 4 way intersections, and 4 way intersection nodes were selected and then spatially joined to the census tracts. One way intersections represent dead ends. Each intersection type selected was then divided by total land area to assess the street network connectivity density.

When all data was collected, processed, and converted into an excel spread sheet I conducted multivariate linear regression models using IBM SPSS v. 20.

Statistical Analysis

The multivariate linear regression uses adjusted R squared to measure the correlation between the dependent variable and independent variables. Two models were created one containing only control variables and a second containing both the control and test variables. The difference of R squared was measured to assess the effect the test variables, land use mix and street network connectivity, on the frequency of child pedestrian vehicle collisions.

The regression form used is $Y=F(X_1, X_2, X_3 \ldots)$ where Y equals the dependent and X represents the independent variables.

Not all variables considered were used in the final model. A stepwise process was used to select only variables that are statistically significant and have the most predictive power. Parameters were set at p=<.05 (selection) and p=>.15 (removal). Next, variables were assessed in univariate models to ensure the quality and accuracy of the data. Variables selected for the final model are shown in table 3.

Table 3: Independent Variables Selected for the Final Model

Independent Variables	Measurement	Author
Demographics		
**Percent of population 17 and younger density*	Total population 17 and younger per sq. mi.	LaScala, Greuenwald et. Al. (2004)
Socio Economic Factors		
**Percent of population Hispanic*	Population Hispanic by total population	Cottrill (2010)
Percent of population at or below the poverty line	Population at or below the poverty line by total population	Cottrill (2010)
Built Environment		
**Middle schools density*	Total number of middle schools per sq. mi.	LaScala, Greuenwald et. Al. (2004)
**Elementary school density*	Total number of elementary schools per sq. mi.	LaScala, Greuenwald et. Al. (2004)
**Recreational facility density*	Total number of recreational facilities per sq. mi.	Clifton & Kreamer-Fults (2007)
Land use mix	Dissimilarity index using four land uses single family residential, multifamily residential, commercial, and recreational facilities	Frank et. al. (2005)
Street Design		
Dead end density	Total number of dead ends per sq. mi.	Mecredy (2012)

**Control Variable*

Once the final variables were selected each variable was graphed on a scatter plot to determine its linear model fit. Transformations were then applied where appropriate to improve the model fit. Transformations were applied to four of the 8 variables. Land use mix used a squared transformation, middle schools per sq. mi. used a log transformation, percent of population as Hispanic used a categorical transformation and total dead ends per sq. mi. also used a categorical transformation.

Hot Spot Investigation

Model variables in the final model were then tested for their presence at specific hot spots for child pedestrian-vehicle collisions. Hot spots were determined using a kernel density feature in ArcGIS 10. The two highest incident areas were identified.

Next, a quarter mile pedestrian catchment zone was created from the center of the high incident areas. A quarter mile is chosen because it has been commonly used in other walkability

research. Within the quarter mile it is assessed whether each built environment variable identified in the linear regression model is present. Socioeconomic factors were not considered in the onsite investigation because the priority focus is on the built environment. Population 17 and younger per sq. mi. is assessed as a control variable. Population 17 and younger per sq. mi. is assessed at the block group level. Block groups that fell within the pedestrian catchment zone were selected.

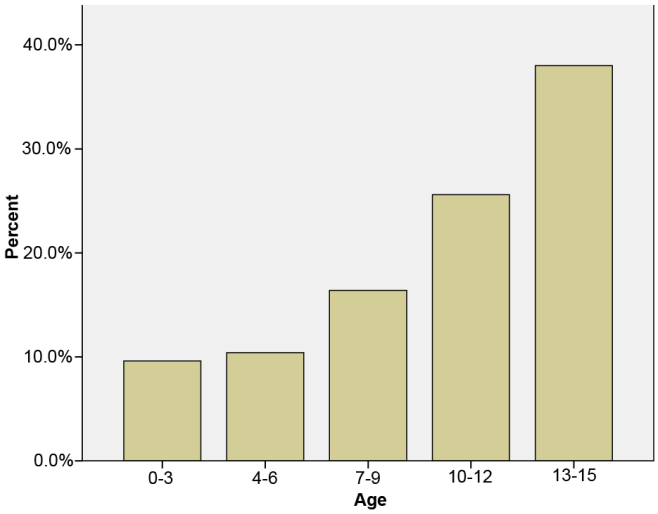
Finally walk audits of two high incident areas were completed using Dr. Kelly J. Clifton Pedestrian Environment Data Scan (PEDS). This walk audit is chosen because of its proven use in academic research on walkability (Clifton, Livi Smith et al. 2007; Zhu and Lee 2008; Shay, Rodriguez et al. 2009).

IV. Results

Descriptive Statistics

Between January 1, 2000 and December 31st, 2010 252 pedestrian-vehicle collisions involving children ages 15 and younger were recorded. Average age of injured child pedestrians is 10.4 years old. Figure 2 displays the percent of total collisions by age group. Early teen years, 13-15, were recorded most frequently marking 95 crashes in eleven years or 38 percent of the 252 collisions.

Figure2: Age Distribution of Child Pedestrian-Vehicle Collisions



Generally, collisions occurred when children are most likely to be outside and traffic volumes are at their peak. The average time of collisions occurred at 4pm. Figure 3 displays the percent of collisions by time. The hour when most collisions occurred is between 5pm and 6pm. Weather and driving conditions were generally nonhazardous. Most collisions occurred on clear dry days, 66 percent, and during light hours, 72 percent. A small percentage, 6, occurred during twilight. The month with the most collisions occurring within is July. Most collisions occurred during the week day with the most occurring on Tuesdays and Fridays. Mondays were the lowest occurrence day. Figure 4 shows percent of collisions by month and figure 5 shows percent of collisions by day.

Figure 3: Percent of Collisions by Time

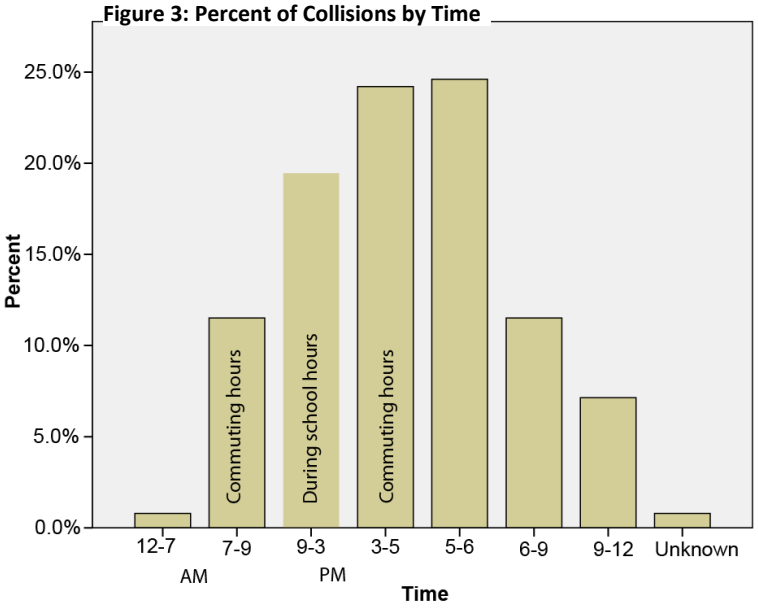


Figure 4: Percent of Collisions by Month

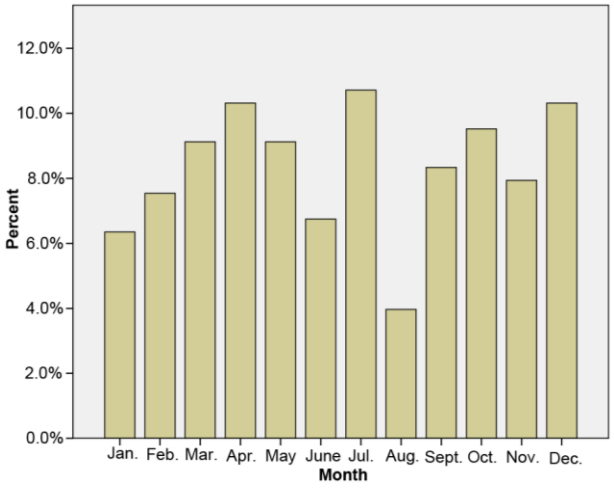
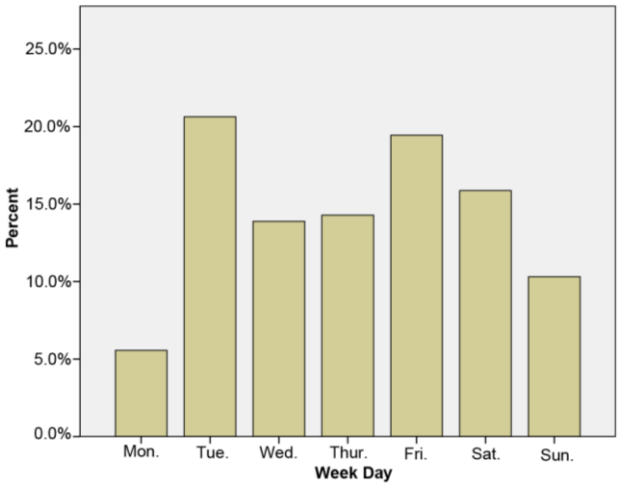
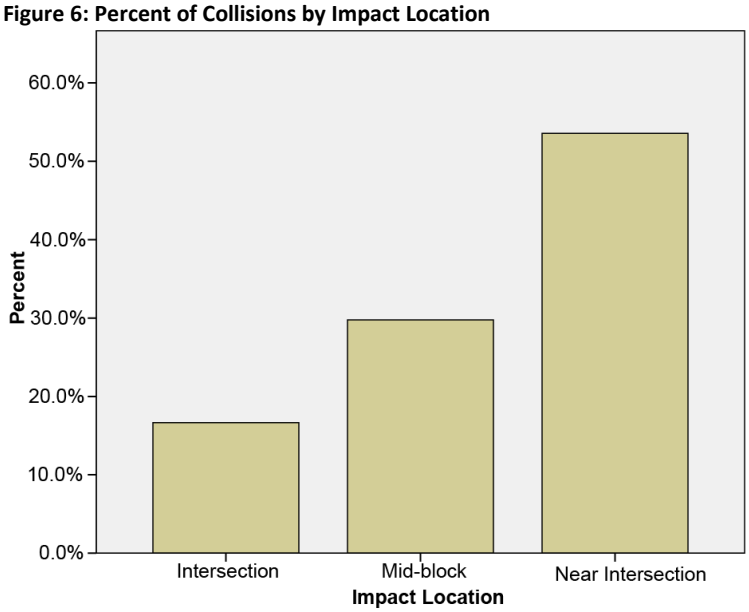


Figure 5: Percent of Collisions by Day of the Week



Collisions occurred most often within 50 feet of intersections, 50 percent. Nearly 32 percent of all collisions occurred at mid-block while 18 percent occurred at the intersection. Figure 6 displays percent of all collisions by impact location. Primary arterial roads also had the largest share of child pedestrian-vehicle collisions, 49 percent. Arterials and minor roads (residential streets) split the remaining 51 percent, 25.5 percent each.

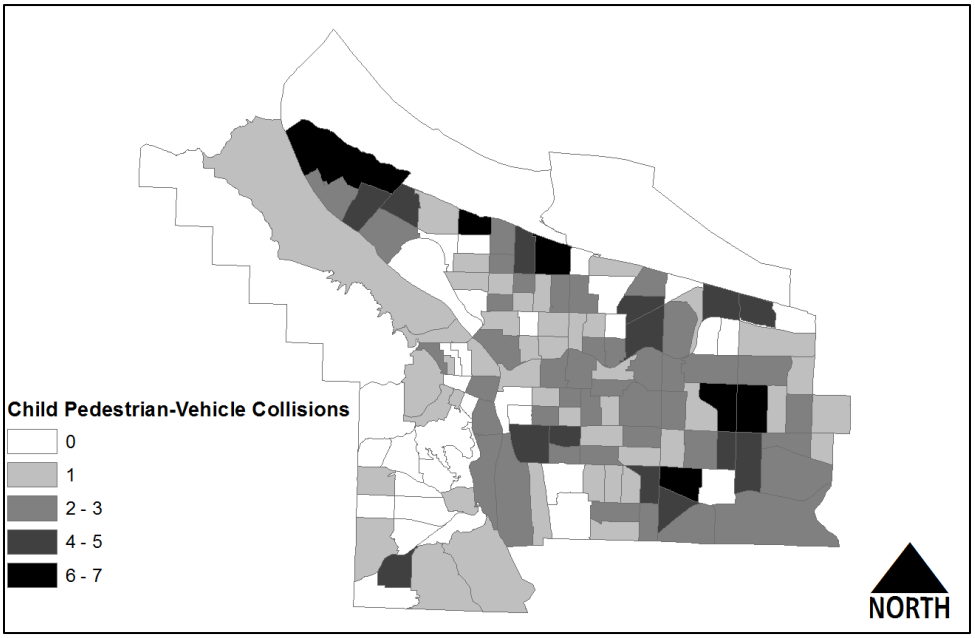
Figure 6: Percent of Collisions by Impact Location



Collisions occurred most frequently in residential neighborhoods. The average distance from a school was .35 mi and from a recreational facility .30 mi.

Aggregate Analysis

Figure 7: Total Child Pedestrian Collisions per Census Tract 2000-2010



No child pedestrian-vehicle collisions occurred in 22 percent of the census tracts. The highest number of incidents within a census tract is 7, which occurred in four census tracts. Most census tracts had a single child pedestrian-vehicle collision, 32 percent. The average number of child pedestrian vehicle collisions per census tract is 1.73. Table 4 provides the descriptive statistics of the dependent variable.

Table 4: Dependent Variable Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Total child pedestrian injuries	142	0.00	7.00	1.73	1.71
Total length of roadway in mi	142	4.47	93.79	19.68	12.59
Dependent variable					
Child pedestrian injuries per mi of roadway	142	0.00	0.46	0.10	0.10
Valid N (listwise)	142				

Concluding the stepwise process and a close analysis of each variable eight variables were shown to have the most statistical significance and predict the frequency of child pedestrian-vehicle

collisions with the highest percentage. Table 5 provides the descriptive statistics for the independent variables considered in the final model.

Table 5: Descriptive Statistics of Independent Variables

Independent Variables	N	Minimum	Maximum	Mean	Std. Deviation
Demographics					
Population 17 and under per sq. mi.	142	0.00	3377.46	1178.86	628.98
Percent of population Hispanic	142	0.00%	30.91%	8.63%	5.71%
Percent of population at or below the poverty line	142	0.00%	40.00%	12.68%	9.41%
Land use					
Total recreational facilities per sq. mi.	142	0.00	26.09	5.30	4.43
Middle schools per sq. mi.	142	0.00	3.64	0.22	0.67
Elementary schools per sq. mi.	142	0.00	4.52	0.89	1.12
Land use mix	142	0.12	0.98	0.69	0.19
Street network connectivity					
Total dead ends per sq. mi.	142	0.00	95.37	31.92	22.03
Valid N (listwise)	142				

As mentioned in the methods section transformations were applied to four of the eight variables to improve their model fit. The descriptive statistics for the variables after applying transformations are shown in table 6.

Table 6: Independent Variable Transformation Descriptive Statistics

Independent Variables	N	Minimum	Maximum	Mean	Std. Deviation
Percent of population Hispanic (categorical transformation)	142	1	4	2.15	1.010
Middle schools per sq. mi. (log transformation)	142	0.0000	1.5339	.117690	.3379294
Land use mix (squared transformation)	142	.0156	.9604	.507301	.2328506
Total dead ends per sq. mi. (categorical transformation)	142	0	3	1.53	.750
Valid N (listwise)	142				

The Control Model

Two multivariate models were completed the control model and the test model. The control model used variables found significant in previous child pedestrian-vehicle collision literature while the test model tested the addition of two new variables, intersection density and land use mix. Table 7 shows the outcome of the control model. The model predicted 38.4 percent of child pedestrian-vehicle collisions in Portland, Oregon.

Table 7: Control Model Output

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Literature	.620[a]	.384	.357	.0770514

a. Dependent Variable: Total collisions per mi. of roadway

Variables considered in this model include youth population density, percent of population at or below the poverty line, percent of population Hispanic, density of middle schools, and density of elementary schools. Table 8 shows the outcomes for the coefficients and their significance. Note all variables are significant at p=<0.05 except for elementary schools per sq. mi. and population at or below the poverty line. These variables are significant at p=<0.1.

Table 8: Control Model Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Literature	(Constant)	-.047	.019		-2.495	.014
	Population 17 and under per sq. mi.	.072	.014	.474	5.268	.000
	Percent of population at or below the poverty line	-.002	.001	-.164	-1.873	.063
	Percent of population Hispanic	.025	.008	.261	3.163	.002
	Total recreational facilities per sq. mi.	.006	.002	.285	3.921	.000
	Middle schools per sq. mi.	.066	.019	.233	3.404	.001
	Elementary schools per sq. mi.	-.011	.006	-.133	-1.780	.077

The most significant positively correlated variables in the control model are population 17 and under per sq. mi. and total recreational facilities per sq. mi.. These variables were significant below P=<.01. Population 17 and under per sq. mi. had the strongest correlation (R^2 =.171) while total recreational facilities had the second strongest correlation (R^2=.102). The third most significant model middle schools per sq. mi., showed a modest correlation to increased child pedestrian vehicle collisions (R^2 = .079). Each of these models is consistent with the literature.

Socio economic variables, however, show mixed results and were inconsistent with the literature. Percent of population Hispanic is significant at P=.002 with a positive of correlation (R^2=.069).

This is expected based on the literature (Barton and Schwebel 2007; Cottrill and Thakuriah 2010). However, percent of population at or below the poverty line shows a negative correlation, though modest (R^2 =.025). Conversely, past studies show a positive correlation between areas with fewer high income families and incidents of child pedestrian vehicle collisions (Lascala, Gerber et al. 2000; LaScala, Gruenewald et al. 2004; Cottrill and Thakuriah 2010). However when considered in a univariate model the correlation is positive between percent of population at or below the poverty line and increased rates of child pedestrian-vehicle collisions. Other variables considered for this study included, percent non-white, educational attainment, and percent unemployed. All were statistically insignificant in the present model. Additionally, an inverse relationship occurred between those variables and incidents of child pedestrian vehicle collisions(LaScala, Gruenewald et al. 2004).

Finally, the model showed a negative correlation between elementary schools per sq. mi. and increased incidences of child pedestrian vehicle collisions, though modest (R^2 =.025). This variable is consistent with the literature. An aggregate study focusing on the effects of schools on child pedestrian-vehicle collisions shows areas with more elementary schools and high schools have less child pedestrian vehicle collisions, while areas with more middle schools have increased rates of child pedestrian-vehicle collisions.

Test Model

The test model introduces two new variables to the model land use mix and total dead ends per sq. mi. The results show a modest increase in predictability with the addition of these variables. Table 9 displays the model summary for the test model. The test model predicts 42.9 percent of events, an increase of 4.5 percent predictability from the control model.

Table 9: Combined Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Test	.655[a]	.429	.395	.0747114

a. Dependent Variable: Total collisions per mi. of roadway

Table 10 displays the independent variables their unstandardized coefficients, standardized coefficients, and significance. Note all but two variables are significant at p=<.05. Percent of population at or below the poverty line and elementary schools per sq. mi. are significant at p=<.1.

Table 10: Combined Model Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Test	(Constant)	-.041	.023		-1.830	.070
	Population 17 and under per sq. mi.	.069	.013	.454	5.161	.000
	Percent of population at or below the poverty line	-.002	.001	-.168	-1.939	.055
	Percent of population Hispanic	.023	.008	.242	2.927	.004
	Total recreational facilities per sq. mi.	.004	.002	.204	2.733	.007
	Middle schools per sq. mi.	.059	.019	.209	3.133	.002
	Elementary schools per sq. mi.	-.011	.006	-.133	-1.823	.071
	Land use mix	.085	.031	.205	2.703	.008
	Total dead ends per sq. mi.	-.020	.009	-.157	-2.248	.026

a. Dependent Variable: Total collisions per mi. of roadway

Table 11 displays the partial correlation of the independent variables land use mix has the 5th most predictive power of the variables while dead ends per sq. mi. the sixth highest predictor. Population 17 and under per sq. mi. remains the most important variable in the model. This is not surprising given this is consistently found to be true in child pedestrian-vehicle collision studies (Sandels 1995; Agran, Winn et al. 1996; LaScala, Gruenewald et al. 2004; Clifton and Kreamer-Fults 2007).

Table 11: Partial Correlation of Independent Variables in the test model

Independent Variable	Correlation	R Square
Population 17 and under per sq. mi.	Positive	0.167
Middle Schools per sq. mi.	Positive	0.069
Percent of Population Hispanic	Positive	0.061
Total recreational facilities per sq. mi.	Positive	0.053
Land use mix	Positive	0.052
Dead ends per sq. mi.	Negative	0.037
Percent of population at or below the poverty line	Negative	0.027
Elementary schools per sq. mi.	Negative	0.024

Land use mix is a relatively low predictor (R^2=.052). However, considered in a univariate model land use mix has a much stronger correlation (R^2=.123). Percentage of land dedicated to commercial, single family residential, and multifamily residential were also considered, however the results showed low or no correlation in addition to being statistically insignificant. Interestingly percentage of land dedicated to commercial was not linear. Studies assessing pedestrian-vehicle collisions among all age groups show central business districts have more pedestrian-vehicle collisions (Sebert Kuhlmann, Brett et al. 2009; Wier, Weintraub et al. 2009). My study revealed an initial increase in the rate of child pedestrian-vehicle collisions as percent of land area as commercial goes up, however once percent of land dedicated to commercial reaches 10 percent the rate of events begins to go down and once hits 50 percent goes down drastically. One possible reason for this phenomenon is simply because children are not present in areas with high amounts of commercial, such as central business districts. Land use mix, in this regard, is particularly helpful in explaining how the relationship between residential areas and commercial areas has an influence on child pedestrian-vehicle collisions wherein it is likely commercial land use is hazardous to child pedestrians when it exists near residential areas, and or recreational facilities.

Dead ends per sq. mi. had an even more modest influence on the rate of child pedestrian vehicle collisions. Results show having more dead ends per sq. mi. is associated with a lower rate of child pedestrian vehicle collisions (R^2=.037). This finding correlates with the general research on cul-de-sacs that are shown to be safer for children playing outside (Southworth and Ben-Joseph 2004). Additionally, a bivariate model illustrated number of intersections correlates with length of block. Meaning areas with higher number of dead ends tend to have longer blocks while areas with higher intersection connectivity had shorter blocks. For child pedestrians longer blocks may mean less streets to cross, a variable associated with decreased rates of child-pedestrian vehicle collisions. Several studies have found that a child's exposure to traffic, counted as number of streets needed to cross on their route to school, has a

significant impact on the likelihood of that child being struck by a car (Macpherson 1998; Posner, Liao et al. 2002). Still, the finding is contrary to recent research by Mecredy (2012) whose study revealed increased street network density had a positive effect on reducing child pedestrian and child cyclist's accidents. However, Mecredy attributes the increase safety mainly due to less child cyclists-vehicle collisions not reduced child pedestrian-vehicle collisions.

The addition of land use mix and dead ends per sq. mi. had effect on the partial correlation of the control variables. Specifically, in the control model population 17 and under per sq. mi. had a stronger correlation (R^2=.171 in the control model compared to R^2=.167 in the test model).Total recreational facilities per sq. mi. had the largest change in influence on child pedestrian-vehicle collisions. Total recreational facilities per sq. mi. fell from R^2=.102 to R^2=.053. This is likely due to the fact that the land use mix model is made up, partly, of recreational facilities. Though a bivariate test between the two variables only has a Pearson correlation of .297.

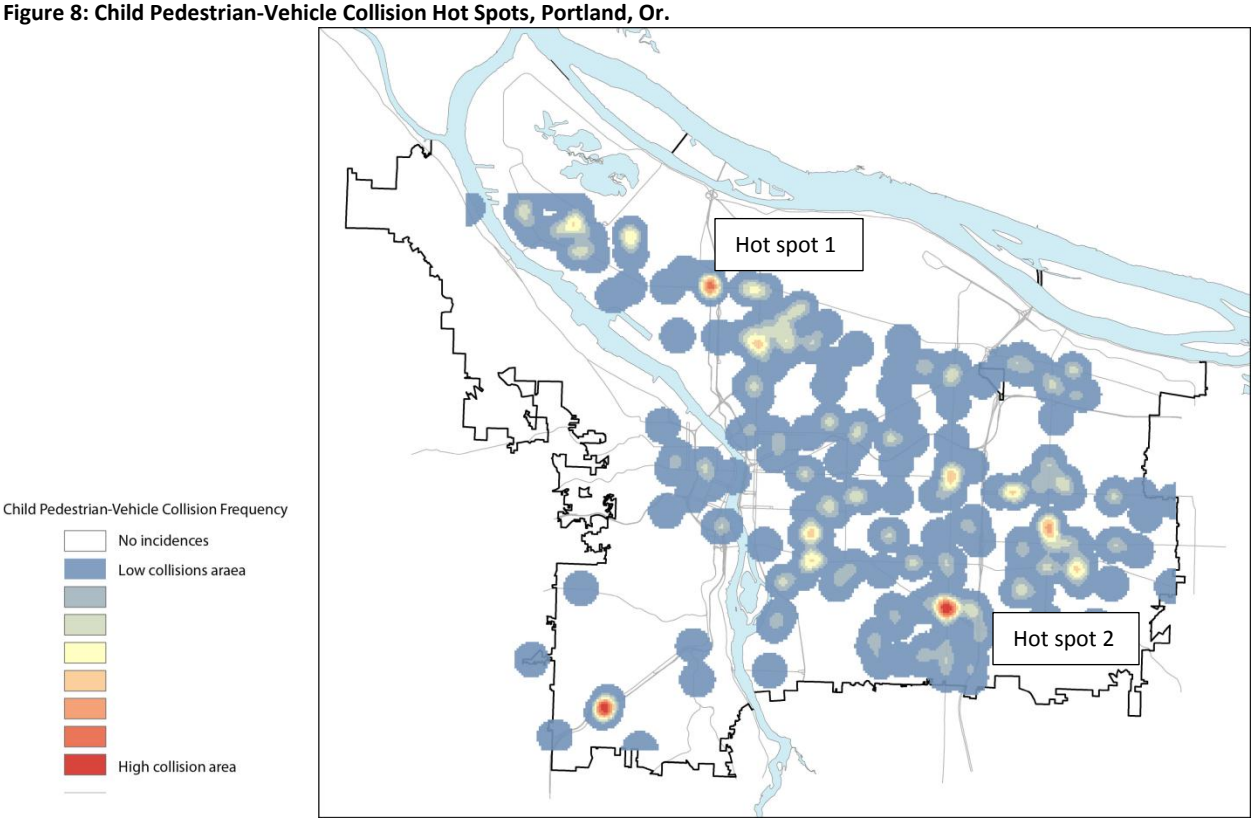
The remaining variables changed only slightly, .02 or less. In particular percent of population at or below the poverty line increased in predictability by .002 from R^2=.025 to R^2=.027. While elementary schools per sq. mi. fell from R^2=.025 to R^2=.023.

One nuance of the test model is the fact that many of the variables are correlated with increased incidences of child pedestrian activity. It is uncertain using this model alone to be certain that areas of higher land use mix, number of middle schools per sq. mi., increased street network density, higher percent of population Hispanic, and high density of children are in fact more dangerous or if it simply predicts higher rates of walking therefore more opportunities for child pedestrian-vehicle collisions to occur. That said, whether or not the latter is true this model still suggests that where child pedestrians are likely to be pedestrian safety infrastructure should be prioritized.

Still, to account for this factor the model was applied to localized areas that have the highest child pedestrian-vehicle collision frequency.

Local Analysis

Figure 8: Child Pedestrian-Vehicle Collision Hot Spots, Portland, Or.



The map above highlights high collision areas. Areas in red represent high incidences of child pedestrian collisions while the blue areas represent low incidences of child pedestrian-vehicle collisions. The hot spots used for analysis are identified as hot spot 1 and hot spot 2 on the map.

Table 11 displays the street location of the two hot spots, total child pedestrian vehicle collisions and traffic volumes. In hot spot 1 all collisions occurred within a single intersection. Collisions within hot spot 2 occurred mainly within the intersection as well. However, two collisions occurred at mid-block. Traffic volumes were generally high in these areas, average daily traffic above 12,000 vehicles. This is expected given the high correlation between traffic volumes and child pedestrian vehicle collisions in the literature (Agran, Winn et al. 1996; LaScala, Gruenewald et al. 2004).

Table 12: Collisions and Traffic Volume at Hot Spot

Hot Spot	Address	Collisions	ADT	Peak AM	Peak PM
1	N Lombard ST & N Interstate Ave	4	12057	4511	7546
2	SE Foster Rd & SE 82nd Ave	6	12358	4738	7283

Figure 9 displays the pedestrian catchment zone used for analysis of the hot spots. The onsite investigation revealed a close fit with the final model output in addition to revealing more nuances specific to land use patterns and geometric street design.

Figure 9: Quarter mile Pedestrian Catchment Zones of High Frequency Child Pedestrian-Vehicle Collisions Areas, Portland, Or.

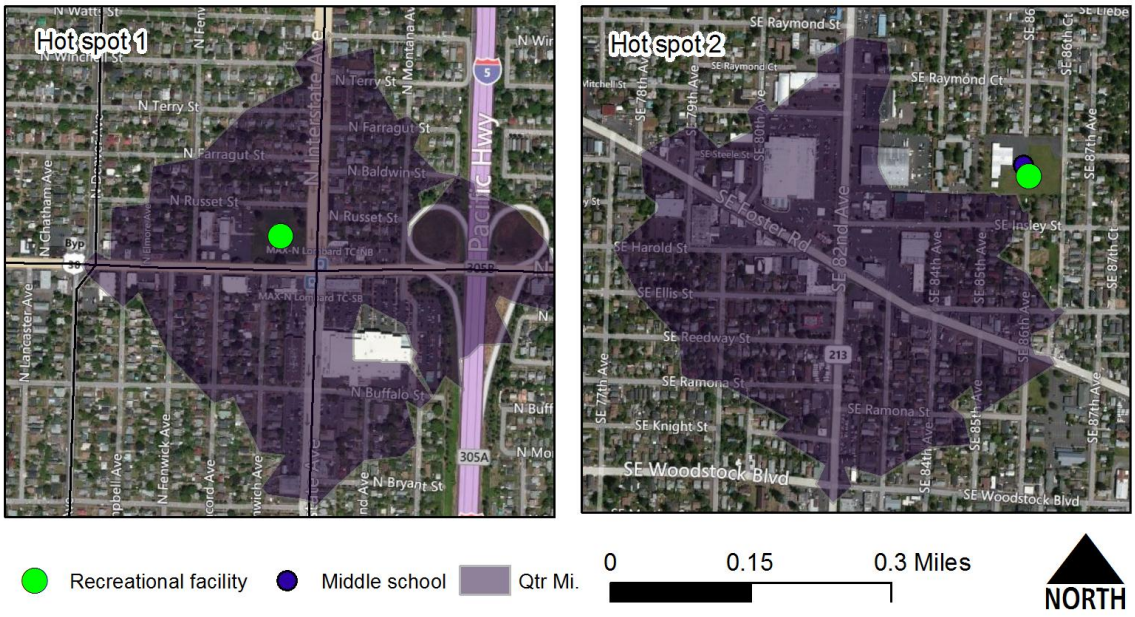


Table 13 displays the associated measurements of the final model output to the localized hot spots studied. Specifically highlighted are the land use types within the land use mix index in addition to presence of middle schools, recreational facilities, and a count of dead ends. Additionally population density of children 17 and younger was assessed. Socioeconomic factors were excluded because the assessment is to determine how well the built environment variables matched.

Table 13: Model Variables Applied to Local Child Pedestrian-Vehicle Collision Hot Spots

Hot Spot	Population 17 and younger per sq. mi.	Middle School	Recreational facility	Commercial	Residential	Dead ends
1	1,195	No	Yes	Yes	Single family and multifamily	3
2	2,080	Yes	Yes	Yes	Single family and multifamily	0

All land use types were found within the catchment zone or just outside. In hot spot 1 a recreational facility is adjacent to the center point of the analysis site while a recreation facility is located just outside of the pedestrian catchment zone in hot spot 2. Hot spot 2 has a middle school located just outside the catchment zone. However, hot spot 1 does not have a middle school within or near the catchment zone. It should be noted that adjacent to the recreational facility in hot spot 1 is a private high school. Though, the model did not find a correlation between high schools and increased incidences of child pedestrian-vehicle collisions. Additionally all commercial and residential types were within both catchment zones suggesting the land use mix variable does in fact fit these high incident areas.

In assessing the street connectivity related to these hot spots we find each have a low number of dead ends. Hot spot 1 had three dead ends while hot spot 2 had zero. These findings coincide with the final model output that showed a negative correlation between increased dead ends per sq. mi. and increased frequency of child pedestrian-vehicle collisions.

According to the final model output both hot spots should have a relatively high population 17 and younger per sq. mi.. This is true for Hot spot 2 which had a density of children higher than the average for all of Portland, Oregon (2,080 children 17 and younger per sq. mi. compared to Portland average 1,179 children 17 and younger per sq. m.). However, Hot spot 1 matches the average child density for all of Portland with a density of 1,195 children 17 and younger per sq. mi..

The two hot spots are similar except for a few key differences. They share similar traffic volumes, similar land use mix and presence of attributed land use types. However, hot spot 1 lacks a middle school, has more dead ends, and a lower density of children. Additionally hot spot 1 has fewer collisions as the model would suggest based on these attributes.

Walk Audits

The PEDS walk audit revealed interesting attributes of commercial design and geometric street design that should be considered more rigorously in future research. First, in both hot spots commercial buildings were primarily set back 20 feet or more in addition to having to walk through parking lots to access the commercial buildings. Second, both areas contained a big box retail store. Research has shown that big box retail and strip commercial development have higher incidences of pedestrian-vehicle collision, however no research has looked at big box retail and strip development and child pedestrian-vehicle collisions (Dumbaugh and Li 2011). Third, both areas had auto oriented retail located at the corners of intersections. In hot spot 1, gas stations were placed kitty corner from one another, while in hot spot 2 fast food drive-thrus and a gas station were found at the corners of the intersection. Fourth, both had operating speeds of 35 mph with five lanes of travel. It is likely the high operating speeds and wide streets play a particularly important role on the rate of child pedestrian vehicle collisions based on the literature that shows children have difficulty spotting looming objects at speeds higher than 25 mph and are vulnerable in high traffic areas (Posner, Liao et al. 2002; LaScala, Gruenewald et al. 2004; Wann, Poulter et al. 2011). Figures 10 and 11 display photographs of hot spot 1 and 2 demonstrating the commercial setbacks, auto-oriented retail at street corners, high number of parking lots and driveways, and wide streets.

Figure 10: Hot spot 1 N. Lombard and N. Interstate



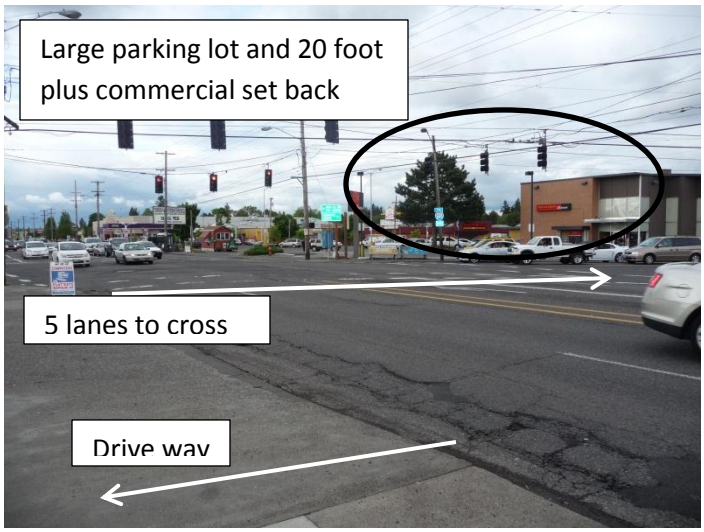






Figure 11: Hot Spot 2 SE Foster Rd and SE 82nd Ave









V. Discussion

Results of this study need to be evaluated carefully. The study is not whether certain land use patterns or street connectivity is more dangerous than another type, rather it notes what land use patterns are street network connectivity exist where child pedestrian-vehicle collisions occur. In order to accurately determine one place safer than another accurate pedestrian counts are needed. Pedestrian counts would allow for a calculation of total number of pedestrian injuries per number of total pedestrians. This would allow for an assessment of what areas of higher rates of collisions versus simply higher number of incidents. The latter case can simply be caused by having more pedestrians in an area therefore more chances of a pedestrian-vehicle collision occurring.

Policy Implications

Lessons from this study support four policy implications

- Prioritizing pedestrian safety infrastructure in commercial zones in areas near middle schools, recreational facilities, and single family residential.
- Separating auto-oriented uses such as gas stations, drive-thrus, and big box retail from areas where, middle schools, recreational facilities, and residential areas are in close proximity to one another.
- Supports the use of engineering strategies that dead-end streets to motor vehicle traffic but still allow connectivity for pedestrian and cyclists such as full and partial closures.
- Improved accident reporting and data collection at the time of a child pedestrian-vehicle collisions namely more accurate reporting of the pedestrian actions and collision location.

Ultimately this study reveals two ways to improve safety of child pedestrians through separation of uses and design. In particular it is shown commercial zones are precarious to children when located within walking distance of residential areas, a recreational facility, and a middle school. However simply separating commercial zones from these areas is impractical. Moreover, greater land use mix is shown

to increase walking among children(Schlossberg, Greene et al. 2006; Panter, Jones et al. 2008). A more suitable policy suggestion is prioritizing pedestrian safety infrastructure in commercial zones.

Findings of the study reveal commercial zones are more suitable for pedestrian safety prioritization rather than school zones or recreational areas. For instance children are struck on average .35 miles from a school and .3 miles from a recreational facility. Also children are struck most often between 5pm and 6pm, after common school commuting hours. An aerial investigation of two child pedestrian-vehicle collision hot spots revealed that high incident areas are within commercial zones located near recreational facilities and middle schools.

Effective pedestrian infrastructure in commercial zones includes general traffic calming measures and reducing the number of lanes to cross. Previous studies have revealed children are most likely to be struck with increased exposure to traffic (Macpherson 1998; Posner, Liao et al. 2002). Additionally research on child cognitive ability shows children are unable to safely detect looming objects at greater speeds than 25 mph (Wann, Poulter et al. 2011). This suggests lowering speeds in commercial areas and using traffic calming measures to reduce speeding among motor vehicles. Furthermore, decreasing the distance crossing street distance will reduce child pedestrian exposure to traffic. Effective methods include reducing the total number of lanes, installing pedestrian refuge, or installing bulb-outs at crosswalks.

While general separation of uses is not recommended separating specific commercial types namely auto-oriented retail and big box retail from recreational facilities, and schools is suggested. A previous study has shown pedestrians are more at risk of being struck by a motor vehicle near big box retail and strip-commercial development (Dumbaugh and Li 2011). Given children have less developed cognitive ability than adults it is not a stretch to assume that these commercial developments put children at greater risk as well. My onsite investigation of two high child pedestrian-vehicle collision areas supports this finding as well. Both areas were characterized by auto-oriented retail at the corners, namely gas

stations and fast-food drive-thrus, and a big box retail store. Recreational facilities were located near these commercial uses.

Potentially, auto-oriented retail and big box retail can exist near schools and recreational facilities with proper pedestrian oriented design. However, a compounding factor unrelated to the design is auto-oriented and big box retail simply create large amounts of motor vehicle traffic. Regardless of design, previous research has shown where there is more traffic near higher density of children more child pedestrian-vehicle collisions will occur. Therefore, the most successful policy will be one that limits vehicle traffic and increases pedestrian traffic. Eliminating commercial uses that favor automobiles over pedestrians near areas where child pedestrians are likely to be—middle schools, recreational facilities and single family homes—is likely to indirectly reduce the number of child pedestrian-vehicle collisions most effectively.

The model also revealed decreased incidents of child pedestrian-vehicle collisions where there are more dead ends. However, research on increased active commuting amongst children show increased street network connectivity is correlated with increased walking. Engineering solutions that can meet both of these issues include partial and full closures.

Full and partial closures limit motorized vehicle traffic while providing permeable design for cyclists and pedestrians through the use of bollards or mounted curbs(Ewing and Brown 2009). Full closures completely dead end a street to motor vehicle traffic while still allowing pedestrian and cyclists to pass through. Full closures create a cul-de-sac like setting for children to play while also maintaining the walking benefits of higher street network connectivity. Partial closures limit traffic but not entirely. They may restrict travel to one-way while still allowing two-way travel by bike (Ewing and Brown 2009).

The final policy implication is related to how data is being collected at the time of reporting of a child pedestrian-vehicle collision. In particular data of pedestrian actions before the collisions and exact location of collision is needed. Understanding these attributes can supply useful information for

determining appropriate street design. The data provided by ODOT had a section for pedestrian actions; however the majority of events had no data. In terms of exact location the recent use of latitude and longitude data is extremely helpful for accurately geocoding the collisions. However, it is still uncertain exactly where they are located since GPS units have a margin of error often 3 feet or more. The data does provide such information but not in enough detail. For instance it provides a column to mark if collisions occurred off roadway, being in a parking lot, driveway, or alley. However it does not differentiate between the three or note whether they occurred within the parking lot or on the sidewalk crossing the entrance. Additionally data is provided whether the event occurred mid-block, near intersection, or in the intersection but the definition for near intersection is too large, within 50 feet or less of the intersection. This should be broken into "near intersection" six feet or less, and outside intersection 50 feet to six feet from the intersection.

On a final note general care needs to be taking to ensure all data is provided. Many of the collisions lacked data in important fields. For instance, sections such as number of lanes, number of turning legs, and intersection type often had no data or marked by a zero where inappropriate. For data such as number of lanes a notation of zero is impossible. Being able to quickly assess the number of lanes streets had where child pedestrian-vehicle collisions would help to provide support for certain types of street design.

Limitations

The study took steps to reduce bias and increase accuracy. However, several limitations still exist in terms of data and tools available to conduct analysis. These include likely underreporting of child pedestrian-vehicle collisions, using census tracts to define study boundaries, limited number of collisions and sites studied, and the lack of motor vehicle and pedestrian traffic counts.

First, it is likely that not all child pedestrian-vehicle collisions studied represent total number of collisions that occurred between 2000 and 2010. Collisions were collected by ODOT through police

reports, meaning for collisions to have been recorded it would need to have been reported to the police. Often collisions where no injury is sustained by the pedestrian go unreported.

Second, conducting an area level analysis at the census tract level can be problematic. For one census tracts are not evenly drawn. They are based on populations of roughly 4,000 people. Tracts at the edges of city boundaries tend to be largest while those concentrated in the center, typically around downtown, are the smallest. Due to this factor certain census tracts may pick up more child pedestrian collisions because of its sheer size. Additionally, arterial roadways tend to border census tracts. A majority of the collisions occurred on arterial roadways, 74.4 percent. Collisions that occur on the periphery may be influenced equally as much by the neighboring census tract as by the census tract the event occurred within. In order to address these issues collisions were divided by the total miles of roadway within each census tract to account for the size differences. Still this is not a perfect solution but the best use of what tools are available.

Third, a potential limitation is the relatively small sample size of 252 child pedestrian vehicle collisions. Other studies of this nature have used much larger samples, between 1,100 and 4,000. It is likely the results would be profoundly stronger had more points been available, fortunately however Portland, Oregon averages roughly 12 child pedestrian-vehicle collisions a year a number still too big but relatively small compared to other communities.

Finally, the model lacks motor vehicle and pedestrain traffic counts. Traffic flow is an important variable found in many other studies. Previous studies have found significant positive correlations between traffic flow and the rate of child pedestrian vehicle collisions (Agran 1996; LaScala, Greuenwald et. al. 2004). It is likely the model would have a much higher predictability rating had I been able to assess traffic flow as a variable. Additionally, given its importance in predicting child pedestrian vehicle collisions, this would be a particularly important variable to be considered with the two test variables, land use mix and dead ends per sq. mi..

Child pedestrian counts are needed to better understand the rate of accidents that occur in specified areas. Having the total number of child pedestrians would allow a calculation of rate of pedestrian-vehicle collision. This data can be helpful in determining if an area is in fact more dangerous or if more collisions are occurring simply because there are more pedestrians.

Future Research

The onsite investigation revealed further research opportunities understanding how commercial type, commercial building design and street design effect child pedestrian-vehicle collisions. Specifically future research should focus on design attributes of commercial space and street design on child pedestrian-vehicle collisions. Specifically assessing micro attributes of streets such as sidewalk width, presence of street trees, traffic calming infrastructure, crosswalk design, and more. In addition to assessing micro attributes of commercial building design such as setbacks, parking lot layouts, and placement of entrances. Understanding these attributes can lead to better street design and building codes to increase the safety of child pedestrians.

One suggestion to identify these design attributes is to focus on environments where child pedestrian-vehicle collisions do not occur. Most studies have looked either in high pedestrian-vehicle collision areas or the environment immediately surrounding a child pedestrian-vehicle collision. Few studies have conducted aggregate analysis and no studies have focused on where collisions have not occurred. This model and other variables associated with pedestrian-vehicle collisions can be used to assess areas that should have high pedestrian-vehicle collisions but do not. These areas can then be systematically studied to assess variables associated with street design and commercial building design to identify street design and building designs associated with improved safety for child pedestrians.

Conclusion

This study assessed the impact of land use patterns and street design on the frequency of child pedestrian-vehicle collisions. Using an aggregate analysis at the census tract level I found land use mix and dead ends per sq. mi. provided an additional 4.5 percent predictability. In all, areas with higher children density, higher percentage of Hispanic population, higher density of middle schools, higher land use mix, positively correlate with increased frequencies of child pedestrian vehicle collisions. A negative correlation is found between density of elementary schools, percent of population at or below the poverty line and frequency of child pedestrian vehicle collisions. The latter correlation is converse to previous research where a positive correlation is shown between areas of fewer high income homes and frequency of child pedestrian-vehicle collisions.

An onsite investigation of two child pedestrian-vehicle collision hot spots in Portland, Oregon reveals the model is an appropriate fit. Both areas had relatively high number of child pedestrian-vehicle collisions and had a mix of land uses, presence of recreational facilities, and few dead ends. Additionally, hot spot 2 had a middle school, higher density of children, and fewer dead ends in addition to greater number of child pedestrian-vehicle collisions. This is consistent with the model wherein the presence of these attributes correlates with greater frequency of child-pedestrian vehicle collisions. The onsite investigation also revealed future research opportunities namely the effect of big box retail, auto-oriented retail, large parking lots, and commercial buildings set back greater than 20 feet, and street width on child pedestrian-vehicle collisions.

Implications of the study suggest prioritization of pedestrian safety infrastructure at commercial centers in areas with greater land use mix, higher density of middle schools, higher percentage of Hispanic population, high density of recreational facilities, and high street network connectivity. Additionally, findings suggest a separation of auto-oriented and big box retail from areas near recreational facilities and schools. Potential design solutions to increasing safety of child pedestrian

safety collisions include full and partial closures, bulb outs, and traffic calming measures. On a final note better data collection is needed on child pedestrian-vehicle collisions namely information on pedestrian actions and better accuracy of collision locations.

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EATER
LOS ANGELES

FEATURES

A Drone's Eye View of LA's Longest Drive-Thru Lines

The frenzy for drive-thru food is incredible in Los Angeles

by Matthew Kang | @mattatouille | May 12, 2020, 10:46am PDT

Photos by Stan Lee and Wonho Frank Lee
| 4 comments



An aerial shot of the Krispy in Gardena, California | Stan Lee

Even as California remains largely locked down in the face of the coronavirus crisis, many stir-crazy Angelenos have been fortunate enough to escape the house in their cars — and apparently head directly to a drive-thru, where lines at fast-food restaurants have reached ridiculous proportions. Last week, with the help of an aerial drone, Eater LA surveyed multiple spots around LA County where queues could reach up to fifty cars long, stretching for a quarter mile or more.

One particular cluster of restaurants in Downey — In-N-Out, Chick-Fil-A, and Raising Cane's — made for what could be the largest collection of cars waiting for fast food in Southern California, with one stretch along Firestone Boulevard bringing together nearly 140 cars waiting in line for food.

In-N-Out Burger, Hollywood

Hollywood's lone In-n-Out is already known to field long lines, especially during prime meal hours, but ever since the Southern California-based burger chain closed its dining rooms, the drive-thru has been the only way to load up on double-doubles and animal-style fries. The building doesn't accommodate more than one drive-thru lane, so the line snakes out into the neighborhood along Orange Drive. Employees walk the line, taking early orders are relayed inside via headset to speed up the process.



handle line flow | Wonho Frank Lee

es here stretch into the residential neighborhood | Wonho Frank Lee

Raising Cane's, Downey



The line for Raising Cane's stretched for nearly a quarter mile, from the restaurant and into the mall parking lot | Stan Lee

Raising Cane's is a Baton Rouge, Louisiana-based fast-food restaurant founded in 1996 with a very simple menu: fried chicken tenders, crinkle-cut fries, coleslaw, Texas toast, and a spicy mayo sauce. The chain has over 500 locations in the U.S. and is just entering the Southern California area with a few dozen restaurants, mostly in southeast LA county, Orange County, and Inland Empire.



over an hour, sometimes diverting traffic patterns | Wonho Frank Lee



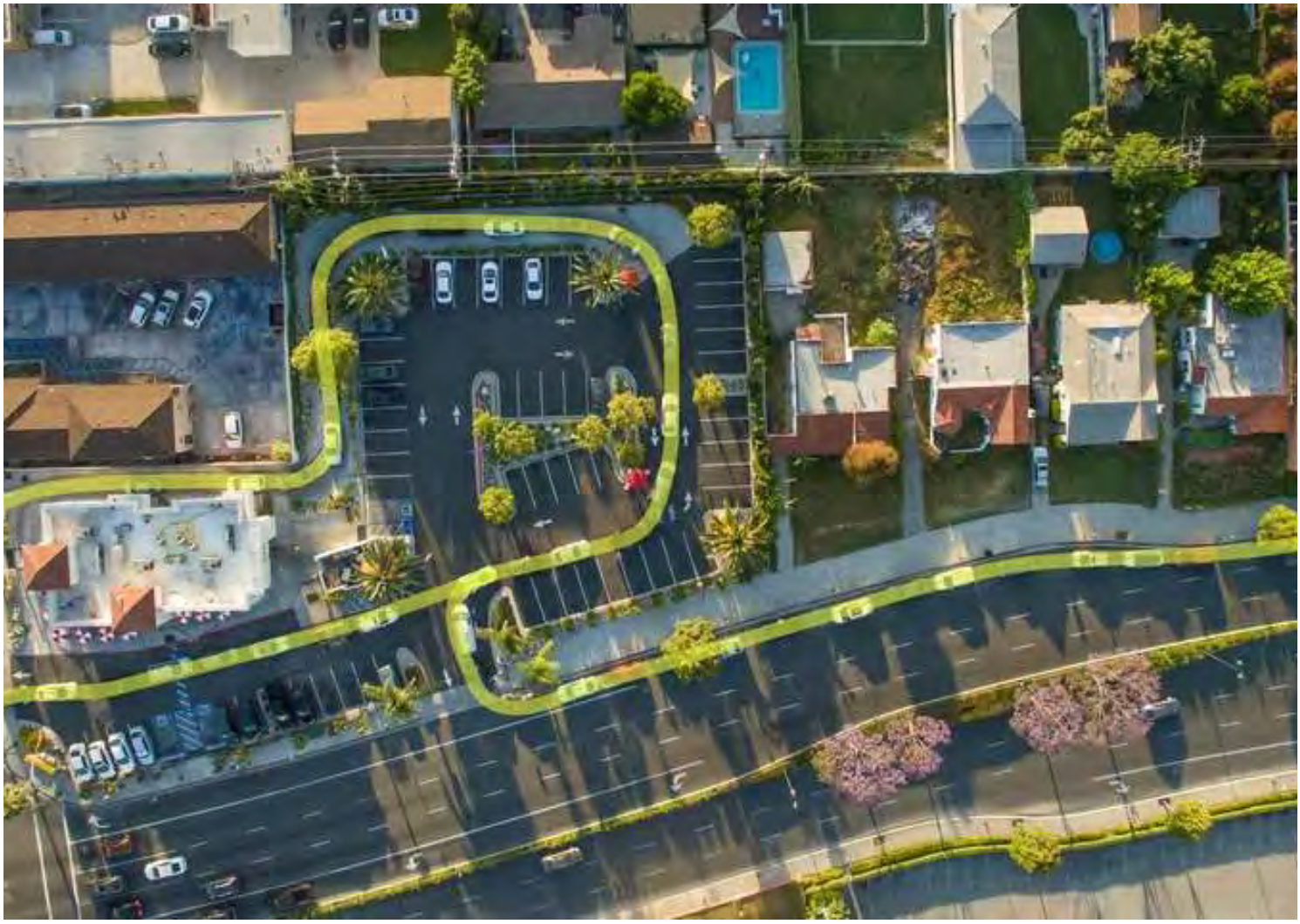
vhile waiting in drive-thru line at Raising Cane's | Wonho Frank Lee

In-N-Out, Downey

The In-N-Out in Downey has a very small footprint and is surrounded by residential buildings, but the line stretched in two different directions on a recent Friday evening. There are nearly 40 cars, with traffic almost piling up on the busy intersection of Firestone and Lakewood Boulevards.



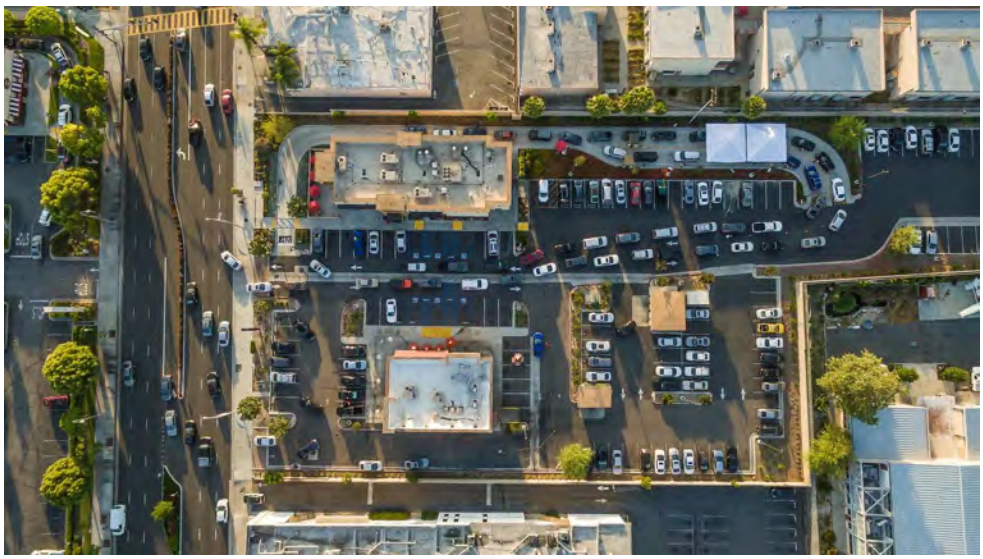
-thru line at In-N-Out | Stan Lee



ive-thru | Stan Lee

Chick-Fil-A, Downey

Chick-Fil-A, which has two locations in Downey, piled 50 cars in two lanes at its Firestone Boulevard location, just two blocks northwest of the In-N-Out.



Chick-fil-A's Downey drive-thru utilizes two lanes to keep cars off of the street | Stan Lee

Krispy Kreme, Gardena

The Krispy Kreme doughnuts in Gardena, just off the intersection of the 91 and 110 freeways, has a snaking line that had 37 cars on Friday evening, though it can get even longer on some Mondays, when the donut chain gives away up to five dozen donuts to healthcare workers.



LA is America's doughnut capital, as evidenced by this always-busy Krispy Kreme | Wonho Frank Lee

Krispy Kreme doughnuts first opened in Southern California during the 2000s, with busy locations in Crenshaw District and Burbank. This location in Gardena received some fame on Reddit a few weeks ago for its long drive-thru line. It certainly helps that starting at 6 p.m., the shop makes warm fritters hot off the fryer.



Despite multiple parking lot switchbacks, this Gardena Krispy Kreme's line takes up a full lane of traffic

In-N-Out, Gardena

In-N-Out in Gardena had an efficient two-lane system that could increase capacity depending on the number of cars lined up. A normal wait for someone joining the drive-thru hovers around fifteen minutes for their order, with about two-dozen cars in front of them.



n-N-Out's drive thru can take 20 or 30 minutes | Wonho Frank Lee



ılways been a common Southern California occurrence | Wonho Frank Lee

Drive-thru culture has long been a tradition in Southern California, owing to the area's commuter culture, freeway access, and insatiable appetite for burgers, doughnuts, and tacos — all easily eaten on the road. Now during the coronavirus pandemic, cars act as natural cocoons, creating physical distance between people while still allowing a modicum of outside-the-home interaction. Pandemic or not, dining in cars is a California tradition — and as these hour-long lines show, one not likely to go away any time soon. ▪

Stan Lee is an LA-based photographer and occasional drone pilot.

Wonho Frank Lee is Eater LA's staff photographer



Wonho Frank Lee

Eater LA

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SOMETHING FOR THE WEEKEND

4 Restaurants to Try This Weekend in Los Angeles

AM INTEL

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DATE **2/22/2022**



CIRCULATION AND PARKING PLAN

LAUREL ELEMENTARY MAGNET SCHOOL

KITTELSON & ASSOCIATES

Brea Olinda Unified School District

CITY of BREA

About Us

Our Team

Fernando Sotelo, TE, PTP
Fernando brings 20 years of traffic engineering and transportation planning experience and has worked on circulation, parking, and pedestrian safety analyses for many school districts including El Segundo, Paramount, Riverside, Malibu, and Beverly Hills.

Mychal Loomis, PE, TE, PTOE, RSP
Mychal is an associate engineer with 15 years of traffic engineering experience working on a diverse range of safety projects and circulation analyses.

Joceline Suhaimi, EIT
Joceline is a UCLA Civil Engineer graduate with two years of experience working on a wide variety of traffic, circulation, parking, and safety studies in California.

About Kittelson

We provide **comprehensive** transportation planning, engineering, and research services to government agencies and private organizations across the nation.

Team Experience

Center Street Elementary School Drop-off Reconfiguration – **El Segundo, CA**

Malibu High School Campus Master Plan Traffic Impact Analysis – **Malibu, CA**

Traffic Impact Study for Wedgeworth Elementary School – **Hacienda Heights, CA**

Traffic and Pedestrian Circulation Analyses for Beverly Hills Unified School Districtwide Reconfiguration – **Beverly Hills, CA**

Project Background

Motivation

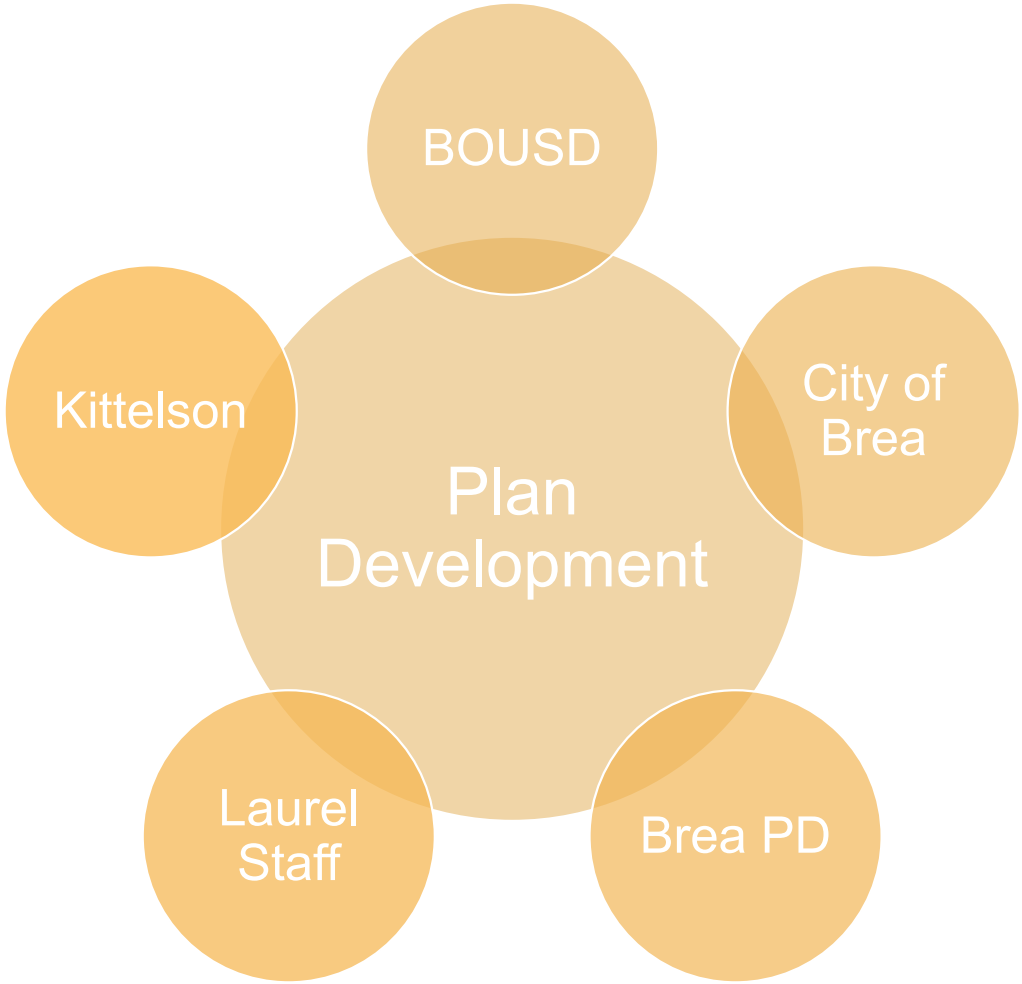
The City of Brea and BOUSD had been coordinating to improve traffic, circulation, parking, and safety at Laurel Elementary Magnet School. Kittelson was hired as a third-party technical expert and tasked with identifying a list of potential physical and operational improvements that can address transportation challenges at the school.

Research

Kittelson reviewed publicly-available documents and studies conducted in the area, such as:

- Transportation Assessment for a drive-through restaurant
- Laurel Elementary School access plan
- BOUSD Master Plan
- Brea Place Traffic Study

A Team Effort



We engaged stakeholders with different backgrounds and perspectives to develop an understanding of the challenges at Laurel and how we could help solve them.

Challenges

- The student **drop-off zones** for private autos and ADA vans are **not separated**
- Not enough **queue space** on site
- Students are being picked up and dropped off **on public streets**
- The **site is constrained** due to the historic nature of the building and proximity to a major highway
- Off-street **parking is insufficient** to accommodate demand from staff, volunteers, and visitors
- There is **limited pedestrian connectivity** and barriers for students who walk to school



RECOMMENDATIONS

KITTELSON & ASSOCIATES

Brea Olinda Unified School District

CITY of BREA

Range of Recommendations

Timing:

- Quick actions (6 months)
- Near-term (18 months)
- Long Term (5+ years)

Cost:

- Quick actions ($)
- Near-term ($$)
- Long Term ($$$$$)

Alternatives:

- Cost
- Space requirements
- Target benefit
- Benefits and costs







Quick Action Recommendations



- Meant to be built within 6 months
- Mostly operational recommendations
- Quick-build delineators
- Signage and striping

Quick-Action Recommendations

Estimated Total Cost: $15,000



1. Expand the Adaptive Traffic Signal System (ATSS) to include the Birch and Flower traffic signal. Modify signal timing to add Leading Pedestrian Interval and increase pedestrian walk time
2. Change right-turn regulatory sign and stripe a 50-foot right turn lane pocket.
3. Improve drop-off/pick-up signage (e.g., restrictions, pull-forward signage) and provide clear curb markings on Flower Ave (green or white curb).
4. Delineate median to prevent U-turn movement.
5. Restrict left turns from Flower Avenue using delineators and striping.
6. Allow drop-off/pick-up along Flower Avenue school driveways, using cones to close driveways for vehicle access except ADA-related vehicles.
7. Add striping and signage for pedestrian traffic at the alleyway (e.g., striped crosswalks, "yield to pedestrians" sign).
8. Restrict left turns at the alleyway at Imperial Highway during drop-off and pick-up hours. Add sign R33A (CA) "No Left Turns (Specify days and times)" to the alley.
9. Formalize the agreement for off-site parking at church north of project site.
10. Develop and publicize a drop-off/pick-up plan.

Quick-Action Recommendations – Flower Avenue Detail



Short-Term Recommendations



- Meant to be built within 18 months
- May require some Caltrans coordination
- Physical improvements
  - Widening the alley
  - Adding high-visibility crosswalks

Short-Term Recommendations

Estimated Total Cost: $100,000



11 Improve the southwest corner of Birch at alley driveway with a better turn radius.

12 Remove/relocate the existing utility pole in the alley.

13 Widen the alley by 16 feet for drop-off, pick-up, and parking. 8 feet of pavement will be for vehicles to pull in and drop-off/pick-up students, and 8 feet will be for a sidewalk.

14 Upgrade the gate and student gathering area. Add an ADA-compliant walking path from the alley to the school.

15 Use signage to restrict the northbound movement through alley during the pick-up and drop-off time periods. This will require Caltrans concurrence due to the presence of an eastbound left turn pocket leading to northbound travel in the alley.

16 Designate a separate loading area for special education students. This can be in the existing parking lot or in the alley.

17 Coordinate with Caltrans to add additional school zone signage and striping along Imperial Highway.

18 Add high-visibility crosswalks at the intersections at Flower Avenue/Birch Street and Flower Avenue/Imperial Highway.

19 Add a mid-block crosswalk on Flower Avenue

Short-Term Recommendations – Flower Avenue Detail



Short-Term Recommendations – Alley Detail



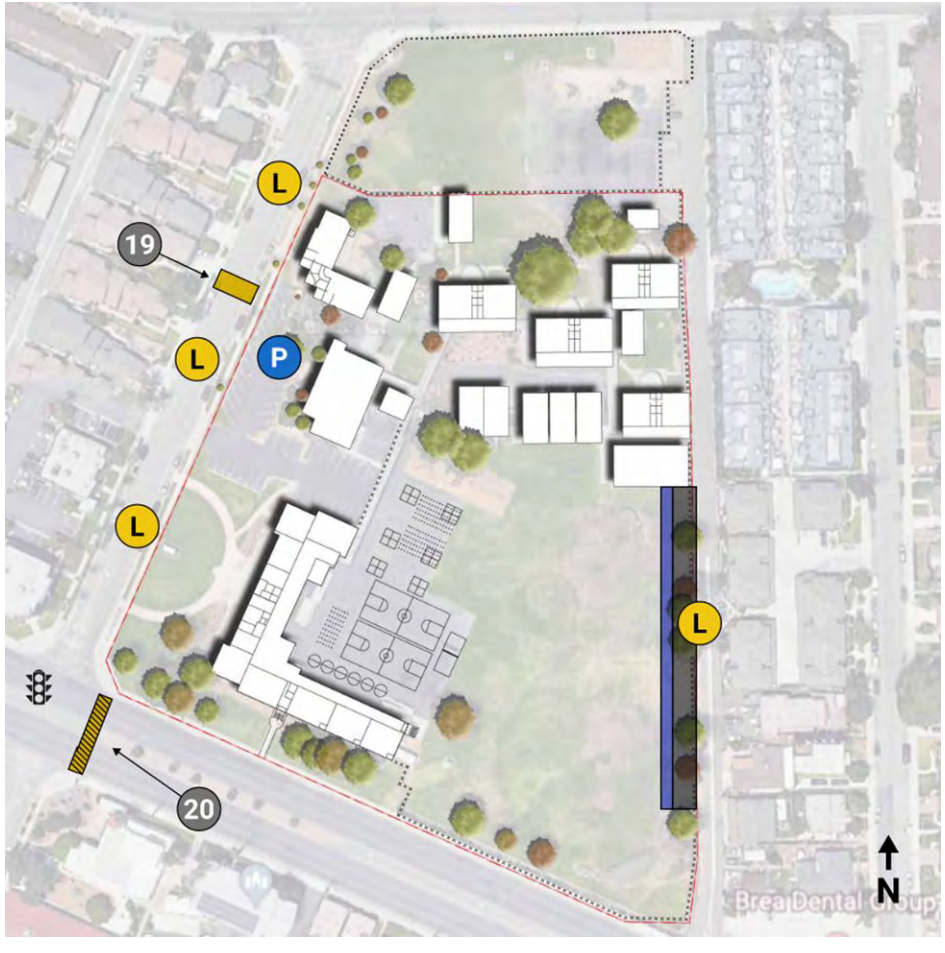
Long-Term Recommendations



- Three alternatives with varying levels of effort and cost
- May take 3 to 5 years to build

Long-Term Recommendations: Pedestrian

Estimated Total Cost: $500,000



19 **Add a mid-block crosswalk on Flower Avenue.** A well-placed crosswalk can also help lengthen the pick-up queue and ensure that adults pull forward as far as possible when picking up students. In addition, a mid-block crosswalk provides a much safer alternative for students who need to cross Flower Avenue. However, this will result in a loss of approximately four on-street parking spaces. The crosswalk can be a standard high-visibility crosswalk with yellow ladder striping or a raised crosswalk.

a. Standard crosswalk. A standard crosswalk would be less costly and much faster to build.

b. Raised crosswalk. Raised crosswalks serve as traffic calming measures and increase visibility of pedestrians. A civil engineering review will be required to ensure proper drainage, that adequate space exists between residential and commercial driveways, and ADA crossing features can be provided.

20 **Install a traffic signal and raised median** to support a new pedestrian crossing at Imperial Highway on the east side of the intersection with Flower Avenue.

Long-Term Recommendations: Alternative 1

Estimated Total Cost: $1,000,000



21 Add a right-turn lane from Imperial Highway to Flower Avenue.

22 Reconfigure the front of the school to incorporate an on-site pick-up/drop-off area with a new driveway.

23 The alley can be converted into a parking lot for staff and visitors. The front parking lot would be replaced with the new pick-up/drop-off configuration. Approximately 20 parallel parking spaces can be added to the alley.

Potential Benefits	Potential Drawbacks
• Increases the amount of on-site parking • Repurposes some underutilized field space near Imperial Highway • Adds a space on Imperial Highway for queueing vehicles that is outside the travel lane	• Reduces recreational space • Affects historical front of the school • There is limited queuing space in front of school (~300 feet) • The right-turn lane on Imperial Highway requires changing the configuration of the crosswalk

Long-Term Recommendations: Alternative 2

Estimated Total Cost: $1,200,000



24 Add a drive aisle (instead of a right-turn lane) off Imperial Highway to increase queuing space on site. The drive aisle can connect to an existing driveway on Imperial Highway west of the fence and the existing driveway to the current parking lot. This removes the need for Caltrans to maintain a right-turn lane, does not increase the width of Imperial Highway in front of the school, and does not impact the existing crosswalk on Flower Avenue.

25 Reconfigure front of school to incorporate an on-site pick-up/drop-off area using the existing driveways.

23 The alley can be converted into a parking lot for staff and visitors. The front parking lot would be replaced with the new pick-up/drop-off configuration.

Potential Benefits	Potential Drawbacks
• Increased on-site parking • New drive lane would provide deceleration lane on Imperial Highway for school and commercial traffic • Moves queues from Imperial Highway to the school site • Adds approximately 600 feet of queue space on-site	• Reduces recreational green space at the school • Affects the historical front of the school

Long-Term Recommendations: Alternative 3

Estimated Total Cost: $1,500,000



26 Add drive aisle with a new driveway that provides angled entry into a horseshoe-style drop-off area. The drive aisle will connect further east to the existing driveway and connect to the existing driveway at the current parking lot.

27 Reconfigure front of school to incorporate an on-site pick-up/drop-off area.

23 The alley can be converted into a parking lot for staff and visitors. The front parking lot would be replaced with the new pick-up/drop-off configuration.

Potential Benefits	Potential Drawbacks
• Increased on-site parking • New drive lane would provide deceleration lane on Imperial Highway for school and commercial traffic • Moves queues from Imperial Highway to the school site • Adds approximately 800 feet of queue space on-site	• Reduces recreational green space at the school • Affects the historical front of the school • Affects the existing batting cage



City Council and Successor Agency to the Brea Redevelopment Agency Agenda

Tuesday, February 16, 2021

5:45 p.m. - Closed Session
6:30 p.m. - Study Session
7:00 p.m. - General Session

***Steven Vargas**, Mayor* — ***Cecilia Hupp**, Mayor Pro Tem*

***Christine Marick**, Council Member* — ***Glenn Parker**, Council Member* — ***Marty Simonoff**, Council Member*

This agenda contains a brief general description of each item Council will consider. The City Clerk has on file copies of written documentation relating to each item of business on this Agenda available for public inspection. Contact the City Clerk's Office at (714) 990-7756 or view the Agenda and related materials on the City's website at www.cityofbrea.net. Materials related to an item on this agenda submitted to the Council after distribution of the agenda packet are available for public inspection in the City Clerk's Office at 1 Civic Center Circle, Brea, CA during normal business hours. Such documents may also be available on the City's website subject to staff's ability to post documents before the meeting.

Procedures for Addressing the Council

This meeting is being conducted consistent with Governor Newsom's Executive Order N-29-20 dated March 17, 2020, regarding the COVID-19 pandemic.

Written comments may be sent to the City Clerk's Office at cityclerksgroup@cityofbrea.net no later than 12:00 p.m. on Tuesday, February 16, 2021. Any comments received via email will be summarized aloud into the record at the meeting. **The Council Chambers will be closed to the public**. To provide comments via teleconference (zoom), members of the public must contact City Staff at (714) 990-7756 or cityclerksgroup@cityofbrea.net no later than 12:00 p.m. on Tuesday, February 16, 2021 to obtain the Zoom Meeting ID number and password. Teleconference attendees will participate via audio only and will be muted until recognized at the appropriate time by the Council - video display will be disabled. **Visit www.cityofbrea.net to watch the live broadcast of the meeting.**

Special Accommodations

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the City Clerk's Office at (714) 990-7757. Notification 48 hours prior to the meeting will enable City staff to make reasonable arrangements to ensure accessibility. (28 CFR 35.102.35.104 ADA Title II)

Important Notice

The City of Brea shows both live broadcasts and replays of City Council Meetings on Brea Cable Channel 3 and over the Internet at www.cityofbrea.net. Your attendance at this public meeting may result in the recording and broadcast of your image and/or voice as previously described.

CLOSED SESSION
5:45 p.m. - Council Chamber
Plaza Level

CALL TO ORDER / ROLL CALL - COUNCIL

1. **Public Comment**

Closed Session may convene to consider matters of purchase / sale of real property (G. C. §54956.8), pending litigation [G.C.§54956.9(d)(1)], potential litigation [G.C. §54956.9(d)(2)(3) or (4)], liability claims (G. C. §54961) or personnel items (G.C.§54957.6). Records not available for public inspection.

2. **Conference with City's Labor Negotiator Pursuant to Government Code §54957.6 Regarding the Brea Management Association (Non-Safety); Brea City Employees' Association (BCEA); Administrative and Professional Employees' Association (APEA); Brea Fire Association (BFA); Brea Fire Management Association (BFMA); Brea Police Association (BPA); and the Brea Police Management Association (BPMA)** - Chris Emeterio, Negotiator, Cindy Russell, Negotiator, and Mario E. Maldonado, Negotiator.

3. **Conference with Legal Counsel Pursuant to Government Code Section 54956.9(d)(1)** - Existing Litigation. Name of Case: Pacific Plastics, Inc. v. City of Brea et al. (Case No. 30-2020-01158750-CU-WM-CXC)

4. **Conference with Legal Counsel Pursuant to Government Code Section 54956.9(d)(1)** - Existing Litigation. Name of Case: City of Brea v. Olen Pointe Brea Corporation, et al. (Case Number 30-2018-01021477-CU-EI-CJC)

5. **Conference with Legal Counsel Pursuant to Government Code Section 54956.9(d)(2) - Anticipated Litigation. Significant Exposure to Litigation: 1 potential case. Facts and Circumstances**: Windes Threat of Litigation.

STUDY SESSION
6:30 p.m. - Council Chamber
Plaza Level

CALL TO ORDER / ROLL CALL - COUNCIL

6. **Public Comment**

7. **Clarify Regular Meeting Topics**

DISCUSSION ITEMS

8. **Parking Restrictions at Parking Facilities Update**

9. **Southern California Association of Governments (SCAG) Delegate and Alternate for the Regional Conference and General Assembly, Scheduled for May 6-7, 2021.**

REPORT

10. Council Member Report/Requests

GENERAL SESSION
7:00 p.m. - Council Chamber
Plaza Level

CALL TO ORDER/ ROLL CALL - COUNCIL

11. Pledge of Allegiance: Girl Scout Troop 4123

12. Invocation: Daniel Mendoza, Celebration OC

13. Report - Prior Study Session

14. Community Announcements

15. Matters from the Audience
Written comments may be sent to the City Clerk's Office at cityclerksgroup@cityofbrea.net no later than 12:00 p.m. on Tuesday, February 16, 2021. Any comments received via email will be summarized aloud into the record at the meeting. ***The Council Chambers will be closed to the public****. To provide comments via teleconference (zoom), members of the public must contact City Staff at (714) 990-7756 or cityclerksgroup@cityofbrea.net no later than 12:00 p.m. on Tuesday, February 16, 2021 to obtain the Zoom Meeting ID number and password. Teleconference attendees will participate via audio only and will be muted until recognized at the appropriate time by the Council - video display will be disabled.* ***Visit www.cityofbrea.net to watch the live broadcast of the meeting.***

16. Response to Public Inquiries - Mayor / City Manager

OLD BUSINESS

17. Conditional Use Permit No. 20-10, Precise Development Plan No. 20-04, and Conditional Use Permit No. 20-18: a Request to Amend Planning Commission Resolution No. 88-56 to Allow the Demolition of Two Commercial Buildings to Construct a Restaurant with a Drive-thru, and to Amend an Existing Sign Program, at 255 East Imperial Highway, in the C-P (Commercial Professional) P-D (precise Development) Zone - Find the project exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA guidelines Section 15301 (Class 1, Existing Facilities) and Section 15303 (Class 3, New Construction or Conversion of Small Structures; and deny the appeal and allow the following: approve CUP No. 20-10 to amend Planning Commission Resolution No. 88-56 to allow a restaurant with a drive-thru, subject to the recommended conditions of approval, and based on the findings and conclusions in the resolution; and approve PD Plan No. 20-04 to allow the demolition of two commercial buildings totaling 9,588 square-feet, and the construction of a new 3,267 square-foot single-story restaurant, subject to the recommended conditions of approval, and based on the findings and conclusions in the attached resolution; and Approve CUP No. 20-18 to amend the existing sign program, based on the findings and conclusions in the resolution.

PUBLIC HEARING - *This portion of the meeting is for matters that legally require an opportunity for public input. Audience participation is encouraged and is limited to 5 minutes per speaker.*

18. **Request to Continue Agenda Item 18: Consideration of an Ordinance of the City Council of the City of Brea Adopting Zone Text Amendment No. ZTA 20-01 to Amend Title 20 of the Brea Municipal Code to Replace the Provisions Pertaining to Accessory Dwelling Units and Junior Accessory Dwelling Units Within the City of Brea -** Staff recommends that the City Council take the following action: open the public hearing and make a motion to continue the item to the March 2, 2021 City Council Meeting.

ADMINISTRATIVE ITEMS - *This agenda category is for City Council consideration of a wide variety of topics related to the City's operations. Public comments regarding items in this section should be presented during "Matters from the Audience."*

19. **City of Brea Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2020 and Related Audit Reports -** Receive and file the City's Comprehensive Annual Financial Report (CAFR) for the Fiscal Year Ended June 30, 2020 and related audit reports. There is no fiscal impact to the General Fund.

20. **Contract with Western Golf Properties LLC (WGP) for Maintenance and Operation of Birch Hills and Brea Creek Golf Courses -** Award Contract with WGP for the maintenance and operations of Birch Hills and Brea Creek Golf Courses in a monthly amount of $201,785 for the initial term of 64 months beginning March 1, 2021; and authorize the City Manager to approve up to two - one year extensions. Funds are available in Fund 465 to move forward with this item.

CONSENT CALENDAR - *The City Council/Successor Agency approves all Consent Calendar matters with one motion unless Council/Agency or Staff requests further discussion of a particular item. Items of concern regarding Consent Calendar matters should be presented during "Matters from the Audience."*

CITY COUNCIL - CONSENT

21. **February 2, 2021 City Council Regular Meeting Minutes** - Approve.

22. **Acceptance of Contract and Notice of Completion for Contract with T.E. Roberts, Inc., Eagle Hills Tract Water Improvements, CIP No. 7467 -** Accept project as complete and authorize City Clerk to record Notice of Completion; and authorize City Clerk to release the Payment and Performance Bond upon notification from the Public Works Department. There is no fiscal impact to the General Fund.

23. **City Council Code of Conduct Amendment -** Adopt amended City Council Code of Conduct. There is no fiscal impact to the General Fund.

24. **Outgoing Payment Log and City Disbursement Registers for February 5 and 12, 2021 -** Receive and File.

ADMINISTRATIVE ANNOUNCEMENTS

25. **City Manager**

26. **City Attorney**

27. Council Requests

COUNCIL ANNOUNCEMENTS

ADJOURNMENT

City of Brea

COUNCIL COMMUNICATION

TO: Honorable Mayor and City Council Members

FROM: Bill Gallardo, City Manager

DATE: 02/16/2021

SUBJECT: Conditional Use Permit No. 20-10, Precise Development Plan No. 20-04, and Conditional Use Permit No. 20-18: A Request to Amend Planning Commission Resolution No. 88-56 to Allow the Demolition of Two Commercial Buildings to Construct a Restaurant with a Drive-thru, and to Amend an Existing Sign Program, at 255 East Imperial Highway, in the C-P (Commercial Professional) P-D (Precise Development) Zone.

RECOMMENDATION

Staff recommends that the City Council take the following actions:

1. Find the project exempt from the California Environmental Quality Act (CEQA) pursuant to CEQA guidelines Section 15301 (Class 1, Existing Facilities) and Section 15303 (Class 3, New Construction or Conversion of Small Structures; and
2. Deny the appeal and allow the following:
    1. Approve CUP No. 20-10 to amend Planning Commission Resolution No. 88-56 to allow a restaurant with a drive-thru, subject to the recommended conditions of approval, and based on the findings and conclusions in the attached Resolution; and
    2. Approve PD Plan No. 20-04 to allow the demolition of two commercial buildings totaling 9,588 square-feet, and the construction of a new 3,267 square-foot single-story restaurant, subject to the recommended conditions of approval, and based on the findings and conclusions in the attached Resolution; and
    3. Approve CUP No. 20-18 to amend the existing sign program, based on the findings and conclusions in the attached Resolution.

The above-mentioned Resolutions are found in Attachment A of this report.

BACKGROUND/DISCUSSION

At the February 2, 2021 regular City Council Meeting, the City Council opened the public hearing, received testimony, and asked follow-up questions of the Appellant, Applicant, and City staff. Following the close of the public hearing, the City Council continued the item to the February 16, 2021 City Council Meeting (5-0 vote). As part of the continuance, the City Council directed staff to provide information related to the following:

Police Department: The City Council requested crime statistics of the Project site and immediate neighborhood. These crime statistics were provided by the Brea Police Department and is provided as Attachment B of this report.

BOUSD: The City Council directed City staff to reach out to BOUSD regarding where students live and how students get to school. They also requested that BOUSD prioritize their list of recommended conditions of approval and provide feedback on the possibility of a partnership with the City. On February 3, 2021, Planning Division staff contacted BOUSD with the following questions and received the following responses.

1. Provide a map, demographic information, exhibits, data, etc. that would explain or address the following:
    a. Where do Laurel students live?
    b. How do these students get to school (walk with friends/parents, bicycle, dropped off in car/bus – including special education)?
    c. What are the ages and/or grade of these students?

BOUSD Response: BOUSD provided Planning Division staff with a Microsoft Excel spreadsheet that provided enrollment data for Laurel Elementary School. This data included the address and grade of each student. BOUSD was unable to provide information about how these students get from their homes to Laurel Elementary School.

City staff plotted the information into GIS, which is provided as Attachment C of this report. Of the 429 students enrolled, 117 students (27% percent live South of Imperial Highway).

2. BOUSD provided a list of recommended conditions/mitigations attached to the January 29, 2021 letter. The City Council requested that BOUSD prioritize and/or tier these requests into groups (for example, high priority versus low or short-term versus long-range).

BOUSD response: *BOUSD staff will be soliciting feedback from the Board on this item as part of their February 11, 2021 meeting.* The publication of this report occurred ahead of their meeting. Any information from the BOUSD Board discussion will be forwarded to the City Council as part of a subsequent memo.

3. The City Council expressed a willingness to partner with BOUSD on a feasibility study that would examine potential solutions to the drop-off/pick-up/circulation issues that Laurel Elementary is experiencing. This feasibility study would require a financial contribution and

participation from BOUSD.

BOUSD response: *BOUSD staff will be soliciting feedback from the Board on this item at their February 11, 2021 meeting*. The publication of this report occurred ahead of their meeting. Any information from the BOUSD Board discussions will be forwarded to the City Council as part of a subsequent memo.

Parking Management Plan (PMP): The City Council requested examples of some realistic, enforceable measures that could be included in the PMP. The Planning Commission can add additional measures through the Parking Management Plan at these reviews that would remain as part of the CUP conditions of approval. Below are a few scenarios, and examples of PMP conditions the Planning Commission could impose:

- Scenario 1: The peak drive-thru time has been observed to be during the dinner hour from 5pm to 8pm. During this peak time, the drive-thru lane extends beyond the 22 queuing spaces in to the parking lot and on to Orange Avenue. Condition of the PMP could be added to require the Applicant to enact an overflow operational Site Plan that extends the double-drive thru beyond the 22-car capacity to along the westerly drive through to the satisfaction of the City Engineer and City Planner.
- Scenario 2: Branded trash has been found throughout the parking lot and neighboring properties, including Laurel Elementary School. The PMP, or separate condition of approval, could be included requiring preparation and implementation of a Litter Clean-up Plan. The Clean-up Plan could include language that requires employees of Raising Canes to make dedicated efforts to clean-up any "branded" refuse in the parking lot and immediate area.
- Scenario 3: There is an overlap in parking of Raising Canes employees in the parking lot. The PMP could require Raising Canes staff to have a sticker or placard placed in the window of their vehicle and require them to park in a dedicated location of the site, or even in an off-site, off-street parking facility.
- Other items related to noise and lighting are regulated by existing ordinances and enforceable by the Police Department and Code Enforcement Division.

Conditions of Approval: The City Council requested some additions to the recommended condition language as reflected below:

New Conditions

- Prior to the issuance of Certificate of Occupancy, the Applicant shall submit a Crossing Guard Feasibility study, in accordance with industry standards and requirements, subject to the review of the City Planner and City Engineer. In the event the Crossing Guard Feasibility Study warrants a crossing guard along Imperial Highway, at Flower or Orange Avenue, the Applicant shall be responsible for a contribution of funds toward the full cost of staffing a crossing guard.
- Six-months following the issuance of a Certificate of Occupancy, the Planning Commission will review the drive-thru operation. This report will include a review of the PMP, business operations, and include any complaints or request for code enforcement action, to allow the Planning Commission the opportunity to assess the approved operation.

- The following uses shall be expressly prohibited through this Precise Development and Conditional Use Permit:
    - Tobacco retail stores including vaping products and/or paraphernalia
    - All cannabis related businesses
    - Any retail store that displays adult content including, but not limited: adult related toys and sexual aids, etc.
    - Convenience stores with or without the sale of alcohol
    - Weapon and ammunition stores
- The applicant shall be required to install signage on Flower and Orange Avenue that restricts commercial vehicles over 6,000 lbs. to the satisfaction of the City Engineer.

CORRESPONDENCE

As of the publication of this report, 13 new correspondences on the Project have been received and included as Attachment E of this report.

SUMMARY

For the reasons discussed above, as well as the information attached to this report, the Project would conform with all the requirements of the General Plan with all applicable requirements of state law, and the provisions of the City of Brea codes.

RESPECTFULLY SUBMITTED:

William Gallardo, City Manager
Prepared by: Tracy Steinkruger, Community Development Director
Concurrence: Jason Killebrew, City Planner

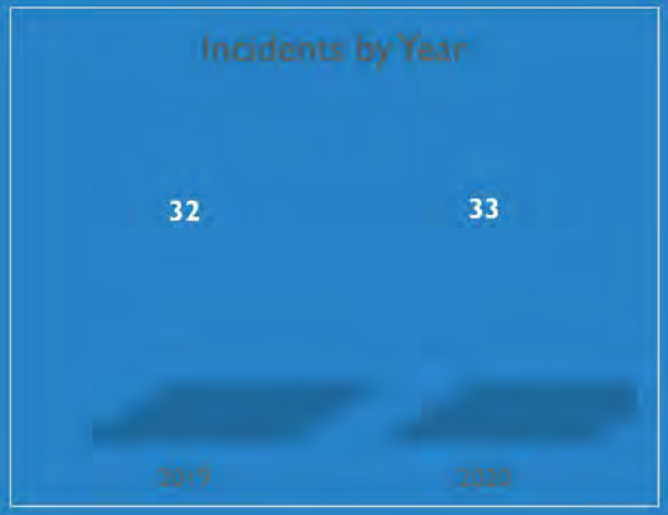
Attachments

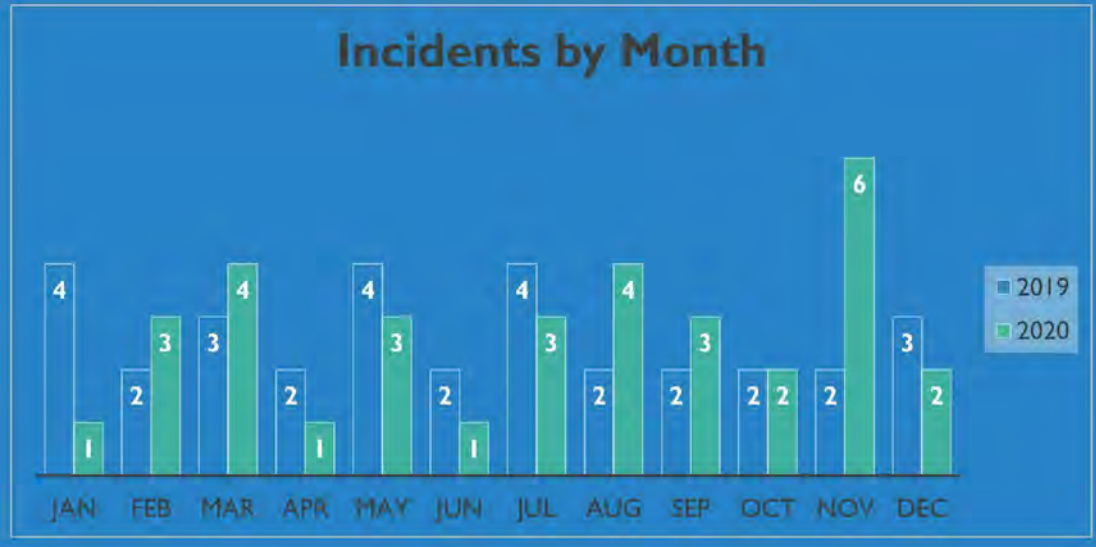
A. February 2, 2021 City Council Staff Report
B. Brea PD Crime Statistics
C. Laurel Elementary School Student Residency Exhibit A
D. Laurel Elementary School Student Residency Exhibit B
E. Laurel Elementary School Student Residency Exhibit C
F. Laurel Elementary School Student Residency Exhibit D
G. Correspondence

February 16, 2021 City Council Staff Report Attachment A (February 2, 2021 City Council Staff Report) is omitted here. The Staff Report, with attachments, is indexed and produced below.

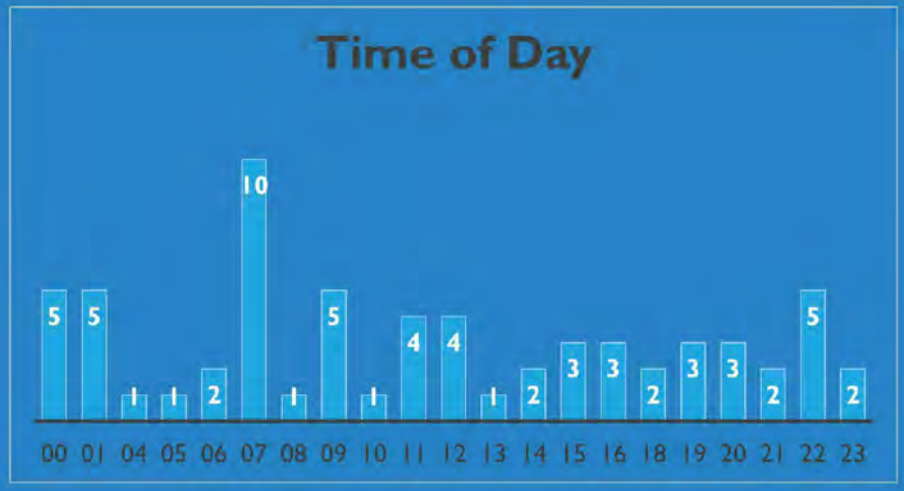
ATTACHMENT B

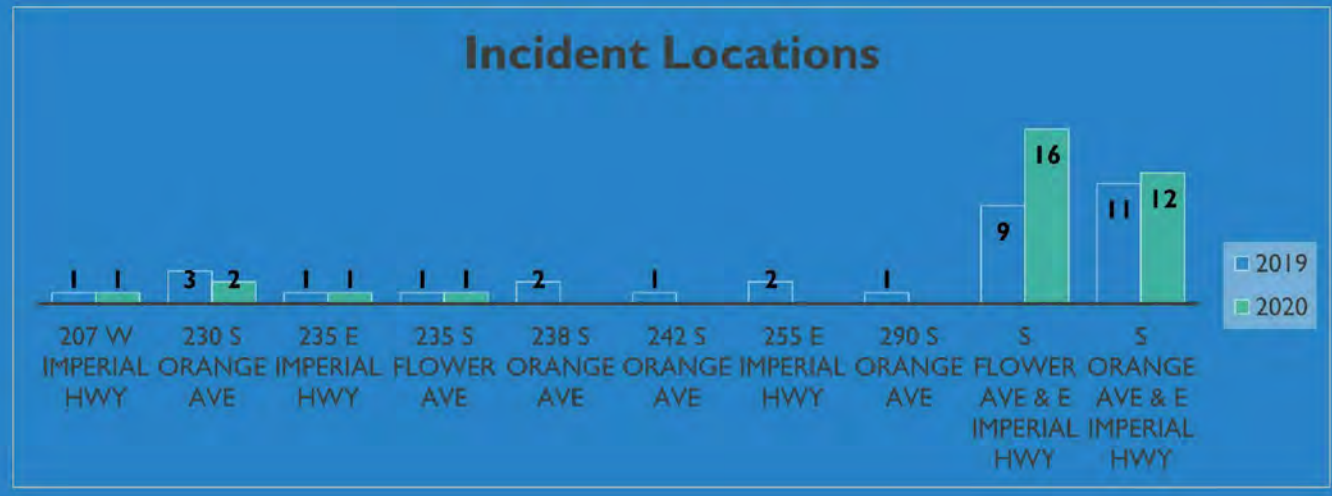
COMMERCIAL CENTER INFORMATION



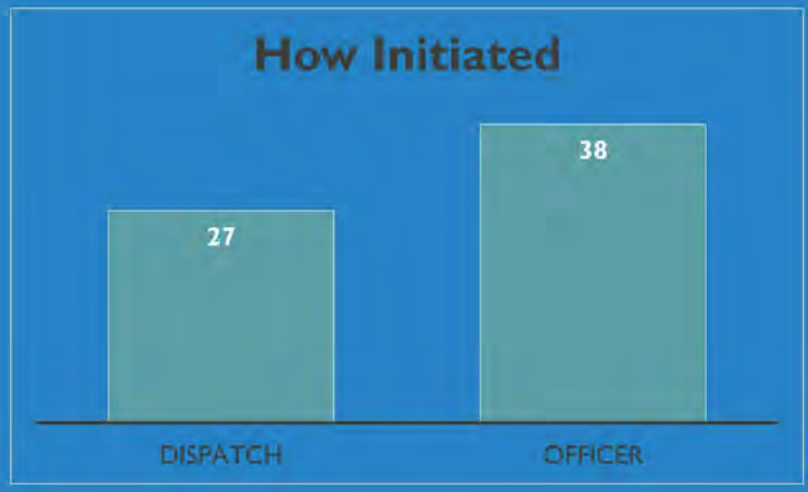


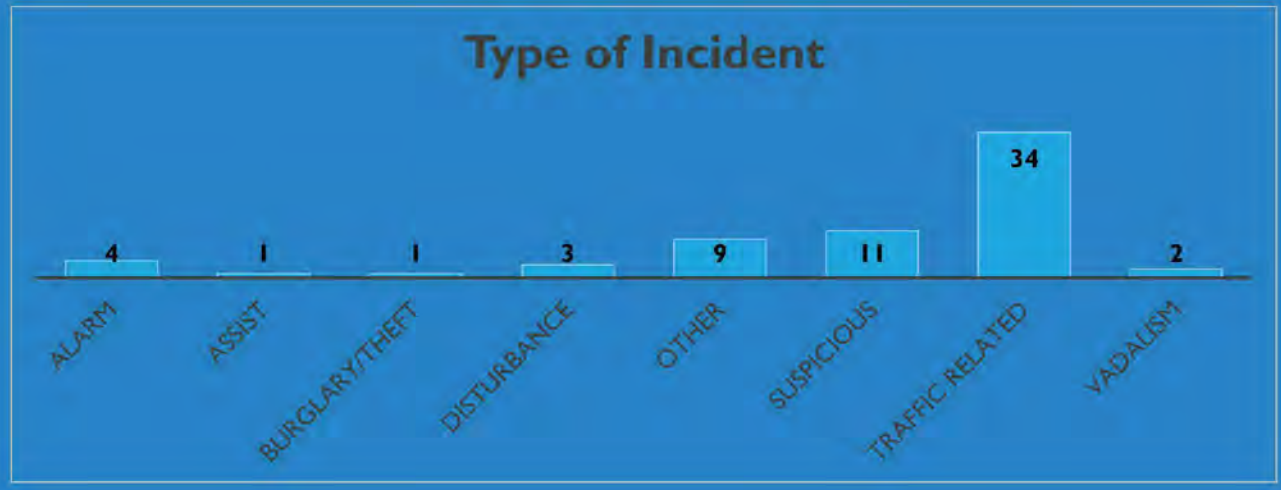
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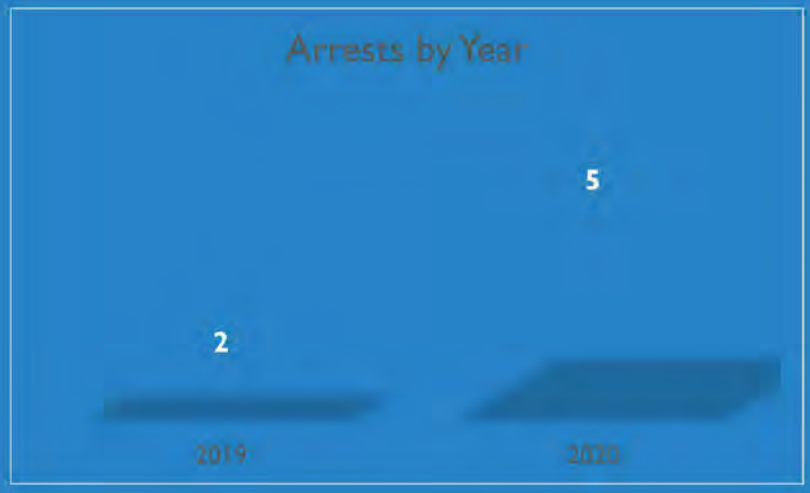


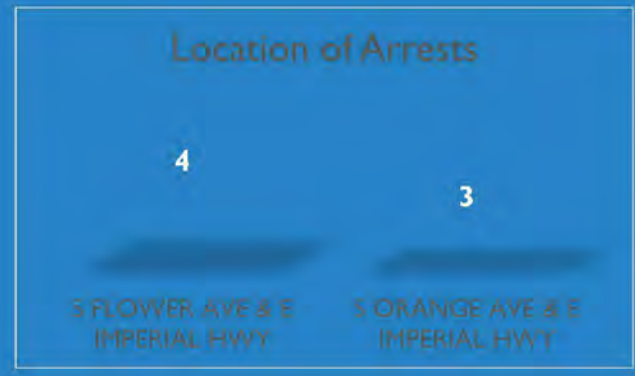
ATTACHMENT B





ATTACHMENT B







Number	Dates	Days	Hours	Address	Nature	How	Officer
2012-1756	12/23-12/23	Thu-Thu	0057-0057	S FLOWER AVE & E IMPERIAL HWY	PATROL CHECK	Dispatch	G GOBLE
2012-0858	12/11-12/11	Sat-Sat	1345-1345	S FLOWER AVE & E IMPERIAL HWY	SURVEILLANCE	Officer	S WULFF
2011-1364	11/19-11/19	Fri-Fri	1221-1221	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	C SPENCER
2011-1282	11/18-11/18	Thu-Thu	1251-1251	235 E IMPERIAL HWY	HOMELESS	Dispatch	L TINNIN
2011-0661	11/10-11/10	Wed-Wed	1152-1152	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	B CROSS
2011-0524	11/07-11/07	Sun-Sun	2206-2206	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	R MCDUFFY
2011-0369	11/05-11/05	Fri-Fri	2235-2235	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	S MACIAS
2011-0006	11/01-11/01	Mon-Mon	0034-0034	S ORANGE AVE & E IMPERIAL HWY	B/O VEHICLE	Officer	K CARPENTER
2010-1474	10/21-10/21	Thu-Thu	0715-0715	230 S ORANGE AVE	HOMELESS	Dispatch	J MOROUSE
2010-1312	10/18-10/18	Mon-Mon	2245-2245	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	C CHRISTNER
2009-1889	09/25-09/25	Sat-Sat	1113-1113	S FLOWER AVE & E IMPERIAL HWY	ABANDONED VEHICLE	Dispatch	J HERRERA
2009-1768	09/23-09/23	Thu-Thu	1920-1920	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	M LUERA
2009-0002	09/01-09/01	Wed-Wed	0039-0039	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	Z MURPHY
2008-2219	08/31-08/31	Tue-Tue	0754-0754	S ORANGE AVE & E IMPERIAL HWY	GRAFITTI	Dispatch	M LUERA
2008-1074	08/15-08/15	Sun-Sun	1151-1151	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	Z MURPHY
2008-0754	08/11-08/11	Wed-Wed	2032-2032	235 S FLOWER AVE	DRUNK DRIVER	Dispatch	D MENDEZ
2008-0025	08/01-08/01	Sun-Sun	1416-1416	230 S ORANGE AVE	BURGLARY ALARM	Dispatch	L TINNIN
2007-1824	07/29-07/29	Thu-Thu	0743-0743	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	T GREEN
2007-0513	07/07-07/07	Wed-Wed	2333-2333	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	G GOBLE
2007-0391	07/05-07/05	Mon-Mon	2323-2323	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	M WENDLING
2006-0124	06/03-06/03	Thu-Thu	0102-0102	S FLOWER AVE & E IMPERIAL HWY	TRAFFIC STOP	Officer	C SPENCER
2005-1227	05/19-05/19	Wed-Wed	1624-1624	S FLOWER AVE & E IMPERIAL HWY	PEDESTRIAN CHECK	Officer	W HUANG

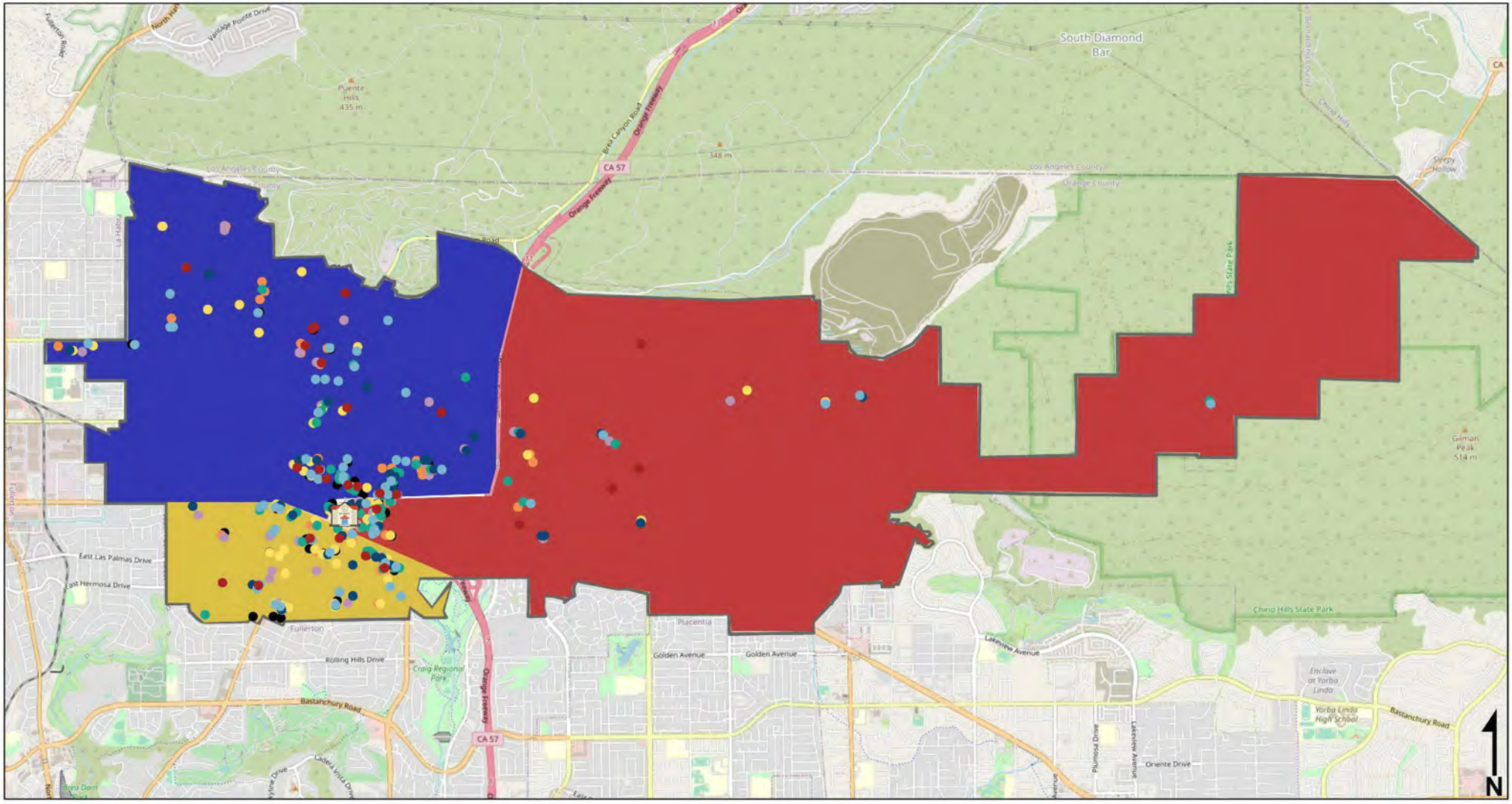
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2005-1166	05/18-05/18	Tue-Tue	2021-2021	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	M WENDLING
2005-0581	05/09-05/09	Sun-Sun	2006-2006	S ORANGE AVE & E IMPERIAL HWY	DISTURBANCE	Dispatch	M WENDLING
2004-0735	04/15-04/15	Thu-Thu	1639-1639	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	M KIM
2003-1468	03/26-03/26	Fri-Fri	1813-1813	S ORANGE AVE & E IMPERIAL HWY	PATROL CHECK	Dispatch	R KLUG
2003-0548	03/08-03/08	Mon-Mon	1622-1622	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	S MACIAS
2003-0423	03/07-03/07	Sun-Sun	0057-0057	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	E PADILLA
2003-0231	03/04-03/04	Thu-Thu	1911-1911	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	R MCDUFFY
2002-1379	02/21-02/21	Sun-Sun	0003-0003	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	B CROSS
2002-1369	02/20-02/20	Sat-Sat	1848-1848	207 W IMPERIAL HWY	HOMELESS	Dispatch	E PADILLA
2002-0807	02/12-02/12	Fri-Fri	0749-0749	S FLOWER AVE & E IMPERIAL HWY	TRAFFIC ACCIDENT	Dispatch	A NGUYEN
2001-0192	01/04-01/04	Mon-Mon	0712-0712	S ORANGE AVE & E IMPERIAL HWY	BURGLARY ALARM	Dispatch	A RODRIGUEZ
1912-1644	12/23-12/23	Thu-Thu	2118-2118	S ORANGE AVE & E IMPERIAL HWY	TRAFFIC ACCIDENT	Dispatch	J MAYO
1912-1118	12/16-12/16	Thu-Thu	1529-1529	207 W IMPERIAL HWY	HOMELESS	Dispatch	A RODRIGUEZ
1912-0176	12/03-12/03	Fri-Fri	1449-1449	235 E IMPERIAL HWY	HOMELESS	Dispatch	B SCHMIDT
1911-1119	11/15-11/15	Mon-Mon	1909-1909	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	J GARDUNA
1911-0610	11/09-11/09	Tue-Tue	0909-0909	230 S ORANGE AVE	BURGLARY ALARM	Dispatch	D HARRIS
1910-1879	10/25-10/25	Mon-Mon	0742-0742	S FLOWER AVE & E IMPERIAL HWY	ILLEGALLY PARKED VEHICLE	Dispatch	D HARRIS
1910-0046	10/01-10/01	Fri-Fri	1528-1528	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	T GREEN
1909-1487	09/19-09/19	Sun-Sun	0536-0536	238 S ORANGE AVE	OPEN DOOR	Dispatch	E PADILLA
1909-1126	09/15-09/15	Wed-Wed	0958-0958	S ORANGE AVE & E IMPERIAL HWY	TRAFFIC COLLISION	Dispatch	J HERRERA
1908-2037	08/28-08/28	Sat-Sat	0109-0109	242 S ORANGE AVE	ABANDON	Dispatch	D HARRIS

Number	Dates	Days	Hours	Address	Nature	How	Officer
1908-1017	08/14-08/14	Sat-Sat	0919-0919	230 S ORANGE AVE	VANDALISM	Dispatch	D KANG
1907-2369	07/30-07/30	Fri-Fri	0408-0408	S ORANGE AVE & E IMPERIAL HWY	DRUNK DRIVER	Dispatch	M CONDI
1907-2077	07/26-07/26	Mon-Mon	0807-0807	255 E IMPERIAL HWY	VANDALISM	Dispatch	J MAYO
1907-1089	07/13-07/13	Tue-Tue	2247-2247	S ORANGE AVE & E IMPERIAL HWY	PEDESTRIAN CHECK	Officer	G GOBLE
1907-0418	07/05-07/05	Mon-Mon	2226-2226	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	G GOBLE
1906-0823	06/12-06/12	Sat-Sat	0654-0654	290 S ORANGE AVE	OUTRCH	Officer	T HILL
1906-0479	06/07-06/07	Mon-Mon	0123-0123	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	G GOBLE
1905-2190	05/31-05/31	Mon-Mon	1113-1113	230 S ORANGE AVE	HOMELESS	Dispatch	A RODRIGUEZ
1905-1725	05/25-05/25	Tue-Tue	0930-0930	255 E IMPERIAL HWY	HOMELESS	Dispatch	B CROSS
1905-1049	05/15-05/15	Sat-Sat	0642-0642	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	B SCHMIDT
1905-0544	05/08-05/08	Sat-Sat	0751-0751	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	B SCHMIDT
1904-1909	04/26-04/26	Mon-Mon	1236-1236	238 S ORANGE AVE	DISTURBANCE	Dispatch	A RODRIGUEZ
1904-1459	04/20-04/20	Tue-Tue	0736-0736	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	A RODRIGUEZ
1903-2022	03/28-03/28	Sun-Sun	0118-0118	S ORANGE AVE & E IMPERIAL HWY	PEDESTRIAN CHECK	Officer	J MOROUSE
1903-1669	03/23-03/23	Tue-Tue	0105-0105	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	G GOBLE
1903-0856	03/13-03/13	Sat-Sat	0735-0735	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	D JOHNSON
1902-1472	02/21-02/21	Sun-Sun	1054-1054	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	A RODRIGUEZ
1902-0199	02/03-02/03	Wed-Wed	2148-2148	S ORANGE AVE & E IMPERIAL HWY	DISTURBANCE	Dispatch	J MOROUSE
1901-2046	01/29-01/29	Fri-Fri	0727-0727	235 S FLOWER AVE	CAR STOP	Officer	J CELMER
1901-1596	01/23-01/23	Sat-Sat	1533-1533	S FLOWER AVE & E IMPERIAL HWY	CAR STOP	Officer	T GREEN
1901-1503	01/22-01/22	Fri-Fri	0918-0918	S FLOWER AVE & E IMPERIAL HWY	PEDESTRIAN CHECK	Officer	T SCHMALTZ

Number	Dates	Days	Hours	Address	Nature	How	Officer
1901-1389	01/20-01/20	Wed-Wed	1250-1250	S ORANGE AVE & E IMPERIAL HWY	CAR STOP	Officer	J CELMER

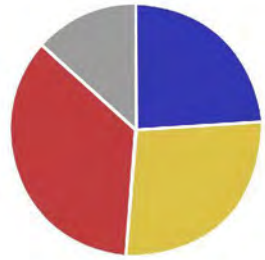
Laurel Elementary School Student Residency Exhibit A

ATTACHMENT C



City Boundary
Parcels
Laurel Elementary

Pre-Kindergarten
Kindergarten
1st Grade
2nd Grade
3rd Grade
4th Grade
5th Grade
6th Grade



- 103 (24%)Students North of Imperial Hwy
- 117 (27%) Students South of Imperial Hwy
- 152 (35%) Students East of Flower Ave
- 57 (13%) Students Live Outside the City of Brea

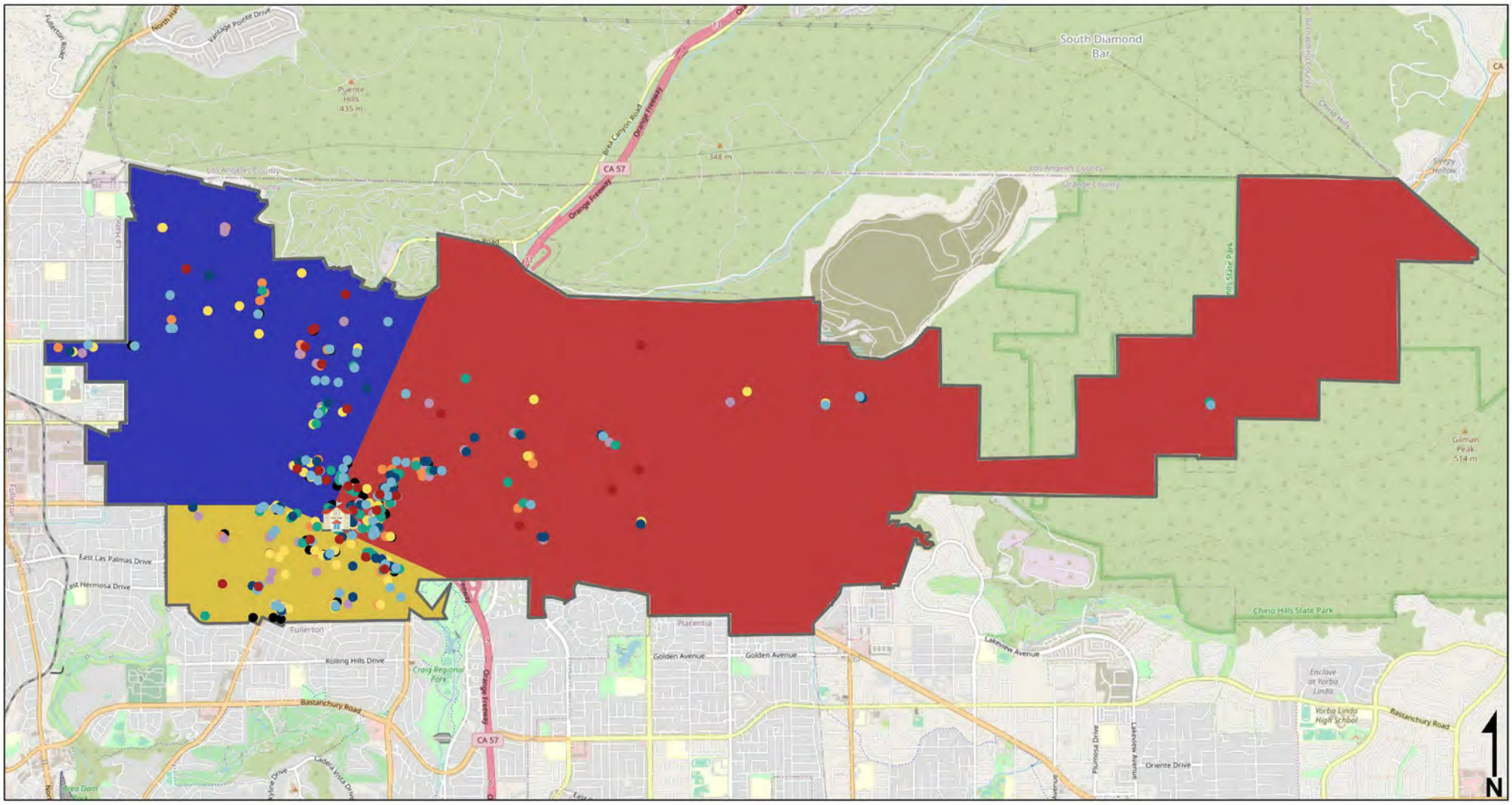
0 0.47 0.95 1.9 mi
0 0.75 1.5 3 km

CITY of BREA

00054

Laurel Elementary School Student Residency Exhibit B

ATTACHMENT D



City Boundary

Parcels

Laurel Elementary

103 (24%)Students North of Imperial Hwy

117 (27%) Students South of Imperial Hwy

152 (35%) Students East of Flower Ave

57 (13%) Students Live Outside the City of Brea

0 0.47 0.95 1.9 mi

0 0.75 1.5 3 km

CITY of BREA

00055

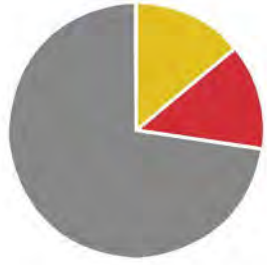
Laurel Elementary School Student Residency Exhibit C

ATTACHMENT E



City Boundary
Parcels
Laurel

Pre-Kindergarten
Kindergarten
1st Grade
2nd Grade
3rd Grade
4th Grade
5th Grade
6th Grade



60 (14%) Students South of Imperial Hwy/West of Flower Ave
57 (13%) Students South of Imperial Hwy/East of Flower Ave
317 (73%) Students Outside this Area

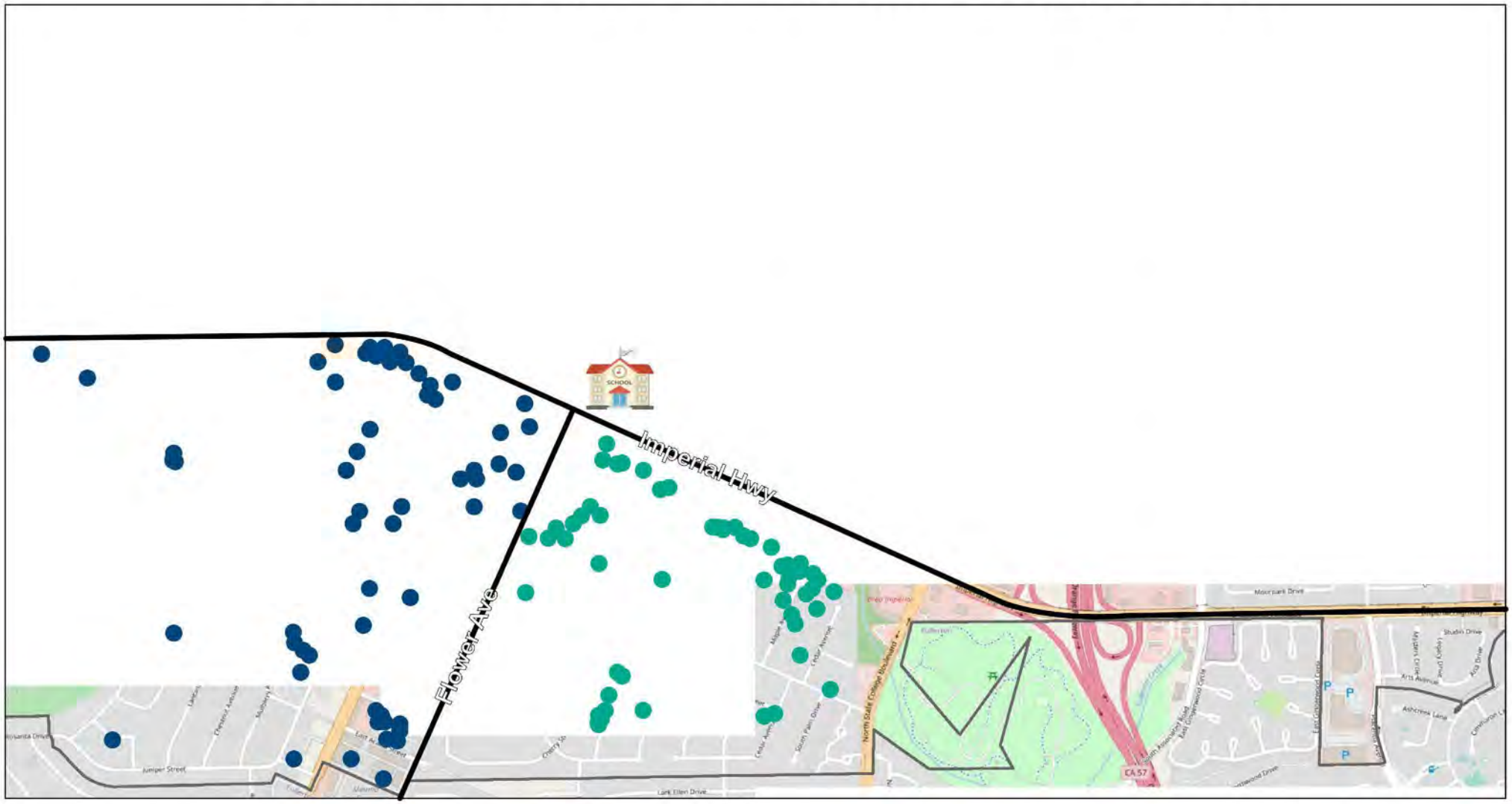
0 500 1,000 2,000 ft
0 205 410 820 m

CITY of BREA

95000

Laurel Elementary School Student Residency Exhibit D

ATTACHMENT F



City Boundary

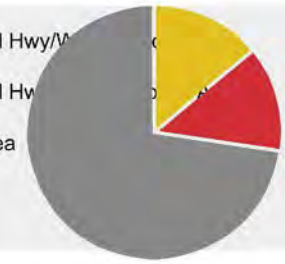
Parcels

Laurel

60 (14%) Students South of Imperial Hwy/W

57 (13%) Students South of Imperial Hw

317 (73%) Students Outside this Area



60 (14%) Students South of Imperial Hwy/West of Flower Ave

57 (13%) Students South of Imperial Hwy/East of Flower A

317 (73%) Students Outside this Area

0 500 1,000 2,000 ft

0 205 410 820 m

CITY of BREA

From: Angelina Sanchez
To: City ClerksGroup
Subject: Brea city council
Date: Thursday, February 11, 2021 8:07:16 AM

Dear brea city council ,
I am a recent graduate from brea canyon high school and I support the thought of a raising canes building in the city of Brea. This restaurant would be a great hit because of its well know delicious chicken fingers . I feel like a raising canes restaurant would add a lot of potential for students like myself and others . Thank you for your time and hope you take this to consideration.

Sent from my iPhone

From:	Diane Stites
To:	City ClerksGroup; Vargas, Steven; Hupp, Cecilia; Simonoff, Marty; Marick, Christine; Parker, Glenn; Gallardo, Bill; Terence R. Boga; Steinkruger, Tracy; Killebrew, Jason
Cc:	Mary Martinez; Kari Windes; Kari Windes; Mary Martinez (via Google Docs); Roderick Conwi; Max D. Stites; Mason, Brad
Subject:	Follow-up Questions to City Council from 2/2 mtg discussion re: Raising Cane's
Date:	Wednesday, February 10, 2021 11:59:06 AM
Attachments:	Screen Shot 2021-02-02 at 7.27.39 AM.png RC-inNeighborhood.png 1612979462189blob.jpg

Apologies for the delay in sending this to all of you.

From not having a full understanding of the process, Covid (bc we would have been in Chambers & been able to come to the podium) and technical difficulties, we were unable to ask all our questions & make statements during Rebuttal. Additionally, like City Council members we have more questions from the 2/2 discussion at the mtg.

1. The main safety concern comes from the exponential increase in **use** and **the type of use**, a drive-thru restaurant, will have to the immediate community. Patrons will be required to interact with the elementary school and neighborhood population because of the current configuration of the ingress/egress.

   This is the fundamental problem that cannot be overcome and once done, cannot be undone. The risk is to the safety and health of the immediate neighborhood and other patrons of other organizations adjacent to the Project Site. The 1988 CUP was put in place with specific safeguards and certain conditions to protect the community's health, safety and general welfare. Those protections are in place until they are amended. This amendment as proposed would not be harmonious, instead it would be detrimental to the surrounding area.

2. **An accurate Pedestrian Study could not be done bc of COVID**. And (SEE City staff 1/13 response #4) pre-pandemic pedestrian and cyclist volumes were not used. Post-project the autos wil have multiple opportunities to encounter pedestrians and cyclists. Pedestrian and cyclist studies need to be done to create a more realistic post-project picture.

3. **Related to Use - CEQA study was not done** - While there's a smaller building footprint, the volume of autos will increase six-fold (using City estimates of 155 to 941cars). This would be a high-volume business, a drive-thru restaurant, so even though there's the decrease of size of construction, there's an increase in business outputs & change of type of business, waste, pollutants, and change to the environment.

4.

BOUSD Communications
When Mr. Max Stites stated what he had heard Superintendent Dr. Brad Mason stated his personal opinion, this was at the 1/28/2021 BOUSD School Board mtg. SEE LINK: https://simbli.eboardsolutions.com/SB_Meetings/ViewMeeting.aspx?S=36030881&MID=5405

Respectfully, there were miscommunications between the City of Brea Staff and BOUSD. Please see our appellant packet and compare it to the Staff Report. Since I am referencing him, Dr. Mason is copied on this correspondence.

5.

I heard one current property owner, Mr. Manley implied a Gaslight business owner's viewpoint is not as important as property owners. We ask for clarification from City Council members on your perspective, how do you view this issue, including:

How do you consider the position of other property owners and others in these types of matters? How do new facts impact your decision-making?
Are they more important than the business owners? Tenants? Renters? The public facility users, i.e. Laurel staff & students? - You have numerous letters of concern.

One property owner of Gaslight Square stated his opposition to this project.

BOUSD Board majority position is against this project and wants to keep the protections in the 1988 CUP.

We heard the concerns of long-time business owners currently in Gaslight Square, Dr. Curtis & Dr. Larson, of the potential impacts to their businesses. If this change occurs and a drive-thru restaurant comes in, they could go out. How is that factored into your decision-making?

Overall, shouldn't the new neighbor fit with the existing neighborhood, not the other way around?

7.

If you put in delineations down Flower Ave so no u-turns, so one must turn right out of Gaslight onto Flower. Then the raised "porkchop" keeps all southbound Flower traffic turning right onto Imperial. Could you please clarify, how many cars will it take before there is a backup of cars on southbound Flower?

8.

We ask for clarification regarding 155 numbers stated by staff. KHA tables **3** show a base of 155 vehicle trips not cars. (See table) However, staff has stated it is cars. We ask for clarification?

Using 155 as a base, there's an estimated six-fold vehicular increase. We ask for clarification if there is agreement to that fact. If not, please state estimated increase of vehicular traffic?

9. Also, Staff stated they could not state what would be acceptable levels of vehicular traffic (SEE City staff 1/13 response #5). **Respectfully, City Council members, this determination is left to you: What is an acceptable level of increase? An unacceptable level of traffic?**

10. While we are no experts, we do ask for further study of land use for drive-thru restaurants, walkability, elementary schools, and safety. The first seems contrary to the others.

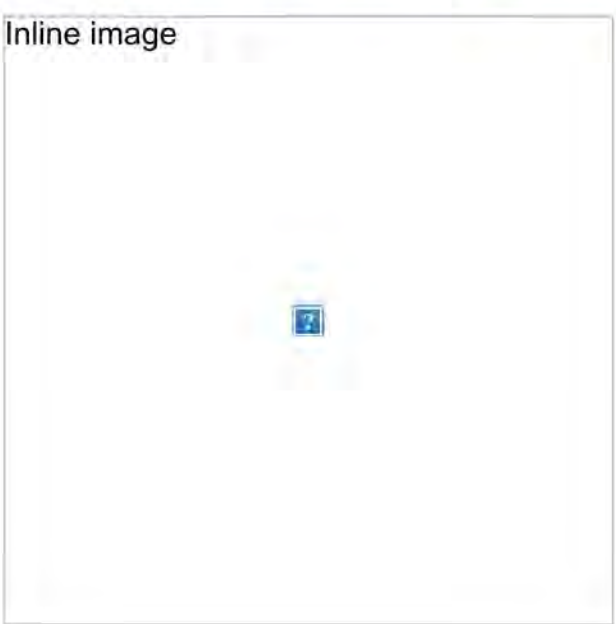
11. We ask that you review our appellant packet, and **our facebook page, including "all photos"** to see the site and compare it to other drive-thrus in Brea, other Raising Cane's in OC. Examples below. **It's a good idea, terrible location, for safety's sake. Please agree and keep protections in place for the community and deny this project.**

Thank you for your time and attention,

Diane Stites

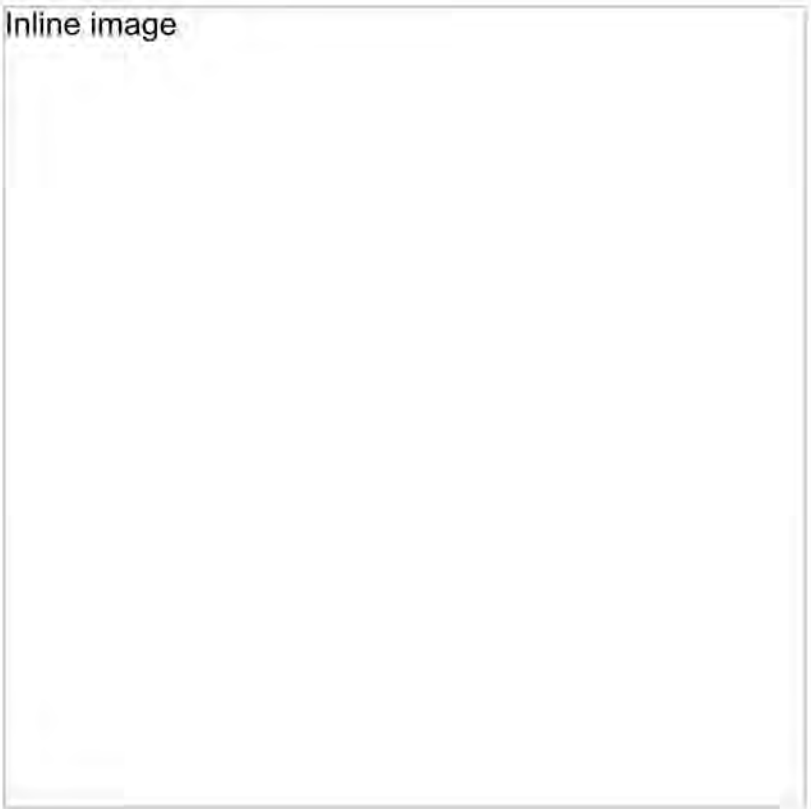
https://www.facebook.com/securegaslightneighborhood

Inline image



Inline image




Inline image

From: Serna, Brigitte
To: City ClerksGroup
Date: Thursday, February 11, 2021 10:08:04 AM

Dear Brea City Council,

I am a recent BOHS alumni and I support the building of a Raising Caines in its proposed location. This restaurant would be a great addition to the downtown area as well as bringing new jobs to the city. Thank you for your time and consideration.

Best,
Brigitte Serna (she/they)
Loyola Marymount University '23, Biology

From: Veronica Carey
To: City ClerksGroup
Subject: No to Raising Canes
Date: Tuesday, February 2, 2021 7:33:56 PM

To whom it may concern:

I would like to express my concern regarding the Raising Canes proposed location. My child is a second grader at Laurel Elementary School.

I think putting a drive through restaurant near the school is a bad idea. This would increase traffic and reduce safety around the school. Children who walk to and from school would be at greater risk due to the increase in traffic. This would also put additional strain on parents during during dismissal time.

There is also a security risk. Laurel is an open campus. Patrons of the restaurant would be able to walk onto campus posing a security concerns for students, teachers and staff.

Please do not approve the Raising Cane location.

Thank you for your time!
Veronica Carey

From:	Kari Windes
To:	City ClerksGroup; Killebrew, Jason; Vargas, Steven; Hupp, Cecilia; Marick, Christine; Parker, Glenn; Simonoff, Marty; glyons@bousd.us; ncolon@bousd.us; pruiz@bousd.us; cflanders@bousd.us; Mason, Brad; Richard Champion
Cc:	Mary Martinez; Diane Stites; Roderick Conwi; rcarson@raisingcanes.com; tgraves@raisingcanes.com; LegalRequests@raisingcanes.com; development@raisingcanes.com; rfuchs@raisingcanes.com; Psandidge@raisingcanes.com; dgoss@raisingcanes.com; jhudson@raisingcanes.com; Kroberts@raisingcanes.com; khansen@raisingcanes.com; bbrown@raisingcanes.com; gtewari@raisingcanes.com; sbellah@raisingcanes.com; cpenfield@raisingcanes.com
Subject:	Opposition to Raising Cane"s across from Laurel Elementary in Brea
Date:	Wednesday, February 10, 2021 2:50:36 PM

Dear Mayor and City Council,

Thank you for your diligence in considering the merits of the Raising Cane's project at Imperial/Flower. As we have stated many times, we are not opposed to there being a Raising Cane's in Brea. They would be welcome in our community. It's a great brand with great products. However, location is important, and our position is that placing a Raising Cane's across the street from an elementary school would be a safety nightmare for the children.

This correspondence will demonstrate that:

- **The project is not allowed under the City's General Plan**
- **The project is not allowed under the Zoning Code**
- **The project is inconsistent with the California Environmental Quality Act**

The General Plan designates the subject property as "Office/Financial Commercial." The definition (page 2-15) for this land use designation states as follows:

The Office/Financial Commercial designation provides for single tenant and multi-tenant offices that house professional, legal, medical, financial, administrative, research and development, corporate and general business offices, and other uses. Support uses appropriate within the areas designated Office/Financial Commercial include small convenience or service commercial activities intended ***to meet the needs of the on-site employee population****. Public and private hiking trails and related facilities can be established within the Office/Financial Commercial designation.*

A drive-thru restaurant clearly does not fit this definition. You don't have to be versed in real estate and land use law to determine the intention of the City Council when it

approved the General Plan. That, this land use designation was meant for professional office uses. **It was not meant for commercial uses other than those that would support the "on-site employee population."** Drive-thru restaurants, by their very nature, are land uses that encourage customers from **off-site**, for the plain and simple fact that those users are in cars.

Staff's draft resolution goes to great lengths to assert that the Raising Cane's project is consistent with the General Plan. It states that:

Restaurants are permitted by-right uses in all commercial zones of the city, including General Commercial (C-G), Major Shopping Center (C-C), and Neighborhood Commercial (C-N).

This is incorrect and misleading. The Brea Zoning Code makes a clear distinction between "restaurants" and "drive-thru restaurants." In fact, drive-thru restaurants are **not** "permitted by-right uses" in **any** of these zoning classifications. The C-G zone allows them only by CUP. In both the C-C and C-N zones, only restaurants are approved by-right that **do not** have a drive-thru, which is explicitly stated. The C-C zone, like the C-G, allows them by CUP. It could be easily argued that drive-thrus are actually **prohibited** because the Zoning Code states that restaurants **without a drive-thru are permitted, but it is silent on whether a drive thru is allowed by CUP.** The C-N zone does state that any use allowed in the C-P zone is permitted in the C-N zone. Yet, the C-P zone states that a "restaurant, tea room, cafe" are permitted uses. Taking the zoning code as a whole, it consistently differentiates between "restaurants" and "drive thru restaurants" as separate uses, especially in the C-G and C-C zone sections. Therefore, when "restaurants" are mentioned in the C-N and C-P zone sections, **it is clear** that they are referring to non-drive thru restaurants. Both sections' silence on drive-thru restaurants implies that they are **expressly prohibited. Why? Because unlisted uses in the Brea Zoning Code are presumed to be prohibited.**

To wit, a drive-thru restaurant is neither compatible with the General Plan nor allowed under the Zoning Code itself.

The draft resolution seems to take creative liberty in the General Plan finding:

The first sentence is directly from the Office/Financial Commercial definition in the General Plan. The highlighted section, which to a casual observer seems also from the General Plan definition, was added by staff. We believe it was added to buffer the previous sentence, which limits uses to "meet the needs of the on-site population." There is nothing in the Office/Financial Commercial definition of the General Plan that

states that the purpose of this land use designation is to "meet the needs of the employee population in the **vicinity." It's obvious that the opposite is true when the definition goes so far as to specifically state "on-site employee population."**

Lastly, because of the aforementioned, this project is also inconsistent with the California Environmental Quality Act (CEQA). A "Categorical Exemption" is inadequate. The cited sections of CEQA cannot be applied because this project is not allowed under the General Plan and Zoning Code.

In conclusion, we are requesting the City Council to **CONTINUE** this item in order for the City Attorney to verify whether or not a drive-thru restaurant is even an allowed use under either or both the General Plan or the Zoning Code.

We feel like we are on strong legal footing with this. That, a General Plan Amendment and Zoning Ordinance modification both take place prior to approving a drive-thru at this property. We are investigating our rights and are seeking a legal opinion, toward a challenge in court, if this project is approved.

Again, thank you for your due diligence.

Sincerely,

Kari Windes

Secure Gaslight Neighborhood

From: Family
To: City ClerksGroup
Subject: Raising canes
Date: Wednesday, February 10, 2021 12:13:47 PM

Dear Brea City Council,
I am a resident of Brea and am in support of building a Raising Canes at the proposed location. An affordable family restaurant near the downtown area would be a welcomed addition to the city. Additionally, this business would bring much needed tax revenue and jobs to the city of Brea.

Thank you!
Monika Robinson

From: Irene Kim
To: City ClerksGroup
Subject: Raising Canes in Brea!
Date: Wednesday, February 10, 2021 6:06:11 PM

Dear Brea City Council,
I am a resident of Brea and a student at BOHS. I love Brea and spend most of my time here. I want to ask you to approve Raising Canes application because I like the food, I think it's a great location, and it will bring jobs to Brea for young people like myself.
Thank you

From: Anthony Barajas
To: City ClerksGroup
Subject: Raising Cane"s Proposed Development
Date: Wednesday, February 10, 2021 4:52:31 PM

Dear Brea City Council,

We are residents of Brea at 518 South Poplar Avenue and are in support of building a Raising Canes at the proposed location. An affordable family restaurant near the downtown area would be a welcomed addition to the city. Additionally, this business would bring much needed tax revenue and jobs to the city of Brea.

Sincerely,

Anthony and Yvette Barajas

From: Aaron Robinson
To: City ClerksGroup
Subject: Raising Canes
Date: Wednesday, February 10, 2021 12:13:51 PM

Dear Brea City Council,

I am a resident of Brea and am in support of building a Raising Canes at the proposed location. An affordable family restaurant near the downtown area would be a welcomed addition to the city. Additionally, this business would bring much needed tax revenue and jobs to the city of Brea.

Aaron Robinson
Proud Resident of Brea since 1985
US ARMY Veteran

From: Autumn Miller
To: City ClerksGroup
Subject: Raising canes
Date: Wednesday, February 10, 2021 12:14:48 PM

Hi this is Autum Miller I am a graduating student from Brea OLinda and I am writing this email in support of getting a raising canes here in the city of Brea!
Thanks!

Sent from my iPhone

From: David Morrill
To: City ClerksGroup
Subject: Raising Canes
Date: Wednesday, February 10, 2021 12:45:27 PM

Dear Brea City Council,
I am a resident of Brea and am in support of building a Raising Canes at the proposed location. An affordable family restaurant near the downtown area would be a welcomed addition to the city. Additionally, this business would bring much needed tax revenue and jobs to the city of Brea. It's time that we see growth and not shut down in our community. Thank you for your time and consideration.
David Morrill

Patriot

From: Mike Nienhouse
To: City ClerksGroup
Subject: Raising Canes
Date: Wednesday, February 10, 2021 12:57:09 PM

Dear Brea City Council,
I am a long time (51yrs) resident of Brea and am in support of building a Raising Canes at the proposed location. An affordable family restaurant near the downtown area would be a welcomed addition to the city. Additionally, this business would bring much needed tax revenue and jobs to the city of Brea.

Thanks,
Mike Nienhouse

From: Terry Swindle
To: City ClerksGroup
Subject: Raising Canes
Date: Wednesday, February 10, 2021 1:20:41 PM

Dear Mayor Vargas & City Council,

I am a resident of Brea and support building a Raising Canes at the proposed location. An affordable family restaurant near the Downtown area would be a welcomed addition to the City. Additionally, this business brings much needed tax revenue and jobs to the City of Brea.

Terry Swindle
Former Planning Commissioner
& Lifelong Resident

From: William Speer
To: City ClerksGroup
Subject: Raising Canes
Date: Thursday, February 11, 2021 8:20:14 AM

Dear Brea City Council,
I am a recent BOHS alumni and I support the building of a Raising Canes in its proposed location. This restaurant would be a great addition to the downtown area as well as bringing new jobs to the city.

Thank you for your time and consideration.

William Speer

BREA CHAMBER
CATALYST. CONVENER. CHAMPION.

2021 Executive Committee
Kevin Caulson
Chairman of the Board
Brea Mall/ Simon Property Group

Bill Murray
Finance & Operations
Edward Jones Investments

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Healthcare Property Advisors

Vern Meurer
Con-Tech Plastics

David Olivera
Transamerica Financial Advisors

Joe Patterson
Albertsons Distribution Center

Heidi L. Gallegos
President/CEO
Secretary to the Board

February 11, 2021

The Honorable Steve Vargas, Mayor City of Brea
City of Brea Councilmembers
1 Civic Center Circle
Brea, CA 92821
SENT VIA EMAIL AND HAND DELIVERY

Subject: Appeal of Planning Commission | Raising Canes®

Dear Mr. Mayor and Honorable Members of the City Council,

The decision before you is to approve or deny the appeal of the Planning Commission decision on December 8, 2020 to approve Conditional Use Permit (CUP) No. 20-10, Precise Development (PD) Plan No. 20-04, and CUP No. 20-18: a request to amend Planning Commission Resolution No. 88-56 to allow the demolition of two commercial buildings to construct a restaurant with a drive-thru, and to amend an existing sign program, at 255 East Imperial Highway, in the C-P (Commercial Professional) PD (Precise Development) Zone.

Brea Chamber of Commerce Policy Position on Economic Development. Business expansion and retention within the City of Brea are critical to a strong local economy. The Brea Chamber of Commerce supports all aspects of assisting businesses and strives to ensure successful growth through development and expansion. The Chamber promotes a positive environment for business and economic development by encouraging the following agendas: expansion of comprehensive infrastructure systems, fostering a pro-business local government culture, expansion of a qualified workforce, and the promotion for sufficient residential housing to meet the employment needs of member businesses. In addition, the Chamber strongly opposes legislative measures that negatively impact the success of member businesses. Abiding by these principles while aiding proper legislations, the Brea Chamber of Commerce aims to cultivate a business-friendly environment while expanding the economic growth of Brea.

Raising Canes Presents Opportunities for Internships and Entrepreneurship. The Brea Chamber supports Economic development (i.e., internship) programs within educational institutions and other community-based organizations to produce a more qualified workforce. Raising Canes® has a commitment to ensure each site gives back to the communities where they are located. Internships in food management to young free enterprise thinkers will serve to grow future business owners in Brea. Additionally, their unique focus on entrepreneurship vis-a-vie the nationally recognized Lemonade Day® Program speaks to their commitment to youth and youth related programs.

The Brea Chamber hears and understands the concerns of parents and community members associated with Laurel Elementary Magnet School of Innovation and Career Exploration. The students that attend Laurel School are our Brea youth. We are all responsible for the well-being and welfare of our Brea kids. To that end, we have full confidence in the Brea City Council, City Staff, the Brea Olinda Unified Board of Trustees and Brea Olinda Unified Staff to have meaningful conversations to mitigate the traffic concerns that have long existed at Laurel Magnet School. Our hope is that both government agencies would engage in conversations with County, State and Federal representatives to bring additional levels of expertise and public dollars to mitigate the growing population of Brea and more specifically California State Highway 90 – Imperial Highway.

Therefore, the Brea Chamber respectfully supports approval of the Project with the recommended traffic calming considerations as proposed by City Staff, along with the conditions of approval as instructed by the Planning Commission and thus deny the appeal.

Sincerely,

Heidi L. Gallegos, CEO
Brea Chamber of Commerce

cc: Brea Chamber of Commerce Board of Directors
Bill Gallardo, Brea City Manager

February 1st, 2021

Brea City Council
1 Civic Center Circle
Brea, Ca 92821

Regarding: The Public Hearing for the project site at 255 East Imperial Highway

My name is Dr Brooks Larson, and I am a General Dentist at 235 South Flower Avenue in Brea. I am directly adjacent to the proposed site for this project. I have been a practicing Dentist at this location for over a decade. I spend most of my day working and observing activity in the Gaslight area. I have several concerns and valuable insight to this project that I feel are important to the decision of the City Council.

1) Laurel Elementary School is directly across the street from the proposed project. Traffic at peak times has always been a challenge for my office. I have had numerous discussions with staff at Laurel Elementary to make this a safer environment. Despite repeated emails from the school regarding parking, parents continue to use the Gaslight parking as a secondary parking lot for drop off and pickup. At times this has been hectic and unsafe. There have been Accidents, Hit and Runs involving Senior patients of mine, and injuries in our parking lot. I have been forced to make parking signs to place in the Gaslight daily, and install security cameras around the perimeter of our building to make it safer.
2) I have spoken to City Traffic Engineer Farhad Iranitalab several times regarding traffic at the Gaslight. I have also had Brea PD post a motorcycle officer on my sidewalk multiple times to monitor traffic flow and show a Police presence. During the Lagos De Moreno Laurel Elementary Magnet School project, and also the construction of the new Brea Parking garage, I observed firsthand how congested it can get on Flower Avenue and on Orange as well.
3) If public access to the Gaslight is denied due to traffic for a fast-food restaurant, where will this traffic go? It will be forced out onto Imperial Highway where School traffic already backs up in an unsafe manner at times, only now it will be much worse. I have already witnessed an accident on Imperial Highway due to this. Imagine cars with families and children sitting at a dead stop on Imperial Highway with a speed limit of 40 miles per hour, where cars are regularly speeding. This could be a recipe for disaster.
4) Earlier in the year traffic monitoring equipment was installed on Flower Avenue. I believe this was done in error due to the COVID-19 crisis and does not give the full picture of the traffic. Laurel Elementary School was closed during this time and most businesses were on a very light schedule. Even if past years were used as a barometer, I do not believe this gives a clear picture of the problem. The frantic pace of parents dropping off and picking children up is my concern. As a father with two daughters I understand how distracting a car with children inside can be. Add to this, the traffic from a popular drive through restaurant and the problem will be compounded.
5) Raising Cane's is a new, up and coming restaurant. It has a buzz and is a new investment opportunity, and I expect it to do a healthy business. I have been to a Raising Cane's before and have eaten their food. In Southern California, the Raising Cane's I have visited, in La Habra and Menifee, have the same traffic level as an In-N-Out Burger or a Chick-Fil-A. These are extremely

busy restaurants. Traffic is always backed up and stretches out to the corner of the property or even out onto the surface street. I have been there and observed it myself. Imagine that level of traffic directly in front of Laurel Elementary.

6) We are a High-Quality Family Dental office that has been in business since the 1950's. I have patients under my care over 90 years old, that have been in our practice since they were teenagers. We have a large patient base of Seniors that are Residents of Morningside, Capriana, Emerald Court, and other Senior communities. These patients rely on ride service drop off and pick up. These ride sharing vehicles include cars and small buses. We also have a lot of Seniors that still drive themselves. I am very concerned about access to our office for our Senior patients. A Senior with limited mobility may find this to be a difficult environment to navigate.
7) I am also concerned about the changes for the Gaslight and our practice. In our office we perform a variety of procedures and surgeries, some under IV sedation. The proposed exit for Raising Cane's is approximately 35 feet from our front door. Any patient, especially one that has just undergone a significant surgery with IV sedation, should not have to battle exit traffic from a fast-food restaurant. With no direct exit for traffic, cars will have to circle our building to leave. It will affect our business significantly in a negative way.
8) Parking will be an issue. We have 12 employees in our office and I assume the Raising Cane's will have a significant number as well. Combine these two factors, along with school traffic, our patients of any age will have difficulty parking. I also have concerns about access for emergency vehicles should the need arise.
9) We are a high end office, not a clinic. We have patients that travel long distance to see us because we are the best at what we do. These patients will be intolerant of traffic issues, parking, and a fast food restaurant as they enter our front door. I believe that this project will negatively affect our business.

I hope that some of the points I have made can help the City Council in their decision. This is a huge impact for our office, our patients, Laurel Elementary School, and the Gaslight. I appreciate the opportunity to express my views and insight, and have them considered.

Sincerely,

Brooks Larson D.D.S.

From: Rachael Contreras
To: City ClerksGroup
Subject: NO Raising Cane"s
Date: Tuesday, February 2, 2021 1:28:16 PM

Hello,

I have been a Laurel parent for the last 9 years and will be for the next 4 years. I have served on the Laurel PTA board for the last 7 years which makes me very active in Laurel events and (during non-COVID times) am on campus volunteering most days of the week. I am also a Noon Duty Substitute (recess monitor sub) for the last 4 years so I know the students, parents, staff and campus very well.

I am beyond disappointed to hear that there might be a super high-traffic drive-thru fast food restaurant directly in front of this elementary school. A "pork chop" on Flower will not create a safer walking environment for our students that walk to and from school (or any other pedestrians). **Has anyone done traffic studies at Laurel during a non-COVID school hours?** Traffic is stopped well onto Imperial Hwy. with cars and big rigs zooming past and honking.

Now that we are no longer allowed to park in the church parking lot, where will our parents, visitors and staff park? We will not be able to park in the large parking structure because we will have to either walk through this drive-through area to get to school or walk around the block which puts us in the pedestrian danger zone that this email is about.

Let's talk about traffic on Birch; students that live on the North side of Birch that walk to school and parents that park in the church parking lot and walk to Laurel (kinder parents that have to drop off at the classroom, school staff, school visitors, any other parents that want to walk their child onto campus) each have a story of almost being rundown on Birch by someone that tries to run the red light (including myself). -Don't believe me? Lets look at our once beautiful statue from Carlos Torres to commemorate our new city/school playground. It's now eviscerated thanks to someone running the red and a police officer, no less, smashing into it trying to get out of the way of the speeding car!

Laurel has had a "no right turn if crossing guard is present" sign at this corner of Flower and Birch for over 2 years now and there are still a large amount of right turns while the crossing guard is present EACH DAY -usually made by people using Flower as a cut-through to Birch. I have also witnessed people make right turns in front of the crossing guard IN FRONT OF POLICE!

The pick-up in the alley behind our school is small and gets congested quickly. The alley gets backed up onto Birch (a 2 lane street) going East. While going West, traffic gets backed up in the center divider area and we just sit there at a dead stop in the street until school lets out, the traffic slowly moves and we can finally get into the alley. There is also a bus stop at this driveway which only makes this even more of a nightmare while cars try and swerve around Laurel parents. **-Imagine adding to that**

traffic on Birch with a busy drive through restaurant!

Through these examples, you can see how having the option to exit the restaurant via Flower or Orange/Birch just won't work either way.

What about idling cars all day and most of the night? There are many children that have asthma or breathing issues that go to our school and this could create issues for them while they are outside during recess or PE. Even the kids without breathing issues shouldn't have those large amounts of carcinogens so close to them on a regular basis. The cars on Imperial move quickly and are not idling.

Laurel is an open campus and has one maintenance worker in the am and one in the pm, both of whom are very hard working. They are already busy enough with the extra sanitation protocols now. Why should we subject them to also picking up after non school visitors that come after hours that will now bring with them even more trash from such a convenient location at the districts expense?

The dentist next-door at Brea Dentistry agrees that this project isn't best suited for this location. Even BOUSD and our school board knows of these dangers for this placement, that's why they voted 3 to 2 against this project. And those 2 that voted in favor of, both have a laundry list of changes they'd like to have happen. There are over 750 signatures on a petition against this project from Brea residents, former residents and people who live nearby or visit a Raising Cane's and know the traffic struggles or people that care for kids and don't want to see anyone get hurt.

There are SO many more reasons to say "No" to this project. PLEASE don't worsen the danger for our Brea pedestrians, students, parents and staff of an already on-going major traffic issue by putting a high profile drive-thru in this location. It's not a matter of being against Raising Cane's, it's a matter of it's poor placement. One accident is too many.

Thank you,
Rachael Contreras

Raising Cane's Brea
Traffic Scoping Letter Dated July 29, 2020
City Traffic Engineer Comments

Date: August 3, 2020

Comments & Suggestions By: David Roseman
City Traffic Engineer
City of Brea

General Comments:

Please see below for a list of comments to the provided Traffic Scoping Letter to the proposed Raising Cane's Brea project, dated July 29, 2019:

1. The project is proposed to be 8 spaces, or 18%, short of code required parking. The consultant's proposed scope includes a shared parking analysis; however, conducting such an analysis is only valid if reserved or assigned parking within the entire Brea Gaslight Square site is, or will be, prohibited.

2. The shared parking analysis should consider both the ULI's 3rd Edition parking rates and methodologies as well as existing parking demand in the Brea Gaslight Square combined with typical parking demand experienced at other Raising Cane's restaurants prior to March of 2020. It is suggested that parking demand from the three restaurants used in the drive-through queuing analysis be used.

3. The consultant is proposing to substitute two of the three City suggested restaurants for the driveway queuing analysis so that pre-March 2020 data already collected could be used. It is reasonable to use pre-March 2020 queuing data; however, the location in Laguna Hills may not be comparable since the single drive-through lane is relatively short. Therefore it is suggested that at least one alternative site with dual drive-through lanes, as is proposed in Brea be included. Consideration should be given to including either the restaurant in Santa Ana or Ontario Mills, or alternatively some other similar location in Southern California.

4. Raising Cane's restaurants are considered one of the most successful fast-food chains in the country. Therefore, the use of ITE Trip Generation rates as suggested in the consultant's proposed scope is likely to under estimate actual traffic demand for the Brea restaurant site. Therefore, the City originally requested that real-world empirical data from three existing sites be used to not only establish the demand for the drive-through but to also establish traffic demand for use in the circulation analysis. If traffic data is unavailable, alternatively the number of daily and peak-period receipts pre-

March 2020 for the three study restaurant sites could be used to estimate anticipated vehicular demand for the Brea restaurant.

5. The consultant is proposing a 50% reduction in Trip Generation of the restaurant to account for pass-by traffic. Such a high pass-by reduction is not appropriate for the Brea site due to the lack of a driveway on Imperial Highway, driveway access is provided only from two local streets, and no direct access to the site from the south. A more appropriate pass-by reduction would be 35% or less. In addition, all pass-by trips must be added back into the circulation analysis to account for turning movements on Imperial Highway and Birch Street and to clearly show traffic increases on both Orange Avenue and on Flower Avenue.

6. The consultant's proposed scope does not include an LOS analysis of any study intersections. As a minimum each site driveway, Imperial Highway & Flower Avenue, Imperial Highway & Orange Avenue, Birch Street & Flower Avenue, and Birch Street & Orange Avenue should be studied. Since the restaurant is located within a school zone, the LOS computations are to also consider pedestrians. Should any LOS impacts be discovered at the study intersections the number of intersections could be expanded.

7. The consultant's proposed scope does not include an assessment of traffic controls in the general vicinity of the restaurant.

8. The consultant's proposed scope does not include a traffic signalization assessment of the Imperial Highway and Flower intersection.

9. The consultant's proposed scope does not include an assessment of access and circulation.

10. The consultant's proposed scope does not include a traffic safety assessment.

11. The consultant's proposed scope does not include a consideration of alternative modes of travel.

Focused Transportation Assessment

for the:

Raising Cane's Project

In the City of Brea



December 2020

Kimley»Horn

07867

FOCUSED TRANSPORTATION ASSESSMENT
FOR THE PROPOSED
RAISING CANE'S PROJECT
IN THE CITY OF BREA

Prepared by:

Kimley-Horn and Associates, Inc.
765 The City Drive, Suite 200
Orange, California 92868



December 2020

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FOCUSED TRANSPORTATION ASSESSMENT
FOR THE PROPOSED
RAISING CANE'S PROJECT
IN THE CITY OF BREA

EXECUTIVE SUMMARY

This focused traffic impact study has been prepared to evaluate the project-related traffic effects associated with the proposed Raising Cane's project in the City of Brea. This focused traffic study has been conducted in coordination with the City of Brea and in accordance with the Orange County Congestion Management Plan (CMP).

The project has been evaluated during the evening peak hour for the following conditions:

- Existing Conditions
- Existing Conditions Plus Project

Under Existing Conditions, the following study intersections currently operate at an unacceptable Level of Service (LOS):

- #1 – Imperial Highway at Orange Avenue: PM – LOS E
- #2 – Imperial Highway at Flower Avenue: PM – LOS F
- #3 – Birch Street at Orange Avenue: PM – LOS F

The project is estimated to generate approximately 1,727 net new vehicle trips on a daily basis, with a net loss of 18 trips in the AM peak hour and 109 net new trips in the PM peak hour.

Project-related traffic volumes were added to Existing Conditions to establish the conditions for the Existing Plus Project scenario. With the addition of project traffic to Existing Conditions, the following study intersections would continue to operate at an unacceptable Level of Service:

- #1 – Imperial Highway at Orange Avenue: PM – LOS F
- #2 – Imperial Highway at Flower Avenue: PM – LOS F
- #3 – Birch Street at Orange Avenue: PM – LOS F

A traffic signal warrant analysis, based on the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD), was conducted for the deficient unsignalized study intersections. The results of the analysis indicate that the deficient unsignalized intersections do not satisfy CA MUTCD signal warrants.

Based on discussion with City staff, the following improvement was evaluated:

#2 – Imperial Highway at Flower Avenue: Modify the southbound approach to restrict southbound left-turn movement. Although the intersection would continue to operate at LOS F on the minor street approach, this improvement would more than offset the project-related incremental increase in delay. Since the project is not causing the deficiency, the project's fair share would be approximately 42.1%, based on the project's proportion of southbound approach volumes under Existing Plus Project conditions at Intersection #2.

Direct vehicular access to the project site would be provided via one existing shared driveway on Flower Avenue and one existing shared driveway on Orange Avenue. Both existing driveways will continue to be full-movement driveways and remain unsignalized.

The proposed project would provide a drive-through lane with two order boards. The drive-through would provide two side-by-side entry lanes until the dual order boards, and then merge into a single drive-through lane prior to the pay and pick-up window. The proposed project would provide a total drive-through queue length of approximately 440 feet, for a drive-through queueing capacity of 20-22 vehicles, assuming 20-22 feet per vehicle, from the beginning of the drive-through lanes to the pay and pick-up window.

Per the City of Brea Municipal code, the proposed parking requirement for the Brea Gaslight Square with the proposed Raising Cane's drive-through restaurant is 98 parking spaces. The site provides 74 parking spaces, for a deficit of 24 parking spaces, compared to City code.

Based on City code, a stacking credit for drive-through lanes is allowed for banks. Based on discussion with City staff, this credit was also applied to the proposed drive-through restaurant, resulting in a drive-through lane parking credit of 16 additional parking spaces. This increases the total proposed parking supply to 90 parking spaces, resulting in a deficit of 8 parking spaces, compared to City code.

Based on the ULI Shared Parking (3rd Edition) methodology, the Brea Gaslight Square with the proposed drive-through restaurant would result in a parking reduction of 9% during a typical weekday. After applying the shared parking reduction to the City's parking requirement for the proposed Brea Gaslight Square of 98 parking spaces, the adjusted peak parking demand for the proposed project would be 89 parking spaces. The Brea Gaslight Square would provide 90 parking spaces, resulting in a surplus of 1 parking space, based on the shared parking analysis.

FOCUSED TRANSPORTATION ASSESSMENT
FOR THE PROPOSED
RAISING CANE'S PROJECT
IN THE CITY OF BREA

INTRODUCTION

This focused traffic impact study has been prepared to evaluate the project-related traffic effects associated with the proposed Raising Cane's fast-food restaurant located within an existing shopping center (Brea Gaslight Square) at 255 Imperial Highway in the City of Brea.

This study has been conducted in coordination with the City of Brea and accordance with the Orange County Congestion Management Plan (CMP). This study includes an evaluation of project-related effects on the surrounding roadway system, a parking analysis, a drive-through queuing analysis, and a traffic control assessment. Where necessary, circulation system improvements have been identified to improve the project's effects at the study locations.

PROJECT DESCRIPTION

The project site is located on the northwest corner of the intersection of Flower Avenue at Imperial Highway in the City of Brea and is shown in its regional setting in **Figure 1**. As shown on Figure 1, the street system in the project vicinity is oriented on a diagonal. For ease of reference, throughout this report, Orange Avenue and Flower Avenue are referred to as the north-south streets, and Imperial Highway and Birch Street are referred to as the east-west streets.

The project site is located within the existing Brea Gaslight Square. The project site is currently occupied by two office buildings with an approximate combined total of 9,588 square feet. The project will involve demolition of the two existing office buildings and the construction of a 3,267-square-foot Raising Cane's restaurant building with a drive-through and approximately 780 square feet of patio area. The operating hours for walk-in and drive-through service will be from 9:00 am to 1:00 am Sunday through Thursday and 9:00 am to 3:30 am Friday through Saturday. The project site plan is provided in **Figure 2**.

Vehicular access provisions for the project site would be provided via the one existing shared driveway on Flower Avenue and one existing shared driveway on Orange Avenue. Both existing driveways will continue to be full-movement driveways and remain unsignalized.

The proposed project would provide a drive-through lane with two order boards. The drive-through would provide two side-by-side entry lanes and two order boards, and then merge into a single drive-through lane prior to the pay and pick-up window.

NOT TO SCALE



FIGURE 1
VICINITY MAP

C:\Users\leslie.sorenson\appdata\local\temp\AcPublish_4424\FIGURES RC_Brea.dwg

Kimley»Horn

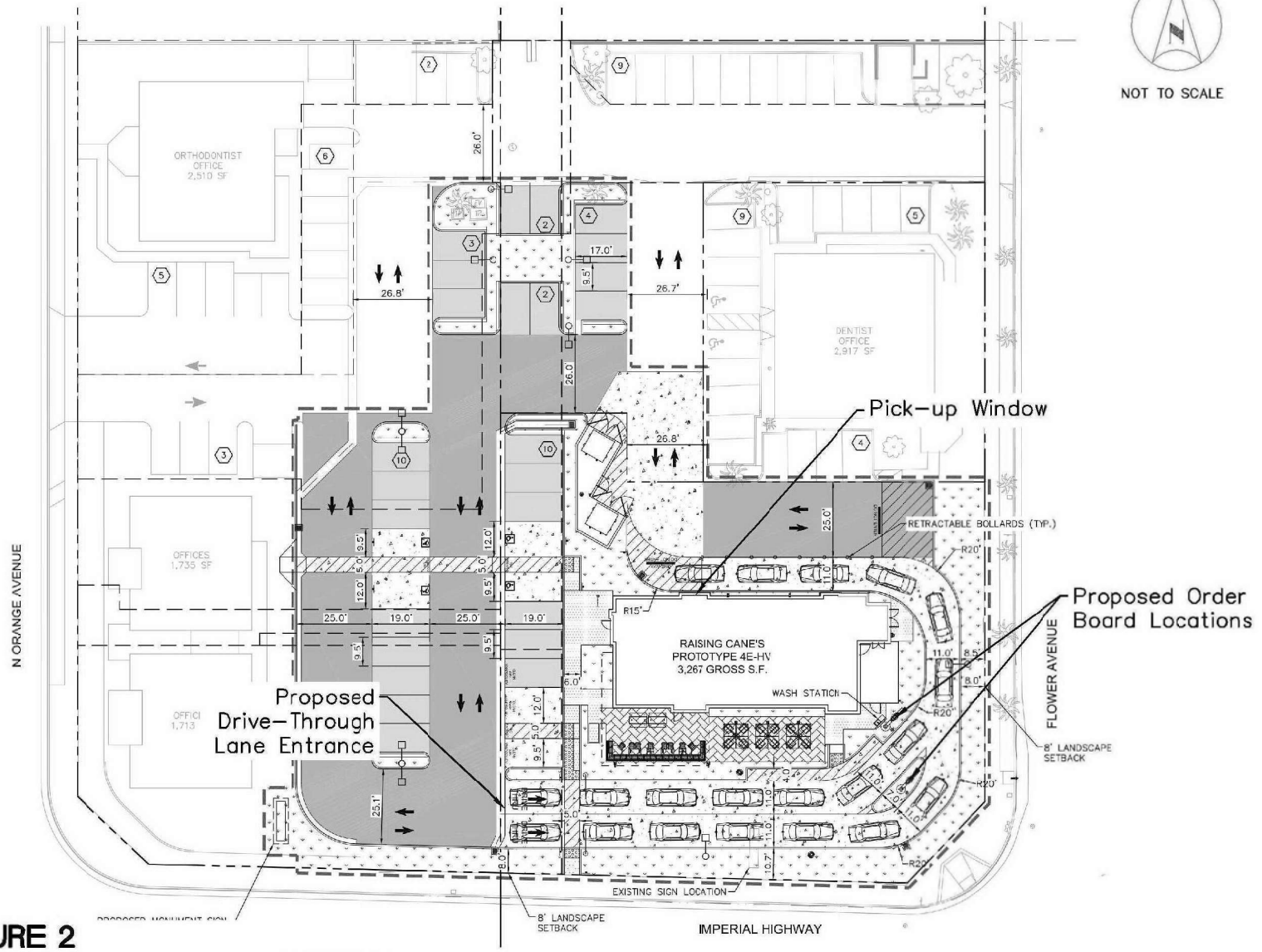


FIGURE 2
PROJECT SITE PLAN

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Kimley»Horn

07875

LEVEL OF SERVICE (LOS) ANALYSIS

This focused Level of Service analysis has been prepared in coordination with the City of Brea and in accordance with the Orange County Congestion Management Plan (CMP).

Analysis Scenarios

The project will be evaluated for the following conditions:

- Existing Conditions
- Existing Conditions Plus Project

Since Raising Cane's is not open during the morning peak hour, the intersection analysis will be conducted for the evening peak hour only.

Study Locations

The LOS analysis will be conducted at the following study intersections:

1. Imperial Highway at Orange Avenue
2. Imperial Highway at Flower Avenue
3. Birch Street at Orange Avenue
4. Birch Street at Flower Avenue
5. Orange Avenue at Project Driveway
6. Flower Avenue at Project Driveway

The study locations were established in consultation with City staff through the Scoping Agreement process. A copy of the approved Scoping Agreement is provided in ***Appendix A***.

Analysis Methodology

Intersection analysis for all signalized intersections has been conducted using the Intersection Capacity Utilization (ICU) methodology, which is the methodology utilized by the Orange County Congestion Management Program (CMP).

The ICU methodology provides a comparison of the theoretical hourly vehicular capacity of an intersection to the number of vehicles actually passing through that intersection during any given hour. The ICU calculation assumes an hourly per-lane capacity for each lane through the intersection, and a clearance factor to account for the effect of yellow and red signal phases.

Intersection analysis for unsignalized intersections has been conducted using the Highway Capacity Manual (HCM) methodology, which returns a delay value, expressed in terms of the average seconds of delay per vehicle.

Operating conditions for both ICU and HCM methodologies are expressed in terms of "Level of Service" which is also referred to by its acronym, LOS. The ICU calculation returns a volume-to-capacity (V/C) ratio that translates into a corresponding Level of Service, ranging from LOS A, representing uncongested, free-flowing conditions; to LOS F, representing congested, over-capacity conditions.

A summary description of each Level of Service and the corresponding V/C ratio or delay is provided below.

LEVEL OF SERVICE DESCRIPTIONS			
Level of Service	Signalized: ICU	Unsignalized: HCM [1]	Description
	V/C Ratio	Delay (sec)	
A	0.00 - 0.60	≤10	EXCELLENT – No vehicle waits longer than one red light, and no approach phase is fully used.
B	0.61 - 0.70	> 10 and ≤ 15	VERY GOOD – An occasional approach phase is fully utilized; drivers begin to feel somewhat restricted within groups of vehicles.
C	0.71 - 0.80	> 15 and ≤ 25	GOOD – Occasionally, drivers may have to wait through more than one red light; back-ups may develop behind turning vehicles.
D	0.81 - 0.90	> 25 and ≤ 35	FAIR – Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive back-ups.
E	0.91 - 1.00	> 35 and ≤ 50	POOR – Represents the most vehicles that the intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.00	> 50	FAILURE – Back-ups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

LOS = Level of Service; ICU = Intersection Capacity Utilization; HCM = Highway Capacity Manual; V/C = volume-to-capacity
[1]Source: Source: Highway Capacity Manual, 6th Edition

Performance Criteria

The City of Brea Level of Service standard for intersection operation is Level of Service D or better. If the project traffic causes operations at an intersection to go from acceptable to unacceptable, the project would have a significant effect at the intersection.

AREA CONDITIONS

Existing Street System

Regional access to the site is provided by Imperial Highway (SR-90) adjacent to the project site, and State Route 57 (SR-57), located nearly one mile east of the project site. The following provides a description of the roadways providing access to the project area.

Imperial Highway (SR-90) is an east-west highway with three lanes in each direction and a raised center median in the project vicinity. The posted speed limit is typically 40 miles per hour (mph) along SR-90, but the project is located within a 25 mph school zone which is applicable when children are present. On-street parking is prohibited on both sides.

Birch Street is an east-west roadway with two lanes in each direction and a two-way center left-turn lane in the project vicinity. The posted speed limit is typically 35 mph along Birch Street, but the project is located within a 25 mph school zone which is applicable when children are present. On-street parking is prohibited on both sides. Birch Street is designated as a secondary arterial in the City's General Plan from Brea Boulevard to Randolph Avenue.

Orange Avenue is a north-south roadway with one lane in each direction. Orange Avenue is a local road and the speed limit can be considered to be 25 mph. On-street parking is allowed on both sides of Orange Avenue.

Flower Avenue is north-south roadway with one lane in each direction. Flower Avenue is a local road and the speed limit can be considered to be 25 mph. On-street parking is allowed on both sides of Flower Avenue.

Transit Service

Transit service to the project area is provided by the Orange County Transportation Authority (OCTA), which serves the City of Brea and surrounding area. The OCTA bus stops closest to the project site are located at the intersection of Birch Street and Flower Avenue. A description of the bus routes serving the project area is provided below.

OCTA Route 57 (Brea to Newport Beach) operates between the Brea Mall Area and the Newport Transportation Center in Newport Beach along State College Boulevard and Bristol Street. Route 57 operates on weekdays from approximately 4:00 AM to 2:00 AM with approximately 15-minute headways, and on weekends from approximately 4:00 AM to 3:00 PM with approximately 30-minute headways.

OCTA Route 129 (La Habra to Anaheim) operates between La Habra Square and Kraemer Boulevard and La Palma Avenue in Anaheim. Route 129 travels along La Habra Boulevard, Brea Boulevard, Birch Street, and Kraemer Boulevard. Route 129 operates every day from approximately 6:00 AM to 9:15 PM with approximately 1-hour headways.

OCTA Route 143 (La Habra to Brea) operates between La Habra Square and the Brea Mall Area through the Fullerton Transportation Center along Whittier Boulevard, Harbor Boulevard, Brea Boulevard, and Birch Street. Route 143 operates on weekdays from approximately 6:15 AM to 9:20 PM with approximately 1-hour headways, and on weekends from approximately 6:20 AM to 8:15 PM with approximately 1-hour headways.

OCTA Route 153 (Brea to Anaheim) operates between the Brea Mall Area and Angel Stadium of Anaheim along Birch Street, Associated Road, Yorba Linda Boulevard, Placentia Avenue, and Batavia Street. Route 153 operates every day from approximately 7:00 AM to 8:45 PM with approximately 1-hour headways.

OCTA Route 213 (Brea to Irvine Express) operates between the Brea Park-and-Ride and University Research Park in Irvine along State College Boulevard, Brea Boulevard, I-91, and I-55. Route 213 operates on weekdays only between approximately 5:30 AM and 7:00 PM with approximately 30-minute headways. No bus service is provided on the weekends. Route 213 service was suspended on March 23, 2020 due to COVID-19 service modifications.

EXISTING OPERATING CONDITIONS

Existing Traffic Volumes

Existing lane configurations and traffic control at the study intersections are shown on **Figure 3**. Per direction from City staff, existing PM peak hour turning movement volumes were collected in September 2020. Due to the current disruptions amid the COVID-19 pandemic, an adjustment factor was applied to existing volumes, based on a comparison of existing volumes and historical counts at the intersection of Birch Street and Flower Avenue. Based on the volume comparison, an adjustment factor of 37% was applied to the new counts at study intersections. The resulting existing baseline traffic volumes are presented on **Figure 4**. Peak hour intersection traffic count worksheets are provided in ***Appendix B***.

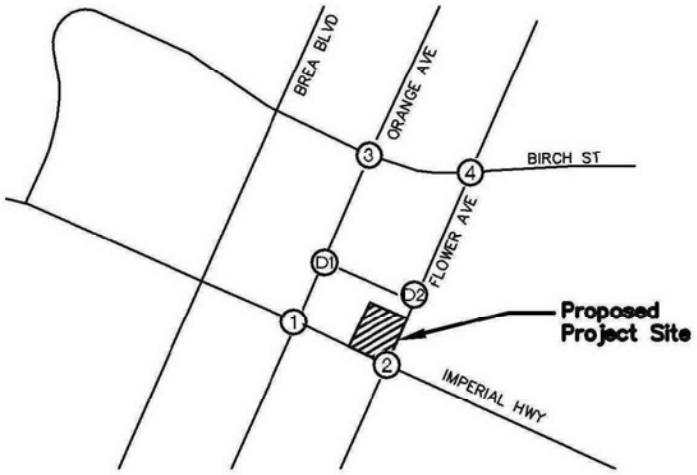
Peak Hour Intersection Operations

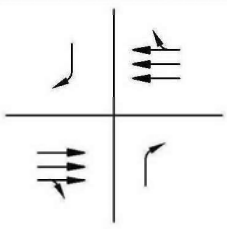
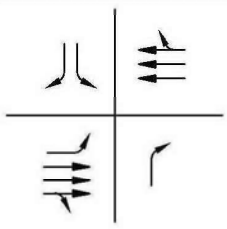
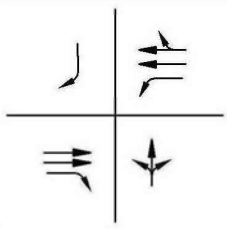
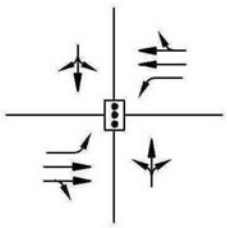
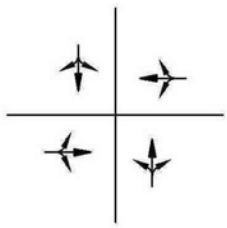
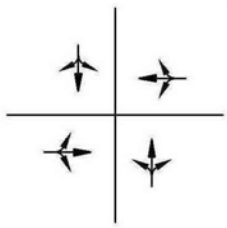
Intersection Level of Service analysis was conducted for the PM peak hour using the analysis procedures and assumptions described previously in this report. The results of the intersection analysis for Existing Conditions are shown on **Table 1**. Review of this table indicates the following study intersections currently operate at an unacceptable Level of Service:

- #1 – Imperial Highway at Orange Avenue: PM – LOS E
- #2 – Imperial Highway at Flower Avenue: PM – LOS F
- #3 – Birch Street at Orange Avenue: PM – LOS F

The Level of Service for an unsignalized intersection is reported based on the single approach movement with the highest delay, which in this case, would be the southbound approach for intersections #1 and #2, and the northbound approach for Intersection #3. The traffic on these approaches would experience delay during the evening peak hour while waiting for an acceptable gap in traffic on Imperial Highway or Birch Street. While the side street approach operates at a deficient Level of Service based on the highest delay approach, the overall intersection delay would be acceptable. Any queuing that occurs on the side street is contained on the minor intersection approach, would occur for only a limited period of time during the working week, and would not impact the progression of traffic on the main arterial. Intersection analysis worksheets are provided in ***Appendix C***.

NOT TO SCALE



1. Orange Ave at Imperial Hwy	2. Flower Ave at Imperial Hwy	3. Orange Ave at Birch St
		
4. Flower Ave at Birch St	**D1. Orange Ave at Project Dwy**	**D2. Flower Ave at Project Dwy**
		

LEGEND:

- (X) = Study Intersection
- = Turn or Through Lane
- = Signal
- = Stop Sign

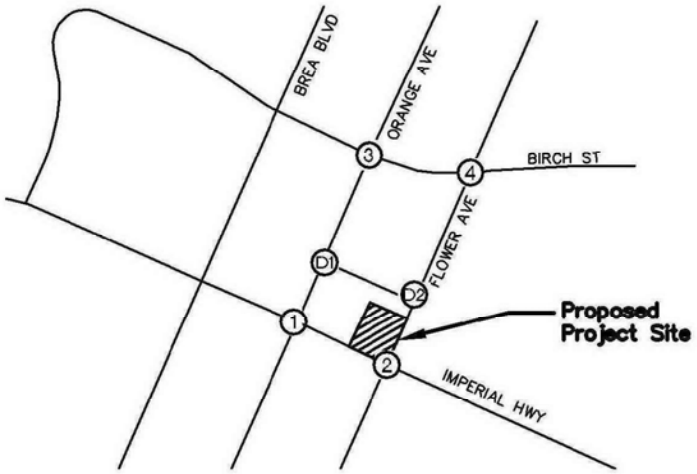
FIGURE 3
EXISTING LANE CONFIGURATION AND TRAFFIC CONTROL

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NOT TO SCALE



1. Orange Ave at Imperial Hwy	2. Flower Ave at Imperial Hwy	3. Orange Ave at Birch St
55 ← ; 45 ← 2436 ↑ ; 2341 → ; 18 ↘ ; 41 ↑	48 ← ; 14 ← ; 22 ← 2456 ↑ ; 62 ↘ ; 2302 → ; 15 ↘ ; 7 ↑	26 ← ; 26 ← 934 ↑ ; 26 ↖ ; 849 → ; 45 ↘ ; 15 ↗ ; 1 ↑ ; 33 ↑
4. Flower Ave at Birch St	**D1. Orange Ave at Project Dwy**	**D2. Flower Ave at Project Dwy**
14 ← ; 4 ← ; 23 ↙ ; 21 ← ; 958 ← ; 49 ↖ ; 25 ↘ ; 837 → ; 12 ↘ ; 12 ↑ ; 12 ↑ ; 58 ↑	71 ← ; 49 →	65 ← ; 84 →

LEGEND:

Ⓧ = Study Intersection

XX = PM Peak Hour Turning Movement Volumes

FIGURE 4
EXISTING PEAK HOUR TRAFFIC VOLUMES

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Table 1 – Summary of Intersection Operations – Existing Conditions

#	Intersection	Traffic Control	Peak Hour	Existing Conditions	
				Delay /ICU	LOS
1	Imperial Highway at Orange Avenue	Unsignalized	PM	47.3	**E**
2	Imperial Highway at Flower Avenue	Unsignalized	PM	>180	**F**
3	Birch Street at Orange Avenue	Unsignalized	PM	78.0	**F**
4	Birch Street at Flower Avenue	Signal	PM	0.364	A

Bold = LOS does not meet the applicable jurisdiction requirements (i.e. unacceptable LOS)

PROJECT TRAFFIC

Project Trip Generation

Trip generation estimates for the existing office building is based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition average rates for Small Office Building (ITE Land Use 712). For the proposed Raising Cane's, the City has expressed that ITE average rates for Fast-food Restaurant with Drive-through (ITE Land Use 934) are likely to underestimate project trips; therefore, the ITE trip generation average rates were factored up by one standard deviation. Also, per request from City staff, the square footage for the proposed use includes the occupiable patio area, for a total square footage of 4,047 SF. Based on City's guidance, a pass-by reduction factor of 35% was applied for the proposed Raising Cane's project.

The trip generation rates and the resulting trip generation estimates for the proposed Raising Cane's project are summarized on **Table 2**. After applying existing trip credits and pass-by reduction factors, the project is estimated to generate approximately 1,727 net new vehicle trips on a daily basis, with 109 net new trips in the evening peak hour.

Trip Distribution and Assignment

Trip distribution assumptions for the project were based on proximity to regional and local roadways and existing travel patterns. Trip distribution percentages at each study intersection were applied to the project trip generation to determine the project trips through each intersection. The project trip distribution and resulting project-related peak hour trips to be added to the surrounding street system are shown on **Figure 5A** and **Figure 5B,** respectively.

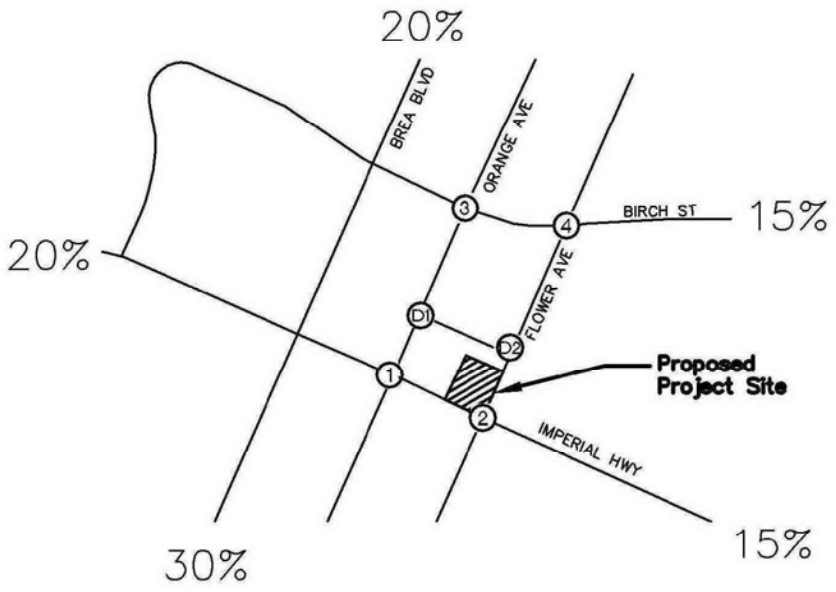
Table 2 – Summary of Project Trip Generation

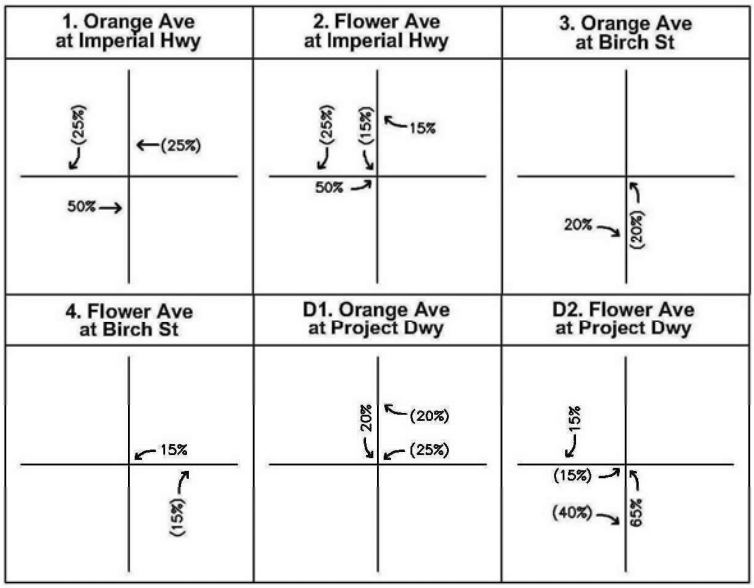
Trip Generation Rates[1]								
Land Use	Unit	Daily Rate	AM Peak Hour[2]			PM Peak Hour		
			In	Out	Total	In	Out	Total
Small Office Building	ksf[3]	16.190	1.594	0.326	1.920	0.784	1.666	2.450
Fast Food Restaurant (w/ drive-through)[2]	ksf[3]	715.390	N/A[4]	N/A[4]	N/A[4]	26.281	24.259	50.540

Trip Generation Estimates								
Land Use	Units	Daily Trips	Midday Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Existing Use								
Small Office Building	9.588 ksf	155	15	3	18	8	16	24
Proposed Use								
Raising Cane's Brea	4.047 ksf	2,895	0	0	0	106	98	204
Pass-by Trips (35% Daily, 35% PM)[5]		*-1,013*	*0*	*0*	*0*	*-37*	*-34*	*-71*
Total Net Trips for Proposed Conditions		1,882	0	0	0	69	64	133
Net Difference (Proposed Minus Existing)		**1,727**	**-15**	**-3**	**-18**	**61**	**48**	**109**

Notes:
1. Source: Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, Volume 2 (September 2017)
2. Trip Generation rates is equal to average rate plus standard deviation to account for higher trip generation than typical land use.
3. ksf = 1,000 square feet
4. Raising Cane's (proposed use) is not open during the morning peak hour.
5. Per City's guidance, a maximum pass-by reduction of 35% was assumed for the proposed project.

NOT TO SCALE





LEGEND:

⊗ = Study Intersection

XX% = Trip Distribution
(YY%) Inbound(Outbound)

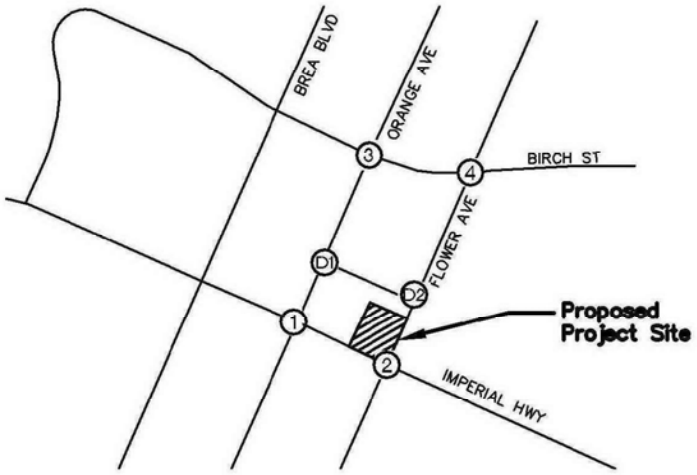
FIGURE 5A
PROJECT TRIP DISTRIBUTION

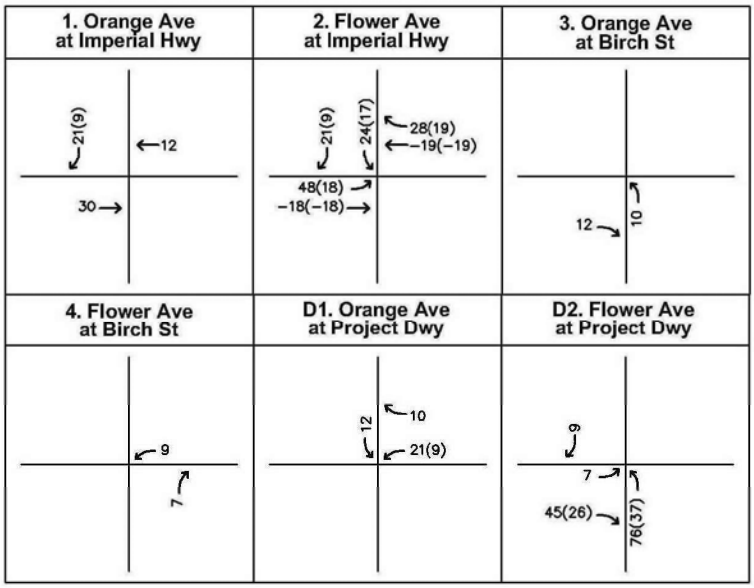
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NOT TO SCALE





LEGEND:

- (X) = Study Intersection
- XX = PM Peak Hour Turning Movement Volumes
- (YY) = PM Peak Hour Pass-by Trips

FIGURE 5B
PROJECT-RELATED TRAFFIC VOLUMES

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EXISTING PLUS PROJECT CONDITION

This section addresses the potential effects associated with adding project-related trips to Existing Conditions traffic volumes. The Existing Plus Project scenario is a hypothetical scenario which assumes that the Project would be fully implemented at the present time, with no other changes to area traffic volumes or to the street network serving the site. This analysis assumes full development of the Project and full absorption of Project traffic on the circulation system at the present time

Peak Hour Intersection Operations

Project-related trips were added to existing traffic volumes to develop forecasts for the Existing Plus Project scenario. The resulting PM peak hour traffic volumes are shown on **Figure 6**. The results of the intersection analysis for Existing Plus Project conditions are shown on **Table 3**. Review of this table indicates the following study intersections are projected to operate at an unacceptable Level of Service with the addition of project traffic:

- #1 – Imperial Highway at Orange Avenue: PM – LOS F
- #2 – Imperial Highway at Flower Avenue: PM – LOS F
- #3 – Birch Street at Orange Avenue: PM – LOS F

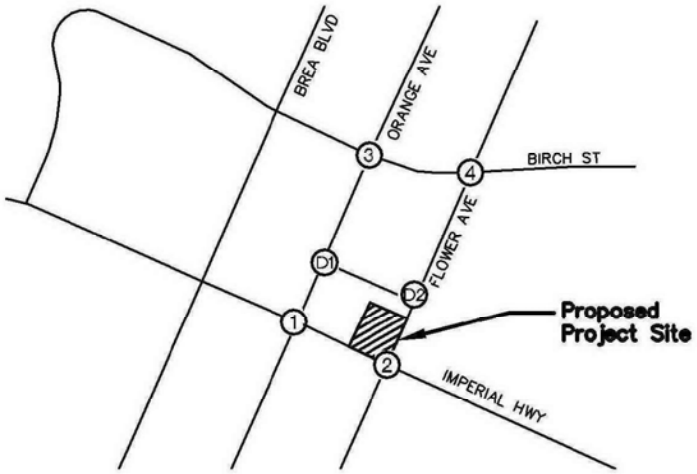
Signal warrant analyses for the above mentioned deficient unsignalized intersections are discussed in a subsequent section of this report. Intersection analysis worksheets are provided in ***Appendix C***.

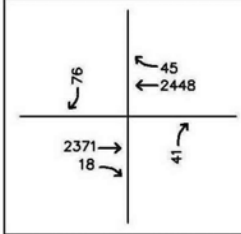
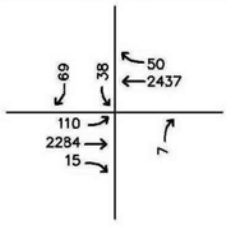
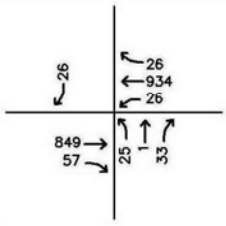
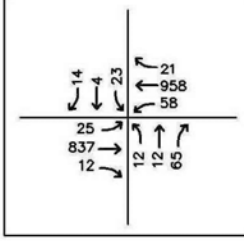
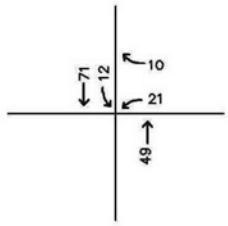
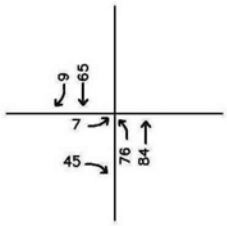
Table 3 – Summary of Intersection Operations – Existing Plus Project Conditions

#	Intersection	Traffic Control	Peak Hour	Existing Conditions		Existing Plus Project Conditions		
				Delay /ICU	LOS	Delay /ICU	LOS	Change in Delay /ICU
1	Imperial Highway at Orange Avenue	Unsignalized	PM	47.3	**E**	60.1	**F**	12.8
2	Imperial Highway at Flower Avenue	Unsignalized	PM	>180	**F**	>180	**F**	N/A[1]
3	Birch Street at Orange Avenue	Unsignalized	PM	78.0	**F**	87.1	**F**	9.1
4	Birch Street at Flower Avenue	Signal	PM	0.364	A	0.369	A	0.005
5	Orange Avenue at Project Driveway	Unsignalized	PM	-	-	9.5	A	-
6	Flower Avenue at Project Driveway	Unsignalized	PM	-	-	11.0	B	-

Bold = LOS does not meet the applicable jurisdiction requirements (i.e. unacceptable LOS)
[1] Oversaturated conditions. Under these conditions, changes in the minor street volumes result in disproportionate changes in delay.

NOT TO SCALE



1. Orange Ave at Imperial Hwy	2. Flower Ave at Imperial Hwy	3. Orange Ave at Birch St
		
4. Flower Ave at Birch St	**D1. Orange Ave at Project Dwy**	**D2. Flower Ave at Project Dwy**
		

LEGEND:

Ⓧ = Study Intersection

XX = PM Peak Hour Turning Movement Volumes

FIGURE 6
EXISTING PLUS PROJECT TRAFFIC VOLUMES

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SIGNAL WARRANT ANALYSIS

A traffic signal warrant analysis was conducted for the following unsignalized intersections:

- #1 – Imperial Highway at Orange Avenue
- #2 – Imperial Highway at Flower Avenue
- #3 – Birch Street at Orange Avenue

The warrants were conducted using Warrant 3 (Peak Hour Warrant) for Existing Plus Project conditions. The signal warrant analysis methodology is based on the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD). Traffic Signal Warrant Analysis worksheets are provided in ***Appendix D***. Based on Existing Plus Project volumes, Warrant 3 was not met for any of the unsignalized intersections.

#2 – Imperial Highway at Flower Avenue

Per request from City staff, a traffic signalization assessment was conducted for the intersection of Imperial Highway at Flower Avenue. The assessment for this intersection is based on review of the following three volume warrants found in section 4C.01 of the CA MUTCD:

- Warrant 1 - Eight Hour Vehicular Volume
- Warrant 2 – Four-Hour Vehicular Volume
- Warrant 3 – Peak Hour

Daily roadway counts at each approach of the intersection were collected on a typical weekday. An adjustment factor of 37% was applied to the 24-hour counts to account for the current traffic disruptions amid the COVID-19 pandemic. Each warrant is described in detail and the results of the warrant analysis for the study intersection are provided in the subsequent discussion.

Warrant 1, Eight-Hour Vehicular Volume

Warrant Criteria

The criteria for Warrant 1, Eight-Hour Vehicular Volume, are contained in Table 4C-1 of the MUTCD, and are shown on **Table 4** of this report. Warrant 1 is satisfied when one of two conditions is met during any 8 hours of an average day: The Minimum Vehicular Volume, Condition A, and the Interruption of Continuous Traffic, Condition B. Condition A may be satisfied due to a significant volume on the minor street approach, while Condition B may be satisfied due to a significant volume of traffic on the major street. The details of Condition A and Condition B are listed below:

A. The vehicles per hour given in both of the 100 percent columns of Table 4 (see Page 19) exist on the major-street and the higher-volume minor street approaches, respectively, to the intersection; or

B. The vehicles per hour given in both of the 100 percent columns of Condition B in Table 4 (see Page 19) exist on the major-street and the higher-volume minor-street approaches, respectively, to the intersection.

Table 4 – MUTCD Warrant 1, Eight-Hour Vehicular Volume

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	500	400	350	280	150	120	105	84
2 or more	1	600	480	420	336	150	120	105	84
2 or more	2 or more	600	480	420	336	200	160	140	112
1	2 or more	500	400	350	280	200	160	140	112

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100%[a]	80%[b]	70%[c]	56%[d]	100%[a]	80%[b]	70%[c]	56%[d]
1	1	750	600	525	420	75	60	53	42
2 or more	1	900	720	630	504	75	60	53	42
2 or more	2 or more	900	720	630	504	100	80	70	56
1	2 or more	750	600	525	420	100	80	70	56

[a] Basic minimum hourly volume
[b] Used for combination of Conditions A and B after adequate trial of other remedial measures
[c] May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000
[d] May be used for combination of Conditions A and B after adequate trial of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

Warrant Findings

The results for the Warrant 1 analysis for the intersection of Imperial Highway and Flower Avenue are shown in ***Appendix D***. The traffic counts collected at the intersection indicate that neither Condition A nor Condition B is met based on the thresholds shown on Table 4.

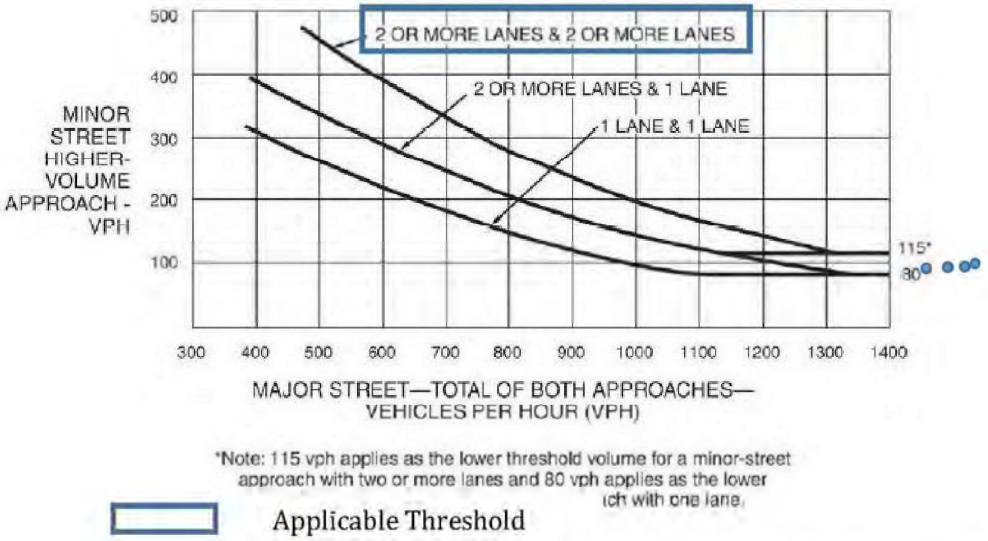
Warrant 2, Four-Hour Vehicular Volume

Warrant Criteria

The criteria for Warrant 2, Four-Hour Vehicular Volume, are contained in Figure 4C-1 and Figure 4C-2 of the MUTCD, and are shown on **Figure 7** and **Figure 8** of this report. The Four-Hour Vehicular Volume Warrant is met when, for each of any four hours of an average day, the plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the minor-street approach (one direction only) fall above the applicable curve in Figure 7 for the applicable combination of approach lanes.

If the posted speed limit on the major street exceeds 40 miles per hour, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then Figure 8 may be used in place of Figure 7.

Figure 7 – MUTCD Warrant 2, Four-Hour Vehicular Volume

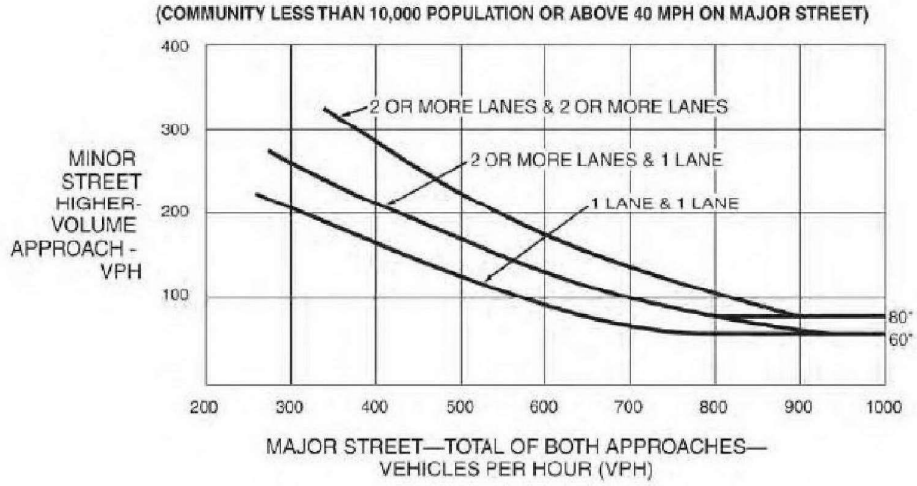


*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower ich with one lane.

Applicable Threshold

Study intersection plotted value for the 4 highest hours of the day

Figure 8 – MUTCD Warrant 2, Four-Hour Vehicular Volume (70% Factor)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Warrant Findings

For the intersection of Imperial Highway and Flower Avenue, the criteria shown on Figure 7 apply. The results indicate that Warrant 2 is not satisfied based on the thresholds shown on Figure 7.

Warrant 3, Peak Hour

Warrant Criteria

The criteria for Warrant 3, Peak Hour Vehicular Volume, are contained in Figure 4C-3 and Figure 4C-4 of the MUTCD, and are shown on **Figure 9** and **Figure 10** of this report. The Peak Hour Warrant is met when either of the following two parts is met:

A. If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

1. The total stopped time delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and
2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and
3. The total entering volume serviced during the hour equals or exceeds 800 vehicles per hour for intersections with four or more approaches.

B. The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 10 for the applicable combination of approach lanes.

If the posted speed on the major street exceeds 40 miles per hour, or if the intersection lies within the built-up area of an isolated community having a population less than 10,000, Figure 10 may be used in place of Figure 9.

Figure 9 – MUTCD Warrant 3, Peak Hour

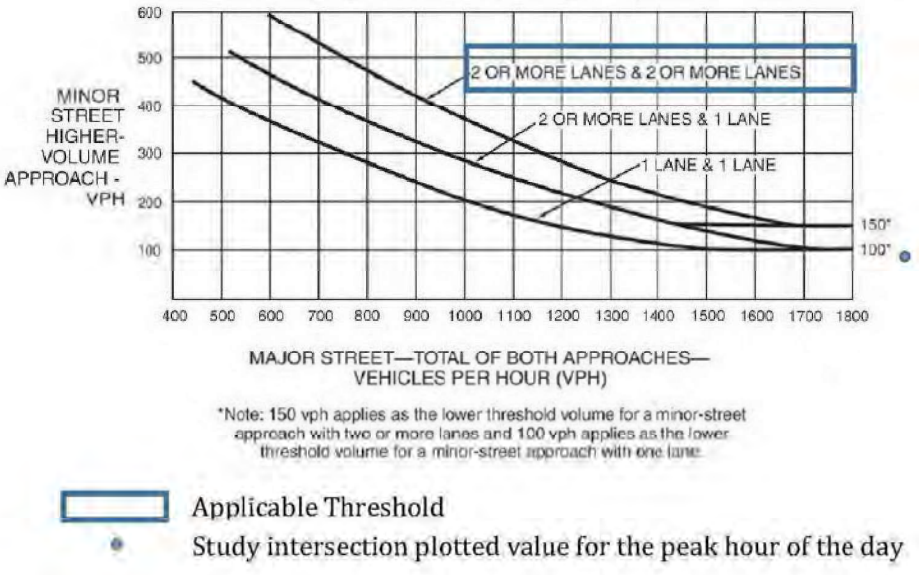
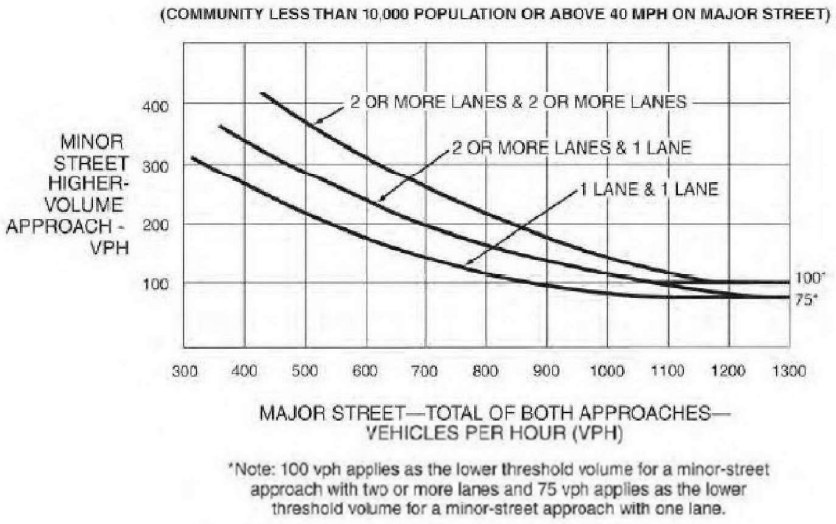


Figure 10 – MUTCD Warrant 3, Peak Hour (70% Factor)



Warrant Findings

Part A.2 of Warrant 3 is not met since the minor street approach peak volume (one direction only) is less than 100 volumes; therefore, Part A is not met. For Part B, the criteria shown on Figure 9 apply. The results indicate that Part B of Warrant 3 is not met based on the thresholds shown on Figure 9. As result, Warrant 3 is not satisfied based on the criteria for Parts A and B.

Conclusions

The existing unsignalized intersection of Imperial Highway and Flower Avenue is shown to operate at an unacceptable Level of Service under Existing Conditions. Traffic signal warrants 1, 2, and 3, based on the 2014 California Manual on Uniform Traffic Control Devices (MUTCD), were assessed. These warrants take into consideration vehicular volumes and other criteria.

All traffic signal warrant calculations and worksheets are provided in ***Appendix D***. The results of the analysis indicate that the unsignalized intersection of Imperial Highway and Flower Avenue does not satisfy CA MUTCD signal warrants 1, 2, and 3.

RECOMMENDED IMPROVEMENTS

Based on discussion with City staff, the following improvement was evaluated:

#2 – Imperial Highway at Flower Avenue: Modify the southbound approach to restrict southbound left-turn movements. As a result of this improvement, it was assumed that 50% of the trips previously turning left from Flower Avenue onto Imperial Highway would instead head north on Flower Avenue and turn right onto Birch Street. The other 50% would use the turn right from Flower Avenue onto Imperial Highway and make a U-turn at the intersection of Imperial Highway at Brea Boulevard. A summary of the intersection operation at the study intersections before and after implementation of this improvement is provided on **Table 5**.

Although the intersection would continue to operate at LOS F on the minor street approach, this improvement would more than offset the project-related incremental increase in delay. Since the project is not causing the deficiency, the project's fair share was calculated based on the project's proportion of southbound approach volumes under Existing Plus Project conditions at Intersection #2, which is approximately 42.1%.

Table 5 – Summary of Intersection Operations – Existing Plus Project With Improvements

#	Intersection	Traffic Control	Peak Hour	Existing Conditions		Plus Project		Plus Project with Improvement[1]		
				Delay /ICU	LOS	Delay /ICU	LOS	Delay /ICU	LOS	Change in Delay /ICU[2]
1	Imperial Highway at Orange Avenue	Unsignalized	PM	47.3	E	60.1	**F**	61.5	**F**	14.2
2	Imperial Highway at Flower Avenue	Unsignalized	PM	>180	F	>180	**F**	78.1	**F**	Reduced[3]
3	Birch Street at Orange Avenue	Unsignalized	PM	78.0	F	87.1	**F**	87.1	**F**	9.1
4	Birch Street at Flower Avenue	Signal	PM	0.364	A	0.369	A	0.376	A	0.012
5	Orange Avenue at Project Driveway	Unsignalized	PM	-	-	9.5	A	9.5	A	-
6	Flower Avenue at Project Driveway	Unsignalized	PM	-	-	11.0	B	11.1	B	-

Bold = LOS does not meet the applicable jurisdiction requirements (i.e. unacceptable LOS)

[1] Intersection Improvement: Modify Intersection #2 to restrict southbound left-turn movements

[2] Change in Delay/ICU is the difference between Existing and With Project with Improvement conditions

[3] Average motorist wait times to enter Imperial Highway are anticipated to be significantly less than existing conditions

DRIVE-THROUGH QUEUING ANALYSIS

The City has requested that a drive-through (DT) queuing analysis be conducted for the proposed project, to evaluate the adequacy of the drive-through lane queuing capacity.

The opening to the drive-through lane would be located at the southwestern corner of the project site, and the drive-through lane would wrap around the building in a counter-clockwise direction. The drive-through would provide two side-by-side entry lanes and two order boards, which would allow Raising Cane's to take orders from two customers at the same time. After the order boards, the two lanes would merge into a single drive-through lane prior to the pay and pick-up window.

There will be approximately 350 feet (approximately 175 feet per lane) of total queuing capacity from the drive-through entrance to the two order boards and approximately 90 feet from the order boards to the pick-up window. This would provide a total drive-through queue length of approximately 440 feet, for a drive-through queueing capacity of 20-22 vehicles, assuming 20-22 feet per vehicle, from the beginning of the drive-through lanes to the pay and pick-up window.

Queuing Data Collection

Drive-through queuing observations and counts were conducted at the following existing drive-through Raising Cane's sites:

- City of Laguna Hills: 23971 El Toro Road (~2,800 SF; DT Lane Capacity: 8 vehicles)
- City of Orange: 2249 North Tustin Street (~4,600 SF; DT Lane Capacity: 8 vehicles)
- City of Riverside: 11066 Magnolia Avenue (~4,700 SF; DT Lane Capacity: 11 vehicles)

These sites do not have dual side-by-side drive-through lanes or dual order boards. Compared to the proposed site, the majority of the existing sites are larger in square footage and provide less drive-through queuing capacity.

These sites were selected for queuing data collection because of the following site characteristics that are similar to the proposed project:

- A Raising Cane's restaurant with a drive-through lane
- Located in Southern California
- Located adjacent to or within a larger commercial center

The drive-through activity was observed during the following times for the Raising Cane's sites on a typical weekday and Saturday:

- Laguna Hills Site:
  - 11:00 AM – 2:00 PM (lunch-time)
  - 4:00 PM – 7:00 PM (commute peak hour/dinner-time)
- Orange Site:
  - 12:00 PM – 2:30 PM (lunch-time)
  - 7:00 PM – 9:30 PM (dinner-time)
- Riverside Site:
  - 11:00 AM – 2:00 PM (lunch-time)
  - 4:00 PM – 7:00 PM (commute peak hour/dinner-time)

A copy of the queuing data collection worksheets is provided in ***Appendix E.***

The results of the observations are summarized in ***Appendix F*** for a typical weekday and Saturday. The data summaries in Appendix F present the number of vehicles in the drive-through lane, broken down into 15-minute periods, based on the observed average queue, 85th percentile queue, and the peak queue for each of the data collection periods.

Queuing Observations

The queuing activity was observed to vary with an ebb and flow pattern throughout the data collection periods. The following vehicle movement and queuing observations of the drive-through operations at the study locations were made:

Laguna Hills Site

- The peak 15 minutes during the weekday lunch-time peak was from 12:15 PM to 12:30 PM, with an average queue of 9 vehicles and a peak queue of 15 vehicles.
- The peak 15 minutes during the weekday dinner-time peak was from 6:45 PM to 7:00 PM, with an average queue of 13 vehicles and a peak queue of 14 vehicles.
- The peak 15 minutes during the Saturday lunch-time peak was from 1:00 PM to 1:15 PM, with an average queue of 8 vehicles and a peak queue of 14 vehicles.
- The peak 15 minutes during the Saturday dinner-time peak was from 6:15 PM to 6:30 PM, with an average queue of 9 vehicles and a peak queue of 13 vehicles.

Orange Site

- The peak 15 minutes during the weekday lunch-time peak was from 12:45 PM to 1:00 PM, with an average queue of 10 vehicles and a peak queue of 16 vehicles.
- The peak 15 minutes during the weekday dinner-time peak was from 7:15 PM to 7:30 PM, with an average queue of 12 vehicles and a peak queue of 14 vehicles.
- The peak 15 minutes during the Saturday lunch-time peak was from 1:00 PM to 1:15 PM, with an average queue of 11 vehicles and a peak queue of 13 vehicles.
- The peak 15 minutes during the Saturday dinner-time peak was from 8:45 PM to 9:00 PM, with an average queue of 15 vehicles and a peak queue of 17 vehicles.

Riverside Site

- The peak 15 minutes during the weekday lunch-time peak was from 12:30 PM to 12:45 PM, with an average queue of 8 vehicles and a peak queue of 12 vehicles.
- The peak 15 minutes during the weekday dinner-time peak was from 6:00 PM to 6:15 PM, with an average queue of 7 vehicles and a peak queue of 11 vehicles.

- The peak 15 minutes during the Saturday lunch-time peak was from 1:30 PM to 1:45 PM, with an average queue of 10 vehicles and a peak queue of 12 vehicles.

- The peak 15 minutes during the Saturday dinner-time peak was from 6:45 PM to 7:00 PM, with an average queue of 8 vehicles and a peak queue of 11 vehicles.

General Observations

- At the Raising Cane's sites, spillovers outside the drive-through lane opening were observed to occur occasionally and to last briefly.

- On occasion, the spillover outside the drive-through lane was due to a delay at the order board, rather than a lack of capacity in the drive-through lane itself. A more-than-average delay at the order board (i.e., due to a large order, or indecisiveness on the part of the customer) would briefly hold up the movement of the queue, sometimes causing the remainder of the queue to extend beyond the drive-through lane opening. When the vehicle at the order board finished the ordering process and pulled forward, the remaining cars in the queue would once again move through the order and pick-up process at the normal pace, and the gap between the order board and the pick-up window would fill in.

- Some customers were observed to pull into the site; evaluate the wait time, based on the vehicle queue; and choose to park and go into the building, rather than join the existing queue.

- Based on the drive-through queuing data, the peak observed queue was 17 vehicles. The proposed site would have a drive-through queuing capacity of 20 vehicles; therefore, the proposed capacity would be able to accommodate the expected peak demand.

Drive-through Queue Length Calculation

To supplement the empirical data collected at the existing Raising Cane's restaurants in Laguna Hills, Orange, and Riverside, the drive-through queuing capacity was also analyzed using queuing analysis formulas published in the Institute of Transportation Engineers (ITE) Transportation Planning Handbook, 3rd Edition.

Raising Cane's typical service time in the drive-through is 2-1/2 minutes from the order board to the pick-up window, with subsequent vehicles being processed at the pick-up window every 35 to 40 seconds during the peak drive-through periods.

Assuming the more conservative processing time of 40 seconds, and applying the ITE queuing formulas, the analysis indicates that the average queue length is estimated to be 9 vehicles, and the probability that the queue would be exactly 20 vehicles would be 1.34%. The probability of the queue exceeding 20 vehicles is estimated to be 13.19%. The queuing calculation worksheet and formulas are provided as ***Appendix F*** of this report.

The ITE queuing analysis assumes a single-lane drive-through. The occurrence of the drive-through queue extending beyond the opening of the drive-through lane is expected to be an infrequent occurrence, and of short duration. The use of dual side-by-side drive-through lanes with dual order boards would improve the service rate, which would lower the number of vehicles queuing in the drive-through, as described in the following section.

Side-by-Side Operational Features

The proposed side-by-side configuration would begin with a two drive-through lanes at the southwestern corner of the building. Each drive-through lane would have its own order board. After the order boards, the two lanes would merge back into one lane for the pay and pick-up window.

While regular customers who are familiar with the menu choices typically would complete the order part of the process in less than the average time, infrequent or new customers are more likely to dwell at the menu board before making their choices, slowing down the process for everyone behind them. As a result, the order board is considered to be the most significant bottleneck in the drive-through process.

The side-by-side ordering configuration, as proposed by Raising Cane's, would provide two lanes with a separate order board for each lane. This will increase the number of customers processed through the order board portion of the drive-through, and "keep the line moving" even if one customer takes a longer-than-average time to make their menu selections, allowing the restaurant to continue to take and complete orders from the other order lane. The newest customer to arrive at the drive-through entrance will naturally choose the empty lane or the shorter line, so that one customer who takes a longer time to order at one order board can be by-passed, thereby not holding up the entire drive-through line.

With the added efficiency of having two order boards and the ability to by-pass customers taking a longer-than-average time to order at the other order board, the service rate would increase, compared to a single order board, as more orders can be processed. The cooks would receive the orders at a more efficient rate, which allows them to continue cooking the food, rather than waiting for the slower customer to finish ordering.

As a result of added efficiency in the cooking area, the efficiency at the pick-up window would increase, compared to a single order board, because the food would be processed by the cooking area at a more efficient rate. It should be noted that the proposed drive-through lane has a single service point at the pick-up window. The efficiencies cited are due to multiple order boards feeding the single service point.

ON-SITE PARKING ASSESSMENT

The City of Brea's Municipal Zoning Code Section 20.08.040 "Off-Street Parking and Loading" outlines the minimum number of parking spaces per square foot by land use. This section of the Municipal Zoning Code can be found in ***Appendix G.*** These requirements were used to determine the adequacy of the number of parking spaces within the project site. For "drive-through restaurants", one parking space is required for each 75 SF of gross floor area under 6,000 square feet. For a site of 4,047 SF (includes occupiable outside patio area), the required number of spaces is 54 spaces. The Project proposes to provide 31 parking spaces, 4 of which will be ADA accessible spaces, resulting in a deficit of 23 parking spaces.

Required Parking – Proposed Conditions

The minimum parking requirements for the Brea Gaslight Square with the proposed drive-through restaurant, based on Section 20.08.040 of the Brea Municipal Code, are shown in **Table 6**. Per the City code, the proposed parking requirement for the Brea Gaslight Square with the proposed Raising Cane's drive-through restaurant is 98 parking spaces. The proposed parking supply would provide 74 parking spaces, for a deficit of 24 parking spaces, compared to City code.

Table 6 – Parking Summary – Proposed Conditions

Building / Use	Unit	Quantity / Capacity	Parking Code	Parking Required	Parking Provided
Drive-Through Restaurant	KSF	4.047	13.30	54	31
Medical (Dentistry)	KSF	2.917	5.50	16	43
Medical (Orthodontist)	KSF	2.510	5.50	14	
Office	KSF	3.448	4.00	14	
TOTAL Parking				98	74
Parking Surplus (Deficit)				(24)	

Drive-Through Lane Parking Credit

The City of Brea Municipal Code specifically allows a stacking credit for drive-through lanes at banks on the basis of one car for every 23 lineal feet of stacking lanes but cannot exceed 30% of the required parking for the use. Although a fast food restaurant is a different land use, the drive-through provides similar relief on the number of parking spaces that are needed to serve the land use. The proposed Raising Cane's restaurant would provide a drive-through lane queuing capacity for 20 vehicles as discussed in the queuing analysis section of this report. However, since 30% of the required 54 parking spaces for the proposed Raising Cane's amounts to 16 parking spaces, a drive-through lane parking credit of 16 additional parking spaces was used for the proposed project.

After including the additional drive-through lane parking credit to the proposed parking supply, the Brea Gaslight Square would have a proposed parking supply of 90 parking spaces. Based on a parking requirement of 98 parking spaces, this would result in a parking deficit of 8 parking spaces.

Table 7 – Parking Summary – Proposed Conditions with Drive-Through Lane Credit

Building / Use	Unit	Quantity / Capacity	Parking Code	Parking Required	Parking Provided
Drive-Through Restaurant	KSF	4.047	13.30	54	47
Medical (Dentistry)	KSF	2.917	5.50	16	43
Medical (Orthodontist)	KSF	2.510	5.50	14	
Office	KSF	3.448	4.00	14	
TOTAL Parking				98	90
Parking Surplus (Deficit)				(8)	

Urban Land Institute (ULI) Shared Parking Assessment

The Urban Land Institute (ULI) documents shared parking characteristics in their *Shared Parking*, 3rd Edition Publication. Furthermore, the ULI parking rates reflect the distribution between customer and employee parking demand, and adjusts the overall demand based on monthly and hourly peak demands. Generally, shared land uses within a single development can experience peak parking demands at various times throughout the day and would therefore not require the full parking for all land uses involved.

The ULI Shared Parking methodology is a multi-step process that, first, establishes the stand-alone peak parking requirements for individual uses, such as office and restaurant uses. The methodology then applies a percentage to the peak requirement for each use, for each hour of the day between the hours of 6:00 AM and midnight, reflecting the fact that the parking demand for each use varies throughout the course of the day.

Beneficial shared parking synergies exist between different uses whose peak operating times occur at different times of the day. An example of complementary uses for shared parking purposes are office and theatre. When the office parking demand is at 100% (at 10:00 and 11:00 in the morning on a weekday), the theatre parking demand is at 0%, according to the ULI Shared Parking document, Table 2-5. Conversely, when the theatre parking demand is at 100% (from 8:00 to 10:00 on a weekend night, the office has virtually no parking demand. These two uses, then, can share all or a portion of the same parking supply without detriment to the other, rather than each providing their own distinct and complete parking supply.

The ULI study also identifies monthly variations in parking demand for each use for each month of the year. Parking demand for retail peaks in the month of December, during the holiday season, and is at less than 75% from January through October. A health club, on the other hand, is at its peak during January.

Each of these factors is applied to the existing condition and incorporated into spreadsheets, which are summarized and provided in ***Appendix G***. Applying these factors to a particular mix of integrated land uses yields a projected peak parking requirement, at a particular time of day (weekday and weekend) and season. In theory, the actual parking needs for that mix of uses will not exceed the projected peak, due to the interrelationships and benefits of shared parking synergies.

Based on ULI's shared parking methodology, the proposed Brea Gaslight Square parking demand by use equates to a shared parking reduction of approximately 9% on a typical weekday and 3% on a typical weekend when compared to the maximum parking demand based on ULI-provided parking ratios and assuming each land use as a stand-alone project. It should be noted that the shared parking methodology and reduction factors are based on ULI parking demand, not the City's parking rates, since ULI provides parking demands for customers and employees during a typical weekday and weekend. Based on ULI parking demand, the medical/dental office uses do not have a parking demand during the weekend. As such, while the shared parking reduction is only 3% during the weekend, the weekend parking demand is underestimated. Therefore, a shared parking reduction of 9% was applied for the shared parking analysis.

The City's Municipal Code parking requirements are assumed to represent the maximum parking demand for each land use as a stand-alone project. Therefore, the maximum parking demand for the proposed project is assumed to be 98 parking spaces. After applying the shared parking reduction of 9% to the City's parking requirement for the proposed Brea Gaslight Square of 98 parking spaces, the adjusted peak parking demand for the proposed project would be 89 parking spaces. The Brea Gaslight Square would provide 90 parking spaces, resulting in a surplus of 1 parking space, based on the shared parking analysis. Based on the shared parking synergies and fluctuations in peak parking patterns on a monthly, daily, and hourly basis, the parking demand for the combination of land uses would be accommodated with the proposed parking supply.

Table 8 – Parking Summary – Proposed Conditions with Drive-Through Lane Credit and Shared Parking Reduction

Building / Use	Unit	Quantity / Capacity	Parking Code	Parking Required	Parking Provided
Drive-Through Restaurant	KSF	4.047	13.30	54	47
Medical (Dentistry)	KSF	2.917	5.50	16	43
Medical (Orthodontist)	KSF	2.510	5.50	14	
Office	KSF	3.448	4.00	14	
TOTAL Parking				98	90
TOTAL Parking After Shared Parking Reduction (9%)				89	90
Parking Surplus (Deficit)				1	

Existing Parking Utilization

As supplemental information, existing parking utilization was evaluated for the existing Brea Gaslight Square. Due to the current disruption of the novel coronavirus (COVID-19), the pandemic has affected traffic patterns. Therefore, in concurrence with City staff, the existing parking utilization for Brea Gaslight Square was evaluated using aerial imagery at the following times to reflect typical weekday and weekend operations:

- *3:11 PM Monday, July 2, 2018*
- *12:27 PM Saturday, February 23, 2019*
- *10:35 AM Tuesday, February 26, 2019*
- *11:46 AM Sunday, June 9, 2019*
- *9:55 AM Wednesday, October 2, 2019*
- *11:13 AM Friday, January 24, 2020*

A summary of the existing parking utilization data collection is shown on **Table 9**. The Nearmap aerial images are provided in ***Appendix G***. Based on the aerial images, the average occupancy on a weekday was 39 occupied spaces, or 42%. The average parking occupancy on a weekend was 9 occupied spaces, or 9% occupancy. The maximum observed occupancy in the parking lot was 49% on Wednesday at 9:55 AM, with 45 occupied parking spaces of the available 91 parking spaces.

Table 9 – Existing Parking Utilization

Date	Time	Occupied Stalls	Total Stalls	Percent Occupied
Monday, July 2, 2018	3:11 PM	38	91	42%
Saturday, February 23, 2019	12:27 PM	13	91	14%
Tuesday, February 26,2019	10:35 AM	42	91	46%
Sunday, June 09, 2019	11:46 AM	4	91	4%
Wednesday, October 02, 2019	9:55 AM	45	91	49%
Friday, January 24, 2020	11:13 AM	29	91	32%

Source: Nearmap aerial imagery

SITE ACCESS AND CIRCULATION

Direct vehicular access provisions for the project site would be provided via one unsignalized full-access driveway on Flower Avenue and one unsignalized full-access driveway on Orange Avenue. Parking is accessed from the internal drive aisles. Maximizing drive-through operations was achieved by a segmented parking layout. There is one internal intersection of drive aisles and a dead-end access on the south side of the north-south parking aisle. Vehicles have room to maneuver in and out of parking stalls and circulate internally to the site parking. The drive-through entrance and exit are separated from the parking aisle to eliminate potential drive-through queue impacts from blocking parking.

Sidewalks are present along all study area roadways and an accessible walkway is provided from Imperial Highway to the building entrance and patio area for pedestrian access to the site.

APPENDIX A

APPROVED SCOPING AGREEMENT

Kimley»Horn

September 14, 2020

Ms. Paige Montojo
Associate Planner, City of Brea
1 Civic Center Circle
Brea, California 92821

RE: ***Scoping Letter Agreement for Focused Traffic Analysis for the Proposed Raising Cane's Project in the City of Brea***

Dear Ms. Montojo:

Kimley-Horn and Associates, Inc. is submitting this Scoping Letter Agreement to the City of Brea to provide a Focused Traffic Analysis for the proposed Raising Cane's Project in the City of Brea. The proposed Focused Traffic Analysis scope for the project is presented below.

PROJECT DESCRIPTION

The project site is located on the northwest corner of Flower Avenue at Imperial Highway in the City of Brea. The project site is located within the existing Brea Gaslight Square. The project site is currently occupied by two office buildings with an approximate combined total of 9,588 square feet. The project will involve demolition of the two existing office buildings and the construction of a 3,267-square-foot Raising Cane's restaurant building with a drive-through and approximately 780 SF of occupiable patio area. The operating hours for walk-in and drive-through service will be from 9:00 am to 1:00 am Sunday through Thursday and 9:00 am to 3:30 am Friday through Saturday. A copy of the project site plan, dated August 4, 2020, is provided on **Attachment 1**.

Vehicular access provisions for the project site would be provided via the one existing shared driveway on Flower Avenue and one shared driveway on Orange Avenue. Both existing driveways will continue to be full-movement driveways. All project driveways would be unsignalized.

SCOPE OF FOCUSED TRAFFIC ANALYSIS

This scope is based on comments from City staff on Plan Review No. PR-20-07, as well as additional input from the City.

Parking Study

The parking requirements and inventory for the site is based on information from the Brea Gaslight Square Covenants, Conditions, and Restrictions (CC&R), dated January 17, 1991. The proposed use will require 95 parking spaces and will provide 88 spaces, resulting in 7 spaces,

or 7% short of code. The parking analysis will determine if stacking in the drive-through along with shared parking may address the parking deficiency, as well as handle the additional parking demand for the proposed site.

The shared parking analysis will use methodologies and assumptions from the Urban Land Institute (ULI) Shared Parking, 3rd Edition. The study will also assume credit for the drive-through lane based on the City's Municipal Code credit for bank drive-through lanes at a rate of 1 parking space per 23 lineal feet. The shared parking analysis will also take into account existing demand at the site. Due to the current disruption of the novel coronavirus (COVID-19), the pandemic has affected traffic patterns; therefore, collecting new data is discouraged. It is proposed that the existing demand be estimated based on timestamped aerials images from Nearmaps. The aerial images used for the analysis have the following timestamps:

- *9:55 AM Wednesday, October 2, 2019*
- *10:35 AM Tuesday February 26, 2019*
- *1:33 PM Wednesday, June 9, 2019*
- *3:06 PM Monday, July 2, 2018*
- *12:08 PM Saturday, January 24, 2020*
- *12:27 PM Saturday February 23, 2019*

Drive-Through Queuing Analysis

A drive-through queuing analysis will be conducted for the proposed project, to evaluate the adequacy of the drive-through lane queuing capacity. The opening to the drive-through lane would be located at the southern edge of the project site and wraps along the east and north sides of the building. The drive-through would provide two side-by-side entry lanes and two order boards, which would allow Raising Cane's to take orders from two customers at the same time. After the order boards, the two lanes would merge back into a single drive-through lane prior to the pay and pick-up window. There will be approximately 350 feet of total queuing lane capacity (approximately 175 feet per lane) from the opening of the two drive-through lanes to the two order boards and approximately 90 feet from the order boards to the pick-up window. This would provide a total drive-through queue length of approximately 440 feet, for a drive-through queuing capacity of 20-22 vehicles, assuming 20-22 feet per vehicle, from the beginning of the drive-through lanes to the pick-up window.

Drive-through queuing will be compared to empirical data collected at three existing Raising Cane's restaurants during the weekday lunch (11am-2pm) and dinner periods (4pm-7pm). Based on correspondence with City staff, empirical drive-through queuing data collected prior to March 2020 will be provided from the following Raising Cane's sites:

- City of Orange: 2249 North Tustin Street
- City of Laguna Hills: 23971 El Toro Rd
- City of Riverside: 11066 Magnolia Ave

Additionally, the drive-through queuing capacity of the project site will also be analyzed using queuing analysis formulas published in the Institute of Transportation Engineers (ITE) Transportation Planning Handbook, 3rd Edition.

Trip Generation

Trip generation estimate for the existing office building is based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition average rates for Small Office Building (ITE Land Use 712). For the proposed Raising Cane's, the City has expressed that ITE average rates for Fast-food Restaurant with Drive-through (ITE Land Use 934) are likely to underestimate project trips; therefore, the ITE trip generation average rates were factored up by one standard deviation. Also, per request from City staff, the square footage for the proposed use includes the occupiable patio area, for a total square footage of 4,047 SF. Based on City's guidance, a pass-by reduction factor of 35% was applied to the proposed Raising Cane's.

Trip generation rates and the resulting trip generation estimates for the proposed Raising Cane's project are summarized on **Attachment 2**. Based on the trip generation estimates, the Project is expected to generate 1,727 net new daily and 109 net new trips during the evening peak hour.

Traffic Operation Analysis

City staff has requested the following traffic analyses be conducted to evaluate potential traffic operational impacts at selected intersections:

- Level of Service
- Traffic Control Assessment
- Site Circulation and Access Evaluation

Level of Service

The Level of Service (LOS) analysis will be conducted at the following study intersections:

1. Imperial Highway & Flower Avenue
2. Imperial Highway & Orange Avenue
3. Birch Street & Flower Avenue
4. Birch Street & Orange Avenue
5. Flower Avenue & Project Driveway
6. Birch Street & Project Driveway

Traffic counts will be collected during the evening(4-6PM) peak period. An adjustment factor will be applied to the new counts to account the current disruptions of the COVID-19 pandemic. This adjustment factor will be based on the percentage difference between historical and new turning movement data at the intersection of Birch Street & Flower Avenue, as well as OCTAM growth forecast. The City will provide the historical counts at Birch Street & Flower Avenue.

Level of Service will be conducted for Existing and Existing Plus Project Conditions. Intersections operating at an unacceptable LOS will be identified based on the City's LOS standard of LOS D.

Traffic Control Assessment

A traffic control assessment will be conducted to assess traffic controls at unsignalized study intersections. Traffic volumes at unsignalized intersections will be compared against Traffic Signal Warrant #3 – Peak Hour Volume Warrant in the 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD).

Per request from City staff, a traffic signalization assessment will be conducted for the intersection of Imperial Highway & Flower Avenue intersection based on section 4C.01 of the CA MUTCD. Kimley-Horn will collect 24-hour roadway counts at each approach and will factor collected volumes based on the same adjustment factor used for the turning movement counts.

Site Circulation and Access Evaluation

In addition to the queuing analysis, Kimley-Horn will evaluate other on-site operations such as vehicle, pedestrian, and bicycle access and circulation.

Please contact me if you have any questions or comments.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

Trevor Briggs, P.E.
Project Engineer

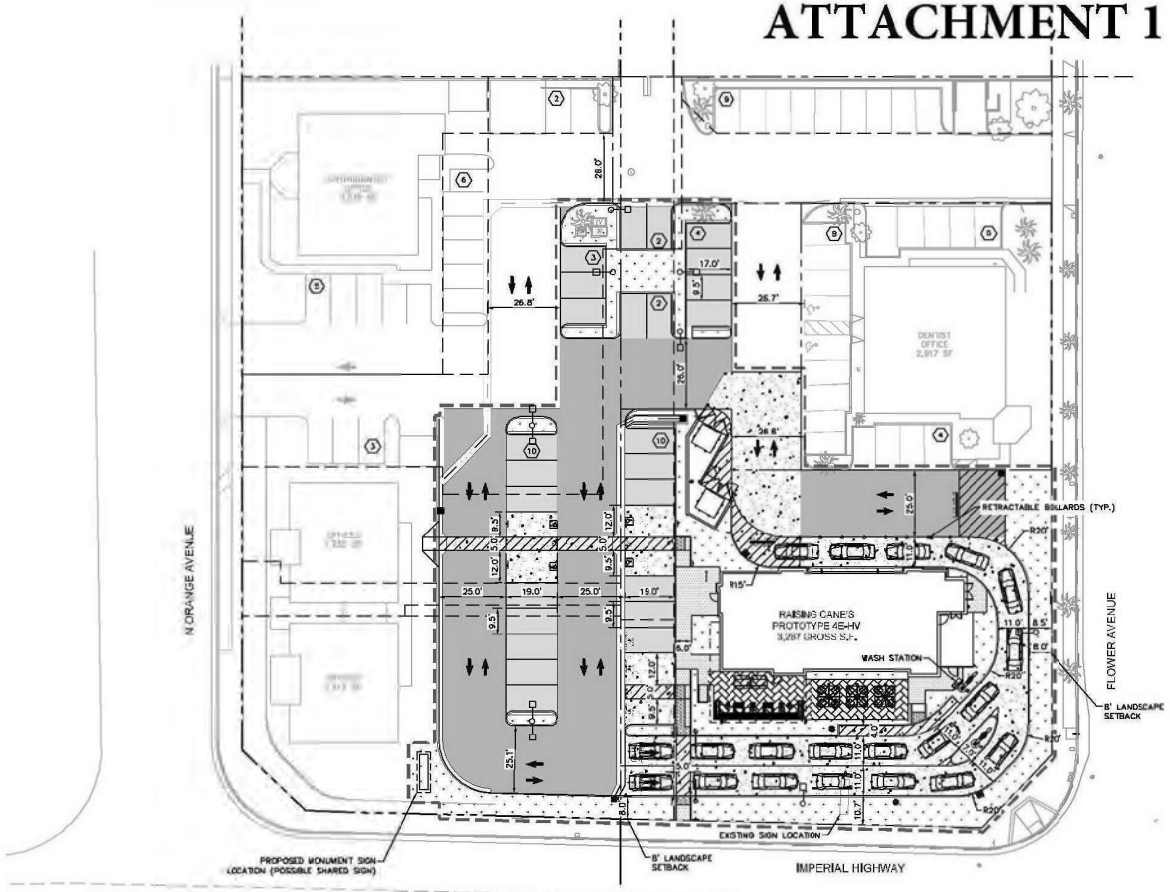
APPROVED:

By:

_____.

Paige Montojo
Associate Planner, City of Brea

ATTACHMENT 1



SITE DATA

ZONE: COMMERCIAL REGIONAL (CRL OVERLAY)

PARKING REQUIRED: 1 SPACE / 75 S.F. GROSS FLOOR AREA 3,267 S.F.) – (20.05.040-D) = 44 SPACES
COMPACT SPACES (20.05.040-C) – NOT MORE THAN 15% OF TOTAL SPACES

QUEUING REQUIRED: 160 LF (MIN) PER LANE, MEASURED FROM THE PICKUP WINDOW. – (20.05.040-D)

QUEUING PROVIDED: INSIDE LANE – 282 LF (DRIVE THRU ENTRANCE TO PICKUP WINDOW)
OUTSIDE LANE – 176 LF (DRIVE THRU ENTRANCE TO LANE MERGE)

PARKING TABLE:	RAISING CANE'S REQUIRED	PROVIDED
STANDARD	38	43
COMPACT (C)		
MOTORCYCLE	1	1
DESIGNATED EV CHARGING	2	2 (EV STALLS ARE ALSO DESIGNATED FOR VANPOOL) (REQUIREMENTS FOR EV-DESIGNATED STALLS ARE BASED ON PROPOSED RAISING CANE'S PARKING)
ACCESSIBLE	2	2
TOTAL:	44	55

CENTER PARKING REQUIRED:

USE PER BUILDING	PARKING REQ'D PER SEC. 20.05.040-D	PARKING REQ'D
OFFICE (1,448 SF*)	1 SPACE / 200 SF	14 SPACES
MEDICAL (2,540 SF*)	5.5 SPACES / 1000 SF	14 SPACES
MEDICAL (2,911 SF*)	5.5 SPACES / 1000 SF	16 SPACES
RAISING CANE'S (3,267 SF)	1 SPACE / 75 SF	44 SPACES
TOTAL		88 SPACES

* SQUARE FOOTAGE BASE ON AERIAL IMAGE

TOTAL CENTER PARKING PROVIDED:

EXISTING UNDISTURBED AREA PARKING SPACES:	39 SPACES
PROPOSED DISTURBED AREA PARKING SPACES:	35 SPACES
TOTAL:	74 SPACES

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40
WHEN PRINTED @ 24"X36"

K:\ORA_LDEV\Raising Cane's\094797086 - Brea (Imperial & Flower) 550\CADD\References\xOnSite-094797086.dwg Total Site Aug 04, 2020 12:26pm by: Nina Cor

Kimley»Horn
765 THE CITY DRIVE, SUITE 200 | ORANGE, CA 92868
PHONE: (714) 939-1030 | www.kimley-horn.com

TITLE:	SITE PLAN
PROJECT:	RAISING CANE'S RC550 – BREA
LOCATION:	255 IMPERIAL HWY BREA, CA
JOB NUMBER:	094797086
SCALE:	1" = 20'
DATE:	8/4/2020
SHEET:	1 OF 1

THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC. COPYRIGHT KIMLEY-HORN AND ASSOCIATES, INC., 2020

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ATTACHMENT 2
SUMMARY OF PROJECT TRIP GENERATION
BREA RAISING CANE'S

Land Use	ITE Code	Unit	Trip Generation Rates [1]						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Small Office Building	712	KSF	16.190	1.594	0.326	1.920	0.784	1.666	2.450
Fast-Food Restaurant w/ Drive-Through[2]	934	KSF	715.390	N/A [3]	N/A [3]	N/A [3]	26.281	24.259	50.540

Land Use	Quantity	Unit	Trip Generation Estimates						
			Daily	AM Peak Hour [3]			PM Peak Hour		
				In	Out	Total	In	Out	Total
EXISTING USE									
Small Office Building	9.588	KSF	155	15	3	18	8	16	24
PROPOSED USE									
Fast-Food Restaurant w/ Drive-Through	4.047	KSF	2,895	0	0	0	106	98	204
Pass-by Trips (35% Daily,35% PM)[4]			-1,013	0	0	0	-37	-34	-71
Total Net Trips for Proposed Conditions			**1,882**	**0**	**0**	**0**	**69**	**64**	**133**
Net Difference (Proposed Minus Existing)			**1,727**	**-15**	**-3**	**-18**	**61**	**48**	**109**

[1] Source: Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, Volume 2 (September 2017)
[2] Trip Generation rates is equal to average rate plus standard deviation to account for higher trip generation than typical land use.
[3] Raising Cane's (proposed use) is not open during the morning peak hour.
[4] Per City's guidance, a maximum pass-by reduction of 35% was assumed for the proposed project

Kimley»Horn

July 29, 2020

Ms. Paige Montojo
Associate Planner, City of Brea
1 Civic Center Circle
Brea, California 92821

RE: ***Scoping Letter Agreement for Focused Traffic Analysis for the Proposed Raising Cane's Project in the City of Brea***

Dear Ms. Montojo:

Kimley-Horn and Associates, Inc. is submitting this Scoping Letter Agreement to the City of Brea to provide a Focused Traffic Analysis for the proposed Raising Cane's Project in the City of Brea. The proposed Focused Traffic Analysis scope for the project is presented below.

PROJECT DESCRIPTION

The project site is located on the northwest corner of Flower Avenue at Imperial Highway in the City of Brea. The project site is located within the existing Brea Gaslight Square. The project site is currently occupied by two office buildings with an approximate combined total of 9,588 square feet. The project will involve demolition of the two existing office buildings and the construction of a 3,198-square-foot Raising Cane's restaurant building with drive-through. The operating hours for walk-in and drive-through service will be from 9:00 am to 1:00 am Sunday through Thursday and 9:00 am to 3:30 am Friday through Saturday. A copy of the project site plan, dated June 2, 2020, is provided on **Attachment 1**.

Vehicular access provisions for the project site would be provided via the one existing shared driveway on Flower Avenue and one shared driveway on Orange Avenue. Both existing driveways will continue to be full-movement driveways. All project driveways would be unsignalized.

SCOPE OF FOCUSED TRAFFIC ANALYSIS

This scope is based on comments from City staff on Plan Review No. PR-20-07.

Parking Study

Based on section 20.05.040-D of the City's Zoning Code, the Project is required to provide 43 parking stalls. However, the Raising Cane's site is proposing to provide 35 parking stalls. Since the Project is providing less parking spaces than required, the Project is requesting modification to the required parking standard. To justify this modification, a shared parking analysis will be conducted to demonstrate if shared parking with other uses within the Brea

Gaslight Square is adequate. The shared parking analysis will utilize methodology and assumptions from the Urban Land Institute (ULI) Shared Parking, 3rd Edition.

Drive-Through Queuing Analysis

A drive-through queuing analysis will be conducted for the proposed project, to evaluate the adequacy of the drive-through lane queuing capacity. The opening to the drive-through lane would be located at the southern edge of the project site and wraps along the east and north sides of the building. The drive-through would provide two side-by-side entry lanes and two order boards, which would allow Raising Cane's to take orders from two customers at the same time. After the order boards, the two lanes would merge back into a single drive-through lane prior to the pay and pick-up window. There will be approximately 350 feet of total queuing lane capacity (approximately 175 feet per lane) from the opening of the two drive-through lanes to the two order boards and approximately 90 feet from the order boards to the pick-up window. This would provide a total drive-through queue length of approximately 440 feet, for a drive-through queuing capacity of 20-22 vehicles, assuming 20-22 feet per vehicle, from the beginning of the drive-through lanes to the pick-up window.

Drive-through queuing will be compared to empirical data collected at three existing Raising Cane's restaurants during the weekday lunch (11am-2pm) and dinner periods (4pm-7pm). The City recommends collecting and comparing sites in La Habra, Orange, and Anaheim. However, the current disruption of novel coronavirus (COVID-19) pandemic have affect traffic patterns, which discourages collecting new data. Kimley-Horn proposes that the queuing analysis be compared with empirical data collected prior to March 2020 at the following sites:

- City of Orange: 2249 North Tustin Street
- City of Laguna Hills: 23971 El Toro Rd
- City of Riverside: 11066 Magnolia Ave

Additionally, the drive-through queuing capacity of the project site will also be analyzed using queuing analysis formulas published in the Institute of Transportation Engineers (ITE) Transportation Planning Handbook, 3rd Edition.

Level of Service Analysis

The City is also requesting that a Level of Service (LOS) analysis be conducted for adjacent intersections. However, based on trip generation estimates, the project impacts will be nominal and a trip generation analysis will be provided in lieu of a LOS analysis.

Trip generation estimates are based on the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition trip rates for Small Office Building (ITE Land Use 712) and Fast-food Restaurant with Drive-through (ITE Land Use 934). Pass-by reduction factors were applied to the proposed Raising Cane's based on the ITE Trip Generation Handbook, 3rd

Edition. The proposed Raising Cane's will not be open during the AM peak hour and no trips will be generated during that time period.

Trip generation rates and the resulting trip generation estimates for the proposed Raising Cane's project are summarized on **Attachment 2**. Based on the trip generation estimates, the Project is expected to generate 598 net new daily and 30 net new trips during the evening peak hour. The City of Brea does not have any trip threshold warranting a traffic analysis, but the County of Orange Congestion Management Program has a trip generation threshold of 2,400 daily trip, which the Project does not meet. Based on these factors, a LOS analysis is not required.

Please contact me if you have any questions, comments, or concerns.

Sincerely,

KIMLEY-HORN AND ASSOCIATES, INC.

Trevor Briggs, P.E.
Project Engineer

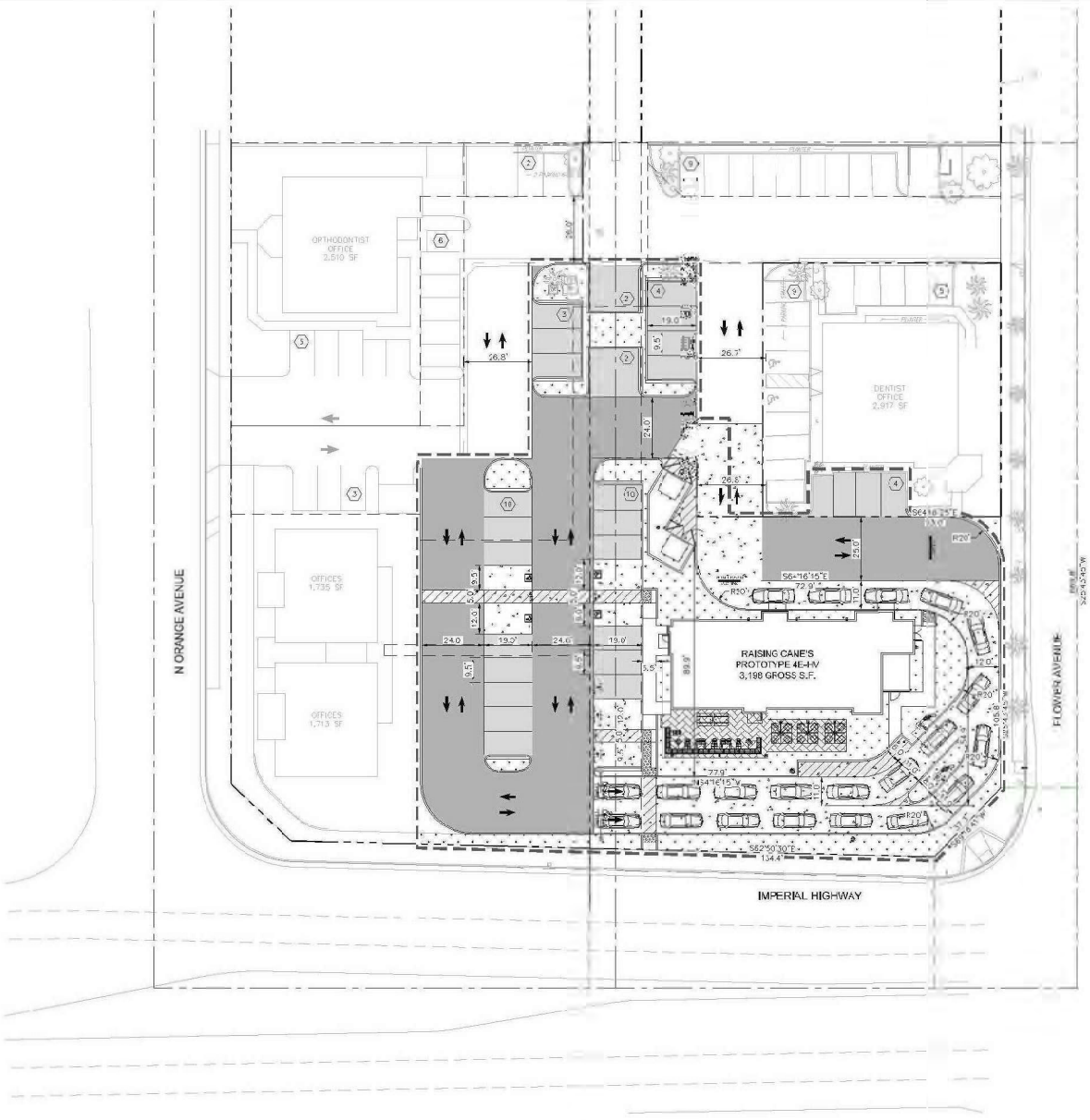
APPROVED:

By:

_____.

Paige Montojo
Associate Planner, City of Brea

RC0550 - BREA, CA
REVISED - 6/2/2020



ZONE: COMMERCIAL REGIONAL (CRL OVERLAY)

PARKING REQUIRED: 1 SPACE / 75 S.F. GROSS FLOOR AREA 3,198 S.F.) - (20.05.040-D) = 43 SPACES
COMPACT SPACES (20.05.040-C) - NOT MORE THAN 15% OF TOTAL SPACES

QUEUING REQUIRED: 160 LF (MIN) PER LANE, MEASURED FROM THE PICKUP WINDOW. - (20.05.040-D)

QUEUING PROVIDED: INSIDE LANE - 262 LF (DRIVE THRU ENTRANCE TO PICKUP WINDOW)
OUTSIDE LANE - 176 LF (DRIVE THRU ENTRANCE TO LANE MERGE)

PARKING TABLE:	RAISING CANE'S REQUIRED	PROVIDED
STANDARD	38	33
COMPACT (C)	1	3
MOTORCYCLE	1	1
DESIGNATED EV CHARGING	1	1
	2	2 (EV STALLS ARE ALSO DESIGNATED FOR VANPOOL) (REQUIREMENTS FOR EV/DESIGNATED STALLS APT BASED ON PROPOSED RAISING CANE'S PARKING)
ACCESSIBLE	2	2
TOTAL:	43	55

CENTER PARKING REQUIRED:

USE PER BUILDING	PARKING REQT PER SEC. 20.05.040-D	PARKING REQ'D
OFFICES (3,448 SF*)	1 SPACE / 250 SF	14 SPACES
MEDICAL (2,510 SF*)	5.5 SPACES / 1000 SF	14 SPACES
MEDICAL (2,917 SF*)	5.5 SPACES / 1000 SF	16 SPACES
RAISING CANE'S (3,198 SF)	1 SPACE / 75 SF	43 SPACES
TOTAL:		87 SPACES

* SQUARE FOOTAGE BASE ON AERIAL IMAGE

TOTAL CENTER PARKING PROVIDED:

EXISTING UNDISTURBED AREA PARKING SPACES:	39 SPACES
PROPOSED DISTURBED AREA PARKING SPACES:	35 SPACES
TOTAL:	74 SPACES

NORTH

GRAPHIC SCALE IN FEET
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WHEN PRINTED @ 24"X36"

Kimley»Horn

© 2020 KIMLEY-HORN AND ASSOCIATES, INC.
765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488

10465

ATTACHMENT 2
SUMMARY OF PROJECT TRIP GENERATION
BREA RAISING CANE'S

Land Use	ITE Code	Unit	Trip Generation Rates [1]						
			Daily	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Small Office Building	712	KSF	16.190	1.594	0.326	1.920	0.784	1.666	2.450
Fast-Food Restaurant w/ Drive-Through	934	KSF	470.950	N/A [2]	N/A [2]	N/A [2]	16.988	15.682	32.670

Land Use	Quantity	Unit	Trip Generation Estimates						
			Daily	AM Peak Hour [2]			PM Peak Hour		
				In	Out	Total	In	Out	Total
EXISTING USE									
Small Office Building	9.588	KSF	155	15	3	18	8	16	24
PROPOSED USE									
Fast-Food Restaurant w/ Drive-Through	3.198	KSF	1,506	0	0	0	54	50	104
Pass by Trips (50% Daily, 50% PM)[3]			-753	0	0	0	-27	-25	-52
Total Net Trips for Proposed Conditions			**753**	**0**	**0**	**0**	**27**	**25**	**52**
Net Difference (Proposed Minus Existing)			**598**	**-15**	**-3**	**-18**	**19**	**9**	**28**

[1] Source: Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition, Volume 2 (September 2017)
[2] Raising Cane's (proposed use) is not open during the morning peak hour.
[3] ITE Trip Generation Manual does not have a daily pass-by percentages, therefore the pass-by percentage for the PM peak hour was assumed.

From: martha degidio
To: Planning; City ClerksGroup
Subject: Opposition to the city"s recommendation of Raising Cane drive thru
Date: Monday, January 25, 2021 9:55:53 AM

Committee- Think About the Children's Safety

The commission is planning on building a Raising Cane's drive thru on Flower Street and Imperial Highway. This is a poor and dangerous proposal for our children and residents. The commission needs to understand that **Laurel Elementary** is also located at the corner of **Flower and Imperial.**

I live on Flower Street in front of Laurel Elementary School.
During the school year, it's difficult to come home for lunch due
To the backed up traffic on Imperial Highway and Flower Street.
The school's pick up zone is located in front of the school on Laurel and this causes an enormous traffic jam on the corner of Imperial and Flower. At times I have found this to be very dangerous for the children and myself as I try to make my way out thru Flower Street.

Please reconsider your proposal as this will add more unwanted traffic and congestion on Flower and Imperial during peak hours.

I am not opposed to the construction of Raising Cane's drive thru- only the location- please find a different location for the project.

Thank you,

Martha Degidio
Proud Brea Resident

From: Nicole Higashi
To: City ClerksGroup
Subject: Please help our kids - my reasons for opposing the proposed Raising Cane"s Drive-Thru
Date: Monday, February 1, 2021 7:47:45 AM

Dear Members of the Brea City Council,

My name is Nicole Higashi (979 Baxter Pwky, Brea) & I am writing in the hopes that you will help us to keep our children and the neighborhood surrounding Laurel Magnet School safe.

I strongly oppose the building of a Raising Canes restaurant/the project proposed at 255 E Imperial Hwy. Having an extremely popular Drive-thru restaurant at this location would most definitely pose a threat to the safety of the students, faculty, staff (& families walking children to and from even just the parking lot at the church across the street from Birch St.) & general welfare of the kids and neighbors. We chose to send our daughter to Laurel Magnet School because of its incredible program and staff. Everything has been beyond AMAZING at school, but the lack of caution from drivers on Flower Ave, on top of the scary backup and near-collision-misses at our drop off & pick up line (from Imperial Hwy) is already frightening. To add to these already overwhelmed streets is incredibly irresponsible.

On top of that, it's befuddling to me that all of the work, investment & care put into developing and opening the first magnet school in Brea is also being overlooked. As an open campus, who will keep the classrooms and grounds safe from late night/early morning patrons of the fast food restaurant?

I've learned a bit more about the 1988 CUP that was put in place in this area. And, I'm truly perplexed and wondering how our city knew to protect this space over 30 years ago - and yet now, with a huge increase in residency and traffic in Brea, it would seem at all probable to overturn this...

Lastly, our post-pandemic world and the nature of in-person offices is looking so much different now. As a small business owner, I am seeing executive suites and small locations getting scooped up off of the rental listings by businesses who are downsizing and seeking alternative work options for their employees that will last beyond the shut downs. I truly believe that if Gaslight was maintained properly, it would be filled with local businesses in no time. Could you consider how the intended use of this area could support the community AND keep the children of Laurel and neighbors safe?

Please, please, please put a stop to this. There has got to be a better location for this restaurant to be opened in Brea.

Many thanks in advance for reading & your assistance.

Best wishes always,
Nicole Higashi

From: Burdett Family
To: City ClerksGroup
Subject: Please vote no for Raising Cane"s next to Laurel
Date: Sunday, January 31, 2021 6:59:41 PM

My children attend Laurel and my family and I are absolutely against a Raising Cane's going across the street from Laurel Magnet School (and so is everyone else I talk to!). Laurel is already in such a high traffic area, we do not need to add to the problem. At school pickup, the drive-up line wraps around the corner and onto Imperial. This already is dangerous as cars crowd the unmanned crosswalk (while children are crossing!) at Flower and Imperial. If you have ever been in this line you know the constant fear of being rear ended, all the honking that occurs and the semi trucks trying to maneuver around the line. Add all the additional traffic a Drive Thru would bring, plus distracted drivers trying to check their order and eat while driving and this is a tragedy waiting to happen. Please protect the children of Brea, you do not want an avoidable death or injury on your conscience. I know I still remember the child who was killed crossing Birch street near Laurel Elementary years ago.

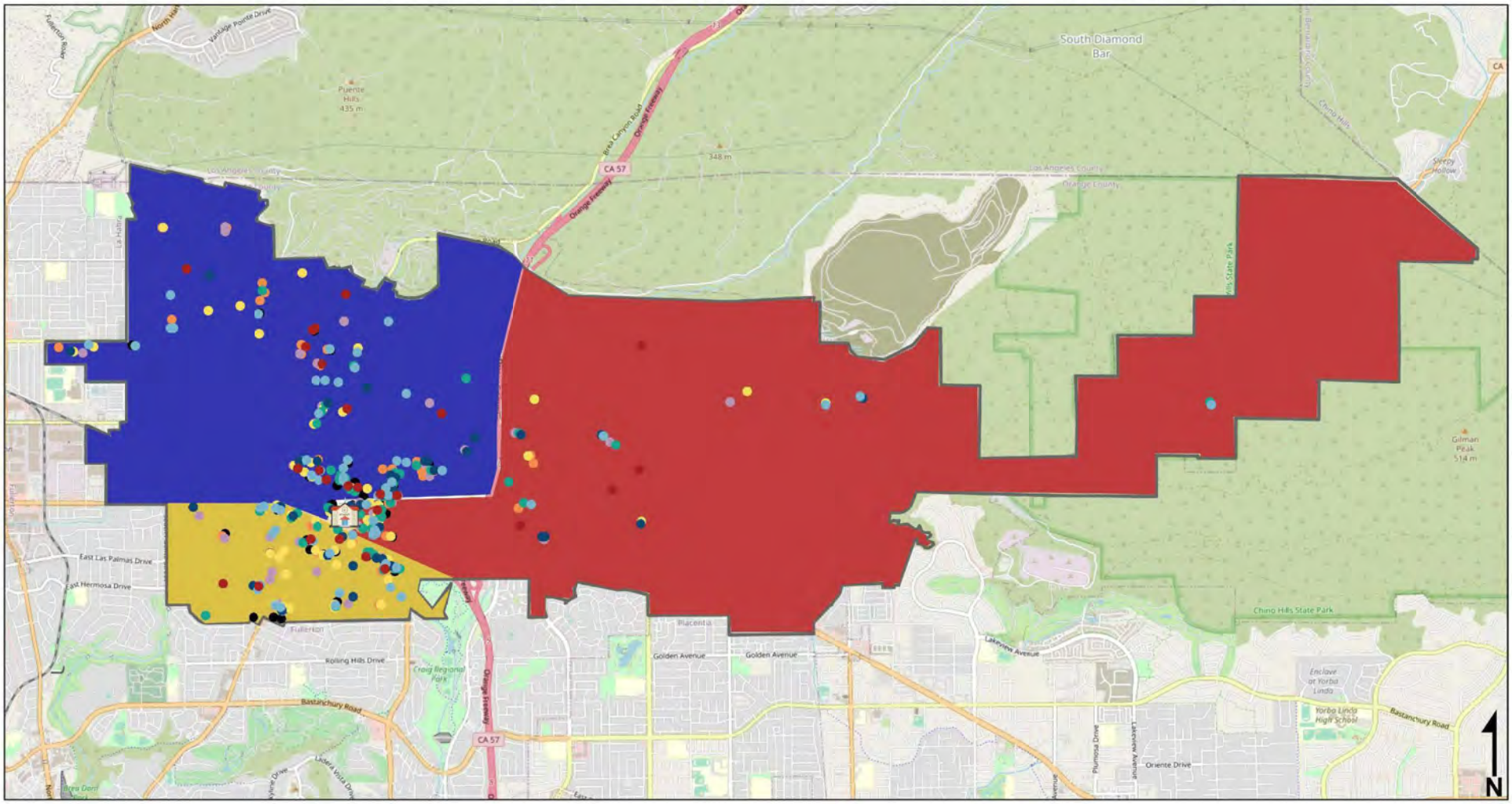
I participated in a study at the Civic Center to improve the walkability of Brea in the summer of 2019. The city spent a lot of money and also had multiple pop-ups getting input from people to increase walkability and pedestrian safety. It really seemed Brea was trying to encourage people to get out and walk after the huge investment of The Tracks. Why would you make Brea less walkable, especially for children, by adding in this high volume drive thru next to an elementary school?

Thank you,

Mandy Burdett

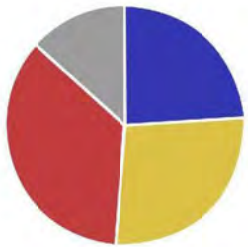
Laurel Elementary School Student Residency Exhibit A

ATTACHMENT C



City Boundary
Parcels
Laurel Elementary

Pre-Kindergarten
Kindergarten
1st Grade
2nd Grade
3rd Grade
4th Grade
5th Grade
6th Grade



- 103 (24%)Students North of Imperial Hwy
- 117 (27%) Students South of Imperial Hwy
- 152 (35%) Students East of Flower Ave
- 57 (13%) Students Live Outside the City of Brea

0 0.47 0.95 1.9 mi
0 0.75 1.5 3 km

CITY of BREA

BREA PUBLIC WORKS

MEMORANDUM

TO: **Cecilia Madrigal-Gonzalez, Assistant Planner**

FROM: Ryan Chapman, PE, Principal Engineer

DATE: March 23, 2022

SUBJECT: **255 E. Imperial Highway (PLN-2022-00011)**
1st Review Comments – Public Works

The Public Works Department has reviewed the 1st Review Submittal for the proposed project at 255 E. Imperial Hwy., and has comments as noted below. Please note that additional comments may be provided upon review of subsequent submittal documents and technical studies. **Please have the applicant provide a comment response upon re-submittal.**

1) Upon resubmittal, the Applicant shall submit a preliminary drainage study for review by City staff. Said study shall meet all City of Brea Master Plan of Drainage and Orange County Hydrology Manual criteria, and demonstrate that the down-stream City storm drain infrastructure has the capacity to carry the drainage flows generated from the proposed development.

2) Upon resubmittal, the Applicant shall submit a preliminary sewer capacity analysis for review by City staff. Said analysis shall meet all design criteria as noted in the City Sewer Master Plan, and demonstrate that the down-stream City sanitary sewer infrastructure has the capacity to carry sanitary sewer flows generated from the proposed development. The provided analysis shall identify the both PWWF and PDWF, and identify the existing and proposed (d/D) for the downstream public sanitary sewer system.

3) Upon resubmittal, the Applicant shall submit a Preliminary Water Quality Management Plan (P-WQMP) for City staff review and approval.

4) Upon resubmittal, provide a geotechnical report that identifies both the infiltration rates for the site and the groundwater elevation at the site. Note that the infiltration testing is to be located in the vicinity of the proposed infiltration BMPs.

5) Upon resubmittal, provide a truck turning exhibit that showcases how trucks will enter and exit the site from Orange Ave and/or Flower Ave, and how they are proposed to maneuver through the site to serve the 3 proposed uses.

6) Upon resubmittal, the Applicant shall provide an ALTA/NSPS Survey that showcases the existing parcel/lot boundaries and all easements affecting the proposed development property limits.

7) Upon resubmittal, clarify the existing and proposed parcel ownership for both the eastern and western parcels of the development. A lot line adjustment or parcel map may be required to clearly delineate operations and maintenance between the two property owners and to adjust easements on the site.

8) All Sheets – Upon resubmittal, correct the linetypes that are shown to clearly showcase the existing and proposed property boundaries for the site. In addition, identify all linework intended to be used for landscape/building setbacks. As shown there appears to be linework for this along Flower and Imperial Highway. In addition, identify the purpose of the linework shown in what appears to be easement linetype at the intersections of Orange & Imperial and Flower & Imperial.

9) Sheet C1.0 – At the northern property limit, adjacent to the existing alley, remove the callout for keynote #25, as this is not a location for an existing or proposed driveway approach.

10) Sheet C1.0 – At the northern property limit, adjacent to the existing alley, remove the proposed curb and gutter/landscaping that is proposed in this area, in favor of additional proposed bollards.

11) Sheet C1.0 – As shown on plan, keynote #25 is calling for reconstruction of the existing driveways to the development off of Flower Ave and Orange Ave. Showcase the proposed configuration of each driveway demonstrating a minimum curb return radius of 15', and identifying any utility relocations that may need to take place on account of the driveway reconstruction.

12) Sheet C1.0 – Upon resubmittal, provide dimensions for all existing/proposed drive aisles, access ways, and driveways.

13) Sheet C1.0 – Clarify the location where keynote "K" is used on the plan. This item as provided does not appear to be located on the plan.

14) Sheet C3.1 – Provide invert elevations for the proposed storm drain infrastructure, including all BMP and detention structures, to demonstrate positive flow towards the public right-of-way.

15) Sheet C3.1 – Clearly identify the invert and flowline elevations and the beginning and end of the existing/proposed parkway drain outfalls on Flower Avenue and on Orange Avenue. Note the provided plan should demonstrate positive flow towards the street flowline.

16) Sheet C3.1 – The proposed drainage outfall design results in the ponding of on-site drive aisle facilities in order to discharge through parkway drains ultimately to the flowline in the public right-of-way. Revise the design to disconnect the proposed ponding/bubbling inlet discharge from the parkway drain system. In the case that the proposed development cannot flow under gravity to the street storm drain infrastructure, a pump with a separate velocity reducing manhole shall be incorporated prior to discharging through the existing/proposed parkway drains.

17) Sheet C3.1 – Correct Keynote 11 to callout the correct page number for the underground storage vault details.

18) Sheet C3.1 – Correct Keynote 9 to callout the correct page number for the reference detail that is being described.

19) Sheet C3.1 – Correct Keynote 10 to callout the correct page number for the reference detail that is being described.

20) Sheet C3.1 – Keynote 6 identifies a trash enclosure drain for the enclosure for the drive-thru use. Provide this drain and connectivity to the proposed sanitary sewer system for the trash enclosure serving the western portion of the site.

21) Sheet C3.1 – Provide additional grading details around the proposed westerly building, identifying how the hardscape around the building is intended to drain and how this drainage ties into the proposed storm drain system. As shown, the contours showcase the hardscape/landscape to the south and west of the proposed westerly building sheet flowing over the adjacent sidewalk. This is area is to be captured by the proposed storm drain system prior to discharging to the public right-of-way.

22) Sheet C4.1 – Upon resubmittal, clarify why the proposed trash enclosure is not located adjacent, or in the proximity of, the proposed restaurant use at the intersection of Orange & Imperial. In addition, provide a separate sewer connection for both proposed trash enclosures.

23) Sheet C4.1 – As shown on plan, two separate easements (associated with title report exceptions 7 & 9) are shown as overlapping with the proposed western building unit. Upon resubmittal, clarify if these easements are to be removed or relocated to facilitate the development, clearly calling this out on plan.

24) Sheet C4.1 – Provide invert elevations on the proposed sanitary sewer system to demonstrate positive flow towards the public sewer infrastructure.

25) Sheet C4.1 – Clearly showcase the connection of the trash enclosure drains to the proposed sanitary sewer system for each trash enclosure. Note that the trash enclosure for the western side of the proposed development shall also have a drain and sewer connection.

26) Sheet C4.1 – At the north end of the site, approximately 25’ south of the existing alley terminus, there is a proposed sanitary sewer manhole shown. Provide a callout to identify what is being proposed. Note, if this is a proposed sewer manhole, relocate this structure to the north of the property line for ease of maintenance in the public right-of-way.

27) Sheet C4.1 – Label the size of the existing public sanitary sewer that is proposed to be connected to on the plan, located within the existing 20’ easement.

28) Sheet C4.1 – Label the size of the all existing waterlines that are proposed to be connected to located within the public right-of-way. Note that the plan is showcasing two existing waterlines within Flower Ave. Please verify/revise this configuration upon submittal.

29) Sheet C4.1 – For both the eastern and western proposed irrigation systems, revise the point of connection to be at the back of the existing irrigation meter.

30) Sheet L1.0 – The plan is currently showcasing proposed Arbutus trees adjacent to the public right-of-way. Upon resubmittal, the applicant shall remove these trees in all areas adjacent to the public right-of-way, and replace with another tree species that does not require increased maintenance and sidewalk cleaning.

31) Conceptual WQMP Plan – The contours on this plan, more clearly defined on Sheet C3.1, showcase the hardscape/landscape to the south and west of the proposed westerly building sheet flowing over the adjacent sidewalk. This area is to be captured by the proposed storm drain system prior to discharging to the public right-of-way.

32) Conceptual WQMP Plan – Adjust the proposed map, and all subsequent calculations, to account for the portion of the existing alley-way to the north that drains through the proposed development and ultimately outfalls through DMA #3.

33) Conceptual WQMP Plan & Detail Sheets – Remove these sheets from the provided plan set, and incorporate into the P-WQMP to be provided upon resubmittal.

34) Based upon City review, a VMT analysis is not required since the project screens out of having any VMT impacts. The applicant is to retain a Traffic Engineering firm to conduct a Transportation & Circulation Study including an LOS analysis of the proposed project in accordance with the City of Brea Transportation Impact Analysis Guidelines. The applicants Traffic Engineering Firm is to coordinate on the scope of work for the study effort with the City Traffic Engineer.

    a. The Transportation & Circulation Study is to review the intersection of Imperial Highway and Flower Avenue for operational & safety measures such as (a) signalization, (b) eliminating southbound left-turns, and (c) providing a westbound deceleration and right-turn lane.

    b. The Transportation & Circulation Study is to provide a queuing analysis for the drive through based on the anticipated occupant for the drive through restaurant space. The proposed project should not result in any queueing on the public right-of-way and within the school zone at any time.

    c. The Transportation & Circulation Study is to address traffic and parking operations for the proposed project during the arrival and dismissal periods for Laurel Elementary School.

35) On-street parking is not readily available near the site; therefore, the proposed project should be designed to accommodate all generated parking demand on site.

36) Consideration should be given to reconfiguring the northbound one-way drive isle adjacent to the western site driveway to be a one-way southbound. Furthermore, the “DO NOT ENTER” pavement markings are shown improperly, and all one-way drive isles are to be signed as such.

37) Upon resubmittal, all parking spaces and internal drive isles shall be clearly dimensioned.

38) Additional traffic related comments may be forthcoming based on the findings and recommendations from the Transportation & Circulation Study.

Comment Response Letter – 1st Entitlement Submittal Comments

To: City of Brea Planning Department

From: John Pollock, P.E.

Kimley-Horn and Associates, Inc.

Date: 05/04/2022

Subject: Comment Response Letter for Brea Gaslight Square 1st Submittal

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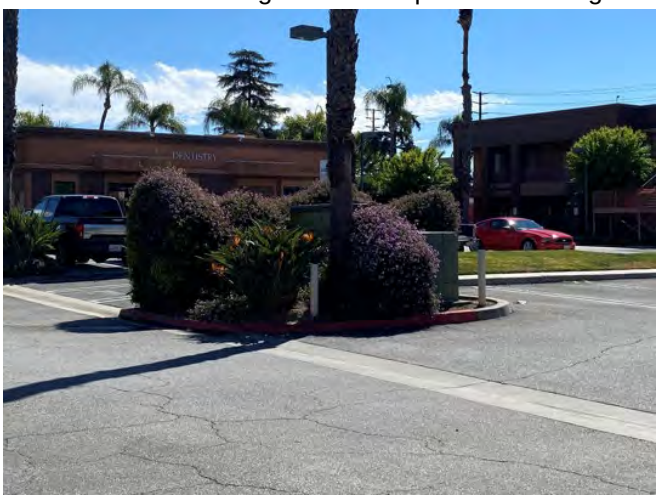
Comment responses as follows:

Community Development – Planning Division Comments Responses

1. General Comment:
    - KHA Response: Noted
2. Initial Study
    - KHA Response – Noted, an EIR has been authorized per coordination with Staff. No Initial Study will be conducted for this project.
3. Revised Project Description: Project description has been revised and provided with this resubmittal
4. Site Plan Configuration: Per coordination with Staff, the proposed buildings and uses will remain as originally shown and will not be swapped.
5. Consideration of Mixed-Use General Plan and Zoning:
    - Preliminary Site Plan updated to show “Mixed Use III” instead of “Residential” in SITE DATA. Package has been fully revised to reflect the Mixed Use III zoning.
6. General Plan:
    - See revised project description
7. Zone Change:
    - See revised project description
8. Color and Material: Physical color material board has been provided.
9. Elevations:
    - Applicant has elected to resubmit elevations as previously shown noting that the design as presented provides a much more modern feel and an enhancement to the existing center. Further discussion with Staff to be had as needed.
10. Parking:
    - Off-Street Parking table is found on sheet C2.1 with correct required and proposed parking counts.
11. Circulation Plan:
    - A truck turn exhibit has been added to the plans, showing the vehicle circulation pattern for the drive-through as well as the delivery truck circulation

12. Construction Plan: Will be provided at a later date once timing of lease and tenants is understood.
13. Landscape:
    - Part a:
        i. KHA Response: Net site area has been added to the plans.
        ii. KHA Response: The 8-foot-wide landscape area has been dimensioned on the plans.
        iii. KHA Response: Property line dimensions have been added to the plans.
        iv. KHA Response: The 8-foot-wide landscape area has been dimensioned on the plans.
        v. KHA Response: The revised plans provide a 5' wide landscape area around the perimeter of all buildings and structures.
        vi. KHA Response: The revised plans show a 5' wide landscape area, running adjacent to interior drive aisle. Landscape areas of at least 5' have been provided in areas that do not interfere with designed drive aisles and other site features. If additional landscape areas are required, please mark on plans for clarity.
        vii. KHA Response: All parking spaces and have been screened with an evergreen hedge. Spacing of the hedge has been reduced to ensure 75% opacity within 18 months after installation.
14. Photometric Plan: photometric plan has been provided with resubmittal.
15. Signage:
    - Concept signage and monument sign has been presented with the revised package. Note that an amendment to the sign program will be pursued once the tenants are identified for the site.
16. Corner Cut-Off Areas:
    - Corner cut off areas as described have been added to C1.0 preliminary site plan.
17. Specific Site/Floor Plan Comments:
    - Part a:
        i. Separate existing and proposed site plans have been made.
        ii. Line weights were revised and overlapping lines were removed to clearly show lot lines, building footprints, and other improvements.
        iii. Existing square footage of the four buildings being demolished can be found in the new Existing Site Plan, in the SITE DATA section.
    - Part b:
        i. Title Report Exceptions were removed from sheet C1.0.
        ii. Heavy duty asphalt pavement color, detectable warning system, and standard duty concrete have all been removed from the Legend on Sheet C1.0.
    - Part c:
        i. List of required entitlements have been added to Sheet C1.0.
        ii. Zoning Conformance Table has been added to Sheet C1.0.
        iii. Distance between buildings have been added to Sheet C1.0.

- Part d:
    i. Additional information for short term and long-term bike racks have been added to construction notes #13 and #14.
- Part e:
    i. Note 24 has been changed from “RETRACTABLE BOLLARDS” to “PROPOSED BOLLARDS”. The bollards are intended to be permanent.
- Part f:
    i. Transformer is existing and has required screening. Picture below:



- Part g:
    i. Square footage of the outdoor patio for both proposed restaurants has been added next to the respective construction note on plan.
- Part h:
    i. Sheet 2.0 was revised from “PRELIMINARY PARKING PLAN” to “EXISTING PARKING PLAN”
- Part i:
    i. Sheet 2.1 was revised from “PRELIMINARY PARKING PLAN” to “PROPOSED PARKING PLAN”
- Part j:
    i. Sheet C2.1 parking plans revised to show corrected parking space counts in the section that says “PARKING REQUIRED AFTER QUEUE CREDIT”, instead of 104. Note that some of the existing square footages for the existing buildings were updated to reflect the property CC&Rs for consistency in previously approved parking counts and square footages.
- Part k:
    i. Table on Sheet C2.1 have been fixed per comment #10.
- Part l:
    i. All “Land Area Acres” and “Zone” columns have been removed from all tables on Sheet C2.1.

- Part m: CMU wall has been added to construction note 7.
- Part n: All drive aisles and parking dimensions have been indicated on sheet C2.1.

18. Comment has been noted.

Public Works – Engineering Division Comments Responses

19. Preliminary Drainage Study
    - Included in this submittal.
20. Preliminary Sewer Capacity Analysis
    - Included in this submittal.
21. P-WQMP
    - Included in this submittal.
22. Geotechnical Report
    - Included in this submittal.
23. Truck Turn Exhibit:
    - Truck turn exhibit has been added to plans showcasing how the truck will enter and exit from Orange Ave and/or Flower Ave for the proposed 3 uses.
24. ALTA/NSPS Survey
    - Included in this submittal.
25. Parcel Ownerships and Lot Line Adjustment
    - Ownership is shown on the parking plans (C2.0, C2.1) and added to C1.0.
        i. Northwest lot – 230 South Orange LLC
        ii. Northweast lot – Christen John B TR
    - A lot line adjustment is not required as there are no impacts to the improvements or encroachments on the existing lots.
26. Correct Line Types:
    - Line types should be clearly shown. Originally overlapping was shown. This time the problem should be fixed and all lines are clearly labeled.
27. Keynote:
    - Keynote #25 at the northern property limit, adjacent to the existing alley, has been removed.
28. Proposed curb/gutter:
    - Proposed curb and gutter/landscaping at the northern property limit has been removed. With the exception of proposed parking and proposed bollards. Two additional bollards have been included as well.
29. Proposed driveway:
    - Reconstruction of driveways with 15’ curb return are now shown on plans.
30. Dimensions:
    - Dimensions for existing/proposed drive aisles, access ways, and driveways have been included.
31. Keynote:
    - Location of use for keynote K is specified in the notes. K is located at the exit of the restaurant drive through.

32. Invert Elevations:
    - Invert elevations have been included in this submittal. Positive flow proposed toward public right away.
33. Invert and flowline elevations:
    - Invert elevations have been included in this submittal for the two parkway drains to show positive drainage.
34. Proposed redesign of drainage outfall.
    - Water quality storm event fills BMPs. Storm events larger than the water quality design storm event fills the BMPs and subsequently backs up to either the catch basin closest to Flower Avenue or catch basin closest to Orange Avenue. Stormwater then parkway drains towards either of the respective streets and into the public storm drain system, matching existing drainage patterns. The proposed parkway design matches the existing drainage parkway drain system. The on-site ponding would be minimal and only occur when the water quality BMPs fill up and the water quality event is exceeded. Design has been previously approved by the City of Brea and remains as proposed.
35. Keynote 11:
    - Keynote 11, page callout, has been changed from C3.2 to C3.3.
36. Keynote 9:
    - Keynote 9, page callout, has been changed from C3.1 to C3.2.
37. Keynote 10:
    - Keynote 10, page callout, has been changed from C3.1 to C3.2.
38. Keynote 6:
    - Keynote 6 now has “See Sheet 4.1 for more information”.
39. Grading Details:
    - Additional details added to westerly building to verify that stormwater drains away from the building and to the proposed onsite stormwater system. Stormwater on the west and south faces of the westerly building will drain to various landscape area drains. The stormwater is then conveyed by pipe to the onsite stormwater BMPs.
40. Trash Enclosures
    - The trash enclosure is in proximity of the restaurant at the intersection of Orange and Imperial so as not to disturb the drive thru traffic and flow of traffic throughout the plaza. A proposed path of travel is designed between the restaurant and the trash enclosure.
41. Easements:
    - Applicant is coordinating with SCE to resolve easement.
42. Invert Elevations:
    - Invert elevations have been provided to demonstrate positive sewage flow towards the public sewer infrastructure.
43. Trash Enclosure Drains:
    - Connection of the trash enclosure drain to the proposed sanitary sewer system for the trash enclosure has been included. The secondary trash enclosure north west of the site is not included in the scope of this project.

44. Sanitary Sewer Manhole Callout:
    - Proposed sanitary sewer relocated to north of property. Manhole included in proposed sewer design because the existing sanitary sewer line does not have a sewer manhole within 350' of the existing manhole south of the site.
45. Public Sanitary Sewer:
    - Label added to Exhibit C4.1.
46. Existing Waterlines:
    - Labels added to Exhibit C4.1.
47. Irrigations Systems:
    - Proposed connections optimize water line pressure to building, reducing pressure losses by reducing quantity of bends in system.
48. Tree Removal:
    - KHA Response: *Arbutus marina* has been replaced with *Koelreuteria paniculata*.
49. Conceptual WQMP Plan:
    - Stormwater on the west and south faces of the westerly building will drain to various landscape area drains. The stormwater is then conveyed by pipe to the onsite stormwater BMPs rather than public right-of-way.
50. Conceptual WQMP Plan:
    - WQMP BMP's do not include treatment for offsite flows. Rather, drainage report has been updated to account for all off-site run-on and on-site drainage, including the alley north of the site.
51. Conceptual WQMP Plan and Detail Sheet:
    - Sheets removed and incorporated into the P-WQMP
52. VMT Analysis
    - An EIR is being conducted for this project through a third party consultant with the City. All Traffic related items will be analyzed and addressed as a part of the EIR.
53. On-Street Parking:
    - A public parking garage is available for public use adjacent to the site off of Orange Avenue less than 400 feet from the proposed development. Per Brea City Code Section 20.08.040(B)(2)(a): Where a parking lot owned by the city is located within four hundred (400) feet of the front door or main entry of the building the required parking can be reduced.
54. One-Way Drive Aisle:
    - Circulation remains as previously shown. If the circulation is reversed and there is no available parking to the north of the building, then a dead end situation would be created causing traffic issues. The traffic flow as shown allows vehicles to have full movement should there be no parking available. Do Not Enter markings have been replaced with one way as requested.
55. Parking and Drive Isle Dimensions:
    - All parking spaces and internal drive isles are now clearly dimensioned.
56. Additional Traffic Related Comments
    - Traffic study will be included as part of the CEQA process

Fire Department- Comments Responses

57. Fire Master Plan
    - Noted, prior to permits a Fire Master Plan will be submitted to the Fire Department for review and approval.

Building and Safety – Community Development Department Comments Responses

58. Code Compliance
    - Noted
59. Accessible Path of Travel Between Buildings:
    - Accessible path of travel was included before, but not clearly shown. Path of travel between buildings are now indicated with ADA line.
60. Accessible Path of Travel to Trash Enclosures:
    - ADA path of travel from drive through restaurant to trash enclosures is now seen on the plans, located easterly of building.
61. Dimensions for Passenger Vehicle:
    - Dimensions for passenger vehicle are found in separate truck turn exhibit. See sheet C5.0 for details.
62. Restaurant A Patio Enclosure:
63. Restaurant B Patio Enclosure:
64. Geotechnical Soils Report:
    - A geotechnical report has been provided with this resubmittal
65. Electronic Permit and Plan Submittal:
    - This comment has been noted.
66. Future Comments:
    - This comment has been noted.

Police Department Comments Responses

67. Operations Plan:
    - This comment has been noted.
68. Adequate Parking:
    - A public parking garage is available for public use adjacent to the site off of Orange Avenue less than 400 feet from the proposed development. Per Brea City Code Section 20.08.040(B)(2)(a): Where a parking lot owned by the city is located within four hundred (400) feet of the front door or main entry of the building the required parking can be reduced.
69. Traffic Plan:
    - The Alley is proposed to be closed off to through traffic with this development. Therefore, cut through traffic to Birch Street is not anticipated to be an issue.

Art's in Public Places – Community Department Comment Responses

70. Lamplighter Sculpture:
    - The Lamplighter sculpture will not be impacted by the improvements and the current location of the sculpture has been specified on the plans. See Sheet C1.0 for more information.

RE: 2023 New Traffic Study - in/around Laurel Elementary Magnet School?

From: Killebrew, Jason (jasonk@ci.brea.ca.us)

To: dianestites@sbcglobal.net; planner@ci.brea.ca.us; ryanch@ci.brea.ca.us; cityclerksgroup@ci.brea.ca.us

Date: Thursday, March 2, 2023, 07:22 PM CST

Hi Diane,

Please see my responses to you questions directly in your email below. Please let me know if you have any questions.

Jason

JASON KILLEBREW

Community Development Director
Community Development Department

P: 714.990.7758 | **E:** jasonk@cityofbrea.net | **W:** www.cityofbrea.net

City of Brea | 1 Civic Center Circle | Brea, California 92821

From: Diane Stites <dianestites@sbcglobal.net>
Sent: Thursday, March 2, 2023 5:14 PM
To: Brea Planning <planner@ci.brea.ca.us>; Chapman, Ryan <ryanch@ci.brea.ca.us>; City ClerksGroup <CityClerksGroup@ci.brea.ca.us>; Killebrew, Jason <jasonk@ci.brea.ca.us>
Subject: Re: 2023 New Traffic Study - in/around Laurel Elementary Magnet School?

Hi again Jason,

Thanks for this information about the VMT screening analysis as well as the City of Brea Traffic Analysis that is outside of CEQA that's in draft form and under review. I do have a couple of follow-up questions and would again appreciate help:

1. Could you please tell me why the City of Brea did the o/s of CEQA Traffic Analysis? No response to this question. However, this document will be included as part of staff's analysis

when making a recommendation to the Planning Commission/City Council for consideration.

2. Also I understand that it is in draft form; still we are interested in receiving any and all documents related to the is this traffic analysis. Could you provide me with any additional details? Staff's draft documents are not subject to public review. Once the document is in a final form, it will be released and available for public review.

Thanks,
Diane

On Thursday, March 2, 2023, 03:35:28 PM PST, Killebrew, Jason <jasonk@ci.brea.ca.us> wrote:

Hi Diane,

As you are aware the City of Brea conducted a VMT screening analysis, consistent with SB743 and CEQA, for the Gaslight Square project which is included in the Draft EIR. The results of this analysis concluded in the EIR that the project, by definition, would have no probable VMT impact. Outside of CEQA, the City has prepared a Traffic Analysis that is currently in draft form and under review. The scope of this Traffic Analysis for the Gaslight Square project does include an evaluation of circulation in and around the project site including: Imperial Hwy (SR-90), Flower Avenue, and Orange Avenue. So to answer your questions, yes, a traffic study in the area of Laurel Elementary Magnet School has been conducted. Please let me know if you have any follow-up questions.

Jason

JASON KILLEBREW

Community Development Director

Community Development Department

P: 714.990.7758 | **E:** jasonk@cityofbrea.net | **W:** www.cityofbrea.net

City of Brea | 1 Civic Center Circle | Brea, California 92821

From: Diane Stites <dianestites@sbcglobal.net>
Sent: Thursday, March 2, 2023 12:46 PM
To: Brea Planning <planner@ci.brea.ca.us>; Chapman, Ryan <ryanch@ci.brea.ca.us>; City ClerksGroup <CityClerksGroup@ci.brea.ca.us>; Killebrew, Jason <jasonk@ci.brea.ca.us>
Subject: Re: 2023 New Traffic Study - in/around Laurel Elementary Magnet School?

Hi Jason,

Thank you for asking. To clarify, this is something I heard and would like verification and details, if any.

So, I would like answers to both and anything beyond: Has the City of Brea conducted any type traffic study on any of the streets near Laurel beginning of 2023/end of 2022?

Diane

On Thursday, March 2, 2023, 12:04:11 PM PST, Killebrew, Jason <jasonk@ci.brea.ca.us> wrote:

Hi Diane,

Can you please clarify your request? Are you referring to the City/BOUSD Traffic effort or the Gaslight Square Project Traffic effort? Thanks!

Jason

JASON KILLEBREW

Community Development Director

Community Development Department

P: 714.990.7758 | **E:** jasonk@cityofbrea.net | **W:** www.cityofbrea.net

City of Brea | 1 Civic Center Circle | Brea, California 92821

From: Diane Stites <dianestites@sbcglobal.net>
Sent: Thursday, March 2, 2023 11:52 AM

To: Brea Planning <planner@ci.brea.ca.us>; Chapman, Ryan <ryanch@ci.brea.ca.us>; Killebrew, Jason <jasonk@ci.brea.ca.us>; City ClerksGroup <CityClerksGroup@ci.brea.ca.us>
Subject: 2023 New Traffic Study - in/around Laurel Elementary Magnet School?

Hello,

I have heard that there was a new traffic study conducted at the beginning of 2023 or thereabouts.

Could you pls advise if this accurate in some way shape or form?

And could you please provide me with all available information on this?

Thank you,

Diane

Safe Routes to School Guide

Engineering



Created January 2012

Pedestrian and Bicycle Information Center

NHTSA www.nhtsa.gov

U.S. Department of Transportation Federal Highway Administration

CDC Centers for Disease Control and Prevention

ite

SafeRoutes National Center for Safe Routes to School

This guide was developed by the Pedestrian and Bicycle Information Center (PBIC) with support from the National Highway Traffic Safety Administration (NHTSA), Federal Highway Administration (FHWA), Centers for Disease Control and Prevention (CDC) and Institute of Transportation Engineers (ITE). This guide is maintained by the National Center for Safe Routes to School at www.saferoutesinfo.org.

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Overview

Engineering is one of the complementary strategies that Safe Routes to School (SRTS) programs use to enable more children to walk and bicycle to school safely. Communities tailor a combination of engineering, education, encouragement and enforcement strategies to address the specific needs of their schools.

Engineering approaches can improve children's safety to enable more bicycling and walking. Engineering is a broad concept used to describe the design, implementation, operation and maintenance of traffic control devices or physical measures, including low-cost as well as high-cost capital measures.

This chapter serves as a toolbox of various engineering techniques aimed at creating safe routes to school. It focuses on tools that work to create safe routes by improving paths, creating safer crossings and slowing down traffic. At the same time, it recognizes the importance of a balanced roadway environment that can accommodate the needs of all modes of transportation, be it foot, bicycle or motor vehicle. In this chapter, there are examples of urban, suburban and rural school locations, which will provide various perspectives on engineering challenges and solutions.

Engineering strategies are best used in conjunction with education, encouragement and enforcement activities. The Education chapter describes the pedestrian and bicycle safety messages and how to deliver the messages to children, parents and others. Driver, bicyclist and pedestrian behavior changes, such as those discussed in the Enforcement and Encouragement chapters, complement the engineering strategies described in this chapter.



Kentfield, California.

"Engineering" is a broad concept used to describe the design, implementation, operation and maintenance of traffic control devices or physical measures.

Guiding Principles for Applying Safe Routes to School Engineering Solutions

Several principles guide this discussion of Safe Routes to School (SRTS) engineering solutions as well as the design of a built environment that provides safe routes for children as they walk and bicycle to school. The following list states and briefly describes some of the principles:

Infrastructure within the school zone and beyond is a prerequisite for walking and bicycling.
The physical environment often determines whether many children walk or bicycle to school. To safely walk or bicycle to school along a street or separate path, or to cross a street along the way, children need well-designed, well-built and well-maintained facilities.

SRTS programs address infrastructure needs at schools as well as along a child's route to school. Children walk and bicycle to school from locations outside the immediate school zone and often from beyond the school's designated walk zone. SAFETEA-LU, the federal transportation legislation, provides funding for SRTS activities within approximately a two-mile radius of a school.

Accessibility Required
SAFETEA-LU specifies that a key purpose of the Safe Routes to School program is "to enable and encourage children, including those with disabilities, to walk and bicycle to school." An important aspect of enabling children with disabilities to walk and bicycle to school is provision of accessible infrastructure. Guidelines for making schools sites and routes to school accessible for children with disabilities can be found in the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and the Public Rights-of-Way Accessibility Guidelines (PROWAG). Throughout this guide, the term "pedestrian" should be understood to include students using assistive devices such as wheelchairs.



Peter Lagerwey
The relationship between the crossing, the building and the sidewalk are important elements in developing a safe route to school. Mary Scroggs Elementary School, Chapel Hill, North Carolina.

Relationships are everything.
The relationship of school buildings to sidewalks and street crossings can determine the level of comfort and safety a pedestrian or bicyclist experiences. All elements are interconnected; the street is connected to the sidewalk and the sidewalk is connected to the building. Getting this relationship right is critical. One important point: do not put motor vehicles between sidewalks and schools. Such obstructions add a conflict point on a child's walking route. Another relationship to consider is the school's location relative to its students' homes. A child's route to school should have a minimal number of busy street crossings, and school attendance boundaries should be drawn with this principle in mind.

Easy-to-implement and low-cost solutions are focused on first, while longer-term improvement needs are identified and the implementation process is begun.
Effective improvements do not always require substantial funds. For example, signs and paint are relatively inexpensive and can make a big difference. Completion of these projects can build momentum and community interest in making other improve-

ments. Smaller cost-effective projects, when concurrently implemented with larger more expensive projects are likely to have lasting impacts on the built environment and garner interest and support from the community.

Some engineering improvements will require substantial time and financial commitment. Projects such as new sidewalks and bridges or the reconstruction of a street crossing should be identified early and advanced through the various stages required to complete them. As these longer-term improvements are developed, smaller projects can be implemented to build momentum and maintain community interest in creating safe routes to school.

Engineering treatments are matched to the type of problem.
As communities consider improvements for the routes to school, care should be taken to identify problems or obstacles and to provide appropriate solutions to alleviate these specific problems.

Collectively, these principles guide the decisions that local professionals and members of the school community make as they begin to address issues that will improve the built environment for children to safely walk and bicycle to school. These principles will help guide decisions as communities:

- Create school walking and bicycling route maps using a variety of assessment tools and exercises.
- Identify and regulate the school zone.
- Provide and maintain bicycle and pedestrian facilities along the school route including sidewalks, on-street bicycle facilities, paths, bridges and tunnels.
- Provide safe street crossings for bicyclists and pedestrians.
- Slow down traffic.



Peter Lagerwey

Crosswalks are an effective, low-cost, and easy-to-implement engineering treatment. It is important, however, to be aware of guidelines for appropriate placement and use of crosswalks. Guidelines can be found at www.walkinginfo.org/engineering/crossings-crosswalks.cfm

What's Wrong With This Picture?

Following are a number of photographs to help identify the types of problems that children may encounter on the trip to or from school. These examples focus on some of the most common problems, many of which are easy to correct. If these problems are addressed and obstacles to safe walking and bicycling routes are eliminated, more parents will allow their children to walk and bicycle to school and children will be safer doing so.

what's wrong with this picture?



David Parisi

Tree root damage has pushed the sidewalk up. The sidewalk is angled greater than the 2-percent Americans with Disabilities Act requirement, and the lifted section presents a tripping condition.

what's wrong with this picture?



David Parisi

There is no paved sidewalk for these students to use, and the rolling terrain can "hide" children walking in the street.

what's wrong with this picture?



David Parisi

Motor vehicle is stopped in the crosswalk and in the red (no parking/stopping) zone. The red curb paint is faded. In addition, most states require all crosswalks to be white. This picture was taken in California, where yellow is used for pavement markings in school zones.

what's wrong with this picture?



David Parisi

This picture was taken one block from school. The sidewalk abruptly ends, forcing children to walk in the street; visibility is obscured at the corner by the bushes and fence. In addition, most states require all crosswalks to be white. This picture was taken in California, where yellow is used for pavement markings in school zones.

what's wrong with this picture?



Bushes are growing over the sidewalk.

what's wrong with this picture?



This motor vehicle is parked on the sidewalk. Not only does this cause pedestrians to walk in the street, it will damage the sidewalk.

what's wrong with this picture?



This is a damaged multi-use pathway with cracks in the surface and debris on the trail. The cracks are an obstacle for walkers, bicyclists and particularly people in wheelchairs.

what's wrong with this picture?



The driver entering this street, just before the school crosswalk, is likely looking left for oncoming motor vehicles and may not see the pedestrian or the crosswalk to the right. The amount of traffic on this busy street is prompting this child to dart across. In addition, most states require all crosswalks to be white. This picture was taken in California, where yellow is used for pavement markings in school zones.

what's wrong with this picture?



This empty bicycle rack is broken and is not a recommended design. It is difficult to lock bicycles to this rack and keep them in an upright position. It is also not a well-placed rack; only one side is useable.

what's wrong with this picture?



Hedges block access to the sidewalk at the end of this school crosswalk. There is no curb ramp, and the bushes block access to pedestrians in wheelchairs and any other students attempting to cross. In addition, most states require all crosswalks to be white. This picture was taken in California, where yellow is used for pavement markings in school zones.

what's wrong with this picture?



This gate and lock were recently installed by neighbors to block access to their private road. The locked fence also blocks access to the sidewalk that leads to the school.

what's wrong with this picture?



This is a pathway off a sidewalk at a school. The pathway ends at a parking lot and is blocked by parked motor vehicles. There is no sidewalk for students to cross the parking lot and walk to the school buildings. The bicycle rack is poorly placed and inaccessible.

what's wrong with this picture?



This is a well-marked school crosswalk with advanced warning signs. (Note the back of the sign in the middle of the image.) However, school children must walk 10 to 12 feet into the travel lane, while in the crosswalk, before they can see approaching traffic. In addition, most states require all crosswalks to be white. This picture was taken in California, where yellow is used for pavement markings in school zones.

what's wrong with this picture?



This is a long line of motor vehicle traffic for drop-off and pick-up of school children. The sidewalk on the left side of the street is narrow and almost entirely blocked by overgrown bushes.

what's wrong with this picture?



This well-marked school crosswalk has good signage, but there is a discontinuous sidewalk on the right side and no curb ramps.

School Route Maps and the Tools to Create Them

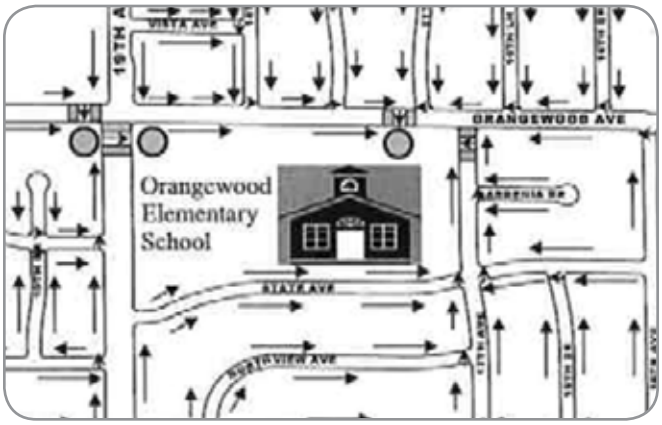
Identifying the safest and most direct route for a student's journey to school is an important step in the process of developing safe routes to school. This section describes school route maps and a variety of tools used to gather information about, and improve the environment for, walking and bicycling near schools.

School Route Maps

A school route map can inform students and families about walking and bicycling route to school and can also identify areas that require improvements. While school route maps are often developed for all households within the school walk zone, consideration should be given to areas outside of the defined walk zone and, when appropriate, to the entire enrollment area of a school.

A school walking and bicycling route map not only provides way-finding for students to walk and bicycle to and from school, it can identify where engineering treatments may be needed and where adult school crossing guards, curb ramps, and traffic control devices such as signs, crosswalks, and traffic signals should be provided. In order to identify the optimal routes to school as well as problem areas, it may be necessary to conduct an assessment of the physical environment surrounding the school. Walkabouts, bike-abouts and audits are methods for assessing the built environment; these are described in the following two sections.

As part of the school route map development and evaluation processes, areas that receive an improvement, such as an engineering treatment, should be reassessed after the implementation of a change to determine if the route is now improved for walking and bicycling. Attendance boundaries and mapped walking routes and bicycling routes should be reviewed at least annually to see if there have been changes to the school attendance boundary, walk zone or the adjacent neighborhoods.



Michael Cynecki

Some schools publish maps for students and parents to use.

A school route map informs each student of the safest and most convenient walking and bicycling route to school.

Putting It Into Practice: Developing a Safe Routes to School Walking Route Map

Roadrunner Elementary School, Phoenix, AZ

Phoenix, like many other communities, is working with school officials and parents to develop walking route maps to provide young students guidance on the safest routes to walk to and from school. The program not only makes the school trip safer by identifying the safest routes, but it also involves a comprehensive review of the walking routes by school officials and parents to identify problem areas. The walking route plan helps to identify where improvements are needed and where to place crosswalks, STOP signs and adult school crossing guards. The ultimate purpose of the walking routes is to encourage more children to walk to school and discourage parents from driving their children to school.

The school provides the walking attendance boundary map and parent volunteers to work on reviewing and developing the walking routes. The city provides aerial photographs, quarter-section maps and guidelines for parents and school officials on how to conduct their reviews. The process requires parent volunteers or school officials to review the entire walking route and to identify the most desirable walking route to serve each household within the walking attendance boundary. This exercise may also involve a revision of the walking attendance boundary if safe routes can be identified or created to serve more students.

Once the walking route maps are completed, traffic officials review the areas of concern and work with school officials to ensure the right number and placement of adult school crossing guards. The city provides final versions of the maps and maintains the computer files for the walking routes. It is the responsibility of the school officials to distribute the walking route plans to the parents at the start of the school year and when new students are enrolled at the school. School walking route maps are reviewed annually to identify if there are any changes to or within the school walking attendance boundary.

For another example of mapping safe routes to school visit the 2004 PEDSAFE "Safe School Route Mapping" Rochester, New York, case study at www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=33.

Neighborhood Walk-abouts and Bike-abouts

Neighborhood walk-abouts and bike-abouts are environment analysis exercises used in many Safe Routes to School (SRTS) programs to raise awareness of the issues and conditions facing walking and bicycling, to garner support for needed changes and to gather information needed to help create school route maps. The walk-abouts and bike-abouts seek to identify and document the traffic and safety issues near schools and identify potential short- and long-term solutions to deal with these safety issues.



Participants of a neighborhood walk-about familiarize themselves with the school zone.

The neighborhood walk-abouts and bike-abouts are organized by the community or school and may involve local policymakers, traffic engineers and planners, law enforcement, safety professionals, school district

personnel, school nurses, parents, students, school principals and local media. The group typically meets at the school, observes the school activities during drop-off and pick-up time, and tours the school zone and walking and bicycling routes to the school. Along the way, safety concerns are documented and photographed for later discussion. Active & Safe Routes to School (www.saferoutestoschool.ca) offers a list of items to consider during a walk-about. Participants also can complete easy-to-use checklists, such as the Walkability Checklist (www.walkinginfo.org/library/details.cfm?id=12) and Bikeability Checklist (www.bicyclinginfo.org/library/details.cfm?id=3) while conducting the walk-about or bike-about.

After the tour, the group reconvenes at the school to discuss their findings and potential short- and long-term solutions to address the problems they encountered. Participants leave the meeting with a clear plan of action that includes responsibilities for each person and follow-up dates. Results of the walk-about and bike-about are communicated to the school community through newsletters or other channels. A walk-about and bike-about can also be conducted by teachers with students as a hands-on learning experience about their community.

Walking and Bicycling Audits

Walking and bicycling audits, sometimes called assessments, are processes that involve the systematic gathering of data about environmental conditions (social, built and natural) that affect walking and bicycling. Audits are typically performed by personnel with experience in pedestrian and bicycle issues or training on the specific audit tool used. One objective of the audits is to document factors that help or hinder safe walking and bicycling. These factors include, but are not limited to, street lighting, sidewalk width and condition, traffic volume, presence of bicycle lanes, topography, and presence of dogs, trash and debris.

Audits might focus on a school site, a corridor popular for bicycling or an intersection that residents find daunting. Walking and bicycling audits are tools that provide community stakeholders (parents, children, school staff, public works or traffic department staff, local engineers or planners, and law enforcement officers) with the information they need to effectively analyze the design and condition of the transportation network. This information can help identify areas conducive to walking and bicycling, identify areas where changes are needed and inform the solutions chosen to create change. For engineers and planners, audits provide useful feedback to help them incorporate these ideas into their work.

Numerous walking and bicycling audit tools exist, and they can vary in the scope and scale of data they collect. Some audits focus broadly on the network or route level, while others hone in on details of the individual street segments that comprise a route or network. Determining which type of audit tool is most appropriate will depend on the audit participants, data needs and available resources. Collecting information on every street segment will provide a detailed and comprehensive assessment, but it may require data collection training and labor intensive data collection and analysis. Audit information collected at the neighborhood level can provide an overview of the walkability and bikeability along routes to school, but it may not allow for pin-pointing a specific area along the route that is a trouble spot.

In addition to assessing infrastructure and conditions currently in place, audits can be used to analyze proposed development construction plans or other projects that will introduce change into a neighborhood. Audits are useful for analyzing proposals to ensure that the needs of bicyclists and pedestrians are accommodated in all stages of a project.

Results from the walking and bicycling audits combined with the walk-about and bike-about activities and parent and student surveys form the basis of the design of a Safe Routes to School program. This information can also be used in the development of school traffic control plans.

For audit tool information, see the following:

- School Site Assessment Form and Neighborhood Assessment Form in the Maryland Safe Routes to School Guidebook at http://www.saferoutesinfo.org/program-tools/neighborhood-site-assessment.

- School Site Assessment and the Neighborhood Site Assessment in the Safe Ways to School "Toolkit" from the Florida Traffic and Bicycle Safety Education Program. at www.saferoutesinfo.org/program-tools/safe-ways-school-tool-kit
- A host of audit tools developed by health professional and planners, which consider the built environment from a walking, bicycling and health standpoint, are available at the Active Living Research Web site at www.activelivingresearch.org/index.php/Tools_and_Measures/312.
- Walking and Bicycling Suitability Assessment at www.unc.edu/~jemery/WABSA.
- Cycle Audit and Review from the UK Department of Transportation at www.bicyclinginfo.org/library/details.cfm?id=2064.

Putting It Into Practice: School Walking Routes Pilot Project
Ontario, Canada

Research suggests that if there were safe routes for children to walk or bicycle to school more families would choose this form of transportation. The School Walking Routes pilot project of Green Communities' Active & Safe Routes to School (ASRTS) set out to test this.

The School Walking Routes pilot project was implemented in four steps:

1. **Mapping**
   Students in participating schools were asked to draw their routes to school on maps of their school's catchment area. Maps were sorted by grade and by street and one master map was created of the most popular routes.
2. **Observing**
   Municipal transportation staff collected baseline data for each mapped route at each school site.
3. **Analyzing traffic**
   Municipal transportation staff coordinated traffic counts at each of the four schools before, during and after the pilot project.
4. **Surveying**
   Parents, children and community members were surveyed at the start and end of the project.

Families who chose to participate in walking school buses were encouraged to walk along the designated routes, which were selected by local municipal and police staff as the best route from the perspective of traffic safety and pedestrian controls. SCHOOL ROUTE signs placed along the route provide the following benefits:

- Notification to drivers that they are on a designated walking route to a school and need to use extra caution.
- Encouragement for parents to walk their children along the designated walking route, thus creating more eyes on the street. This is critical in the establishment and sustainability of walking school buses.
- Encouragement for pedestrians and bicyclists to cross only at the designated intersections.
- Promote the culture of child safety in general.

Project organizers found that collecting data through observations is labor-intensive, not cost-effective and there are many factors contributing to transportation choices of families from one day to the next. Also, signs coupled with other ASRTS initiatives can change behaviors of drivers and encourage more people to walk their children to school.

Phase One of the School Walking Routes pilot project was implemented in Toronto in April 2002. During 2004, Phase Two of the School Walking Routes pilot project was expanded from the City of Toronto to three other Ontario municipalities: London, Brantford and Brampton.

For more information visit Active & Safe Routes to School at www.saferoutestoschool.ca.

School Traffic Control Plans

A comprehensive traffic control plan can help create a balanced roadway environment to accommodate the needs of all modes of transportation, be it by foot, bicycle or motor vehicle. A traffic control plan is a map of a school campus and the adjacent street system marked with proposed engineering improvements to increase the safety of bicyclists and pedestrians.

Putting It Into Practice: Traffic Control Plan

Park Elementary School, Marin County, CA

Schools in two communities in Marin County, California, developed comprehensive traffic control plans to increase the safety of bicyclists and pedestrians traveling to school.

The schools mapped typical routes that students used to walk and bicycle to school and proposed safety improvements along those routes. The schools used this analysis to apply for and receive funding to complete suggested improvements. One map proposed a new signing and striping plan for a local elementary school. It lays out proposed signing and pavement marking measures, taking into account many streets surrounding the school.



David Parisi

Park Elementary, Marin County, California.

The traffic control improvements in Marin County, in conjunction with Safe Routes to School encouragement activities, have led to an increase in the number of students walking and bicycling to school, as well as an increase in carpooling.

For more information about this story visit the 2004 PEDSAFE "Safe Routes to School Program" Marin County, California, case study at www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=9.

Around The School

Ideally, the school zone starts at the front door and encompasses the campus and as many blocks as possible that surround the school and have a high concentration of school-generated traffic. Often the school zone includes the streets along the school and usually the area one to two blocks around it. The school zone should be marked with special signing to alert drivers of the high concentration of children. School crossing signs, speed signs, school zone pavement markings and other traffic calming devices remind drivers to treat the area with special care and attention.

Understanding The School Environment

There are generally three zones around the school that you need to think about when doing a Safe Routes to School project: the school enrollment boundary, the school walk zone, and the school zone.

School Enrollment Boundary

The school enrollment boundary is the entire zone around the school from which students are drawn.

School Walk Zone

The school walk zone is typically a subset of the enrollment zone. School walk zones may be defined by State or Local policy, but if not, a general rule of thumb is that the walking boundary is ½ mile or 1-mile out from an elementary school, sometimes further for middle and high schools. The shaded circle on the map above is intended to provide a visual of a "walk zone", but rarely is the walk zone an exact circle. Some students will live too far away from the school to reasonably be expected to walk, and they are typically provided with bus service. Walk zones defined by policy typically indicate



School enrollment boundary. Image provided by Dave Parisi.



School walk zone. Image provided by Dave Parisi.

Since school zones are locations frequented by children, making the area safe for children at any time of day is a sound investment for the community.

the area within which students are NOT provided with bus service (note that some schools may define this as the no-transport zone, not the walk zone). Determining walk zones, whether policy based or through the general rule-of-thumb, can be helpful in focusing your efforts in identifying engineering problems and solutions.

School Zone

The school zone is the roadway (or roadways) immediately adjacent to the school (shown in yellow on the map to the right), usually extending one to two blocks in each direction. Speed limits are often reduced in the school zone during morning and afternoon hours. Special signing is used – crossing signs, speed signs, school zone pavement markings – so that motorists know to treat the area with special care and attention.

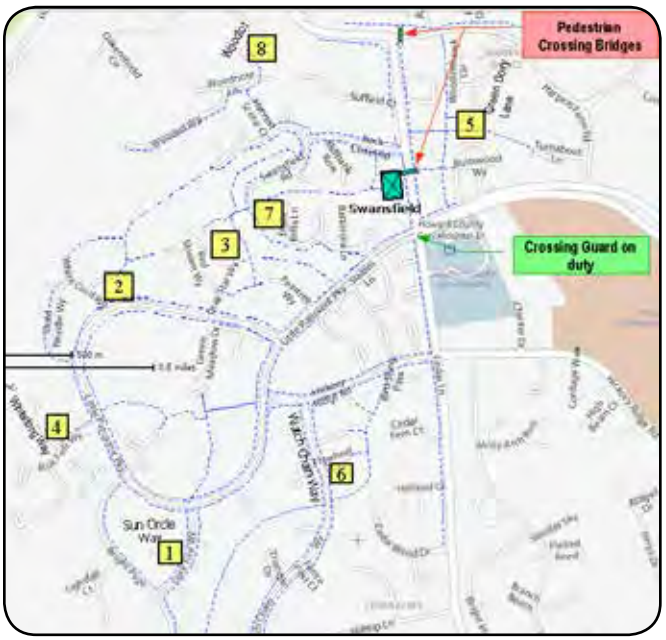


School zone. Image provided by David Parisi.

School Zone Signing and Marking

School zone signs and pavement markings provide important information to drivers to improve safety within the school zone. The 2009 Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Part 7 sets forth principles and standards for controlling traffic in school areas, although many states and local jurisdictions provide additional guidance. The principles and standards in the MUTCD provide information on appropriate design, application, and maintenance of all traffic control devices (including signs, signals, and markings) and other controls (including adult school crossing guards, student patrols, and grade-separated crossings) required for the special pedestrian conditions in school areas (MUTCD, Ch. 7).

Some jurisdictions recommend or require school signs that are larger than the sizes of signs recommended by the MUTCD or may allow different types of pavement markings. School zone signs and markings on public streets must comply with the MUTCD as well as consider any relevant local or state guidelines that are themselves consistent with the MUTCD. Signs should be used judiciously, as overuse may lead to driver noncompliance and excessive signs may create visual clutter.



Swansfield Elementary School, Howard County, MD. Image provided by Jennifer Toole.

Guidelines for making schools accessible to children with disabilities can be found in the Americans with

Disabilities Act Accessibility Guidelines (ADAAG) and the Public Rights-of-Way Accessibility Guidelines (PROWAG). ADAAG applies to the school site itself whereas PROWAG addresses the route to school. The Department of Justice established the 1991 ADAAG as a standard, which means that compliance is required for all newly constructed or altered school facilities.

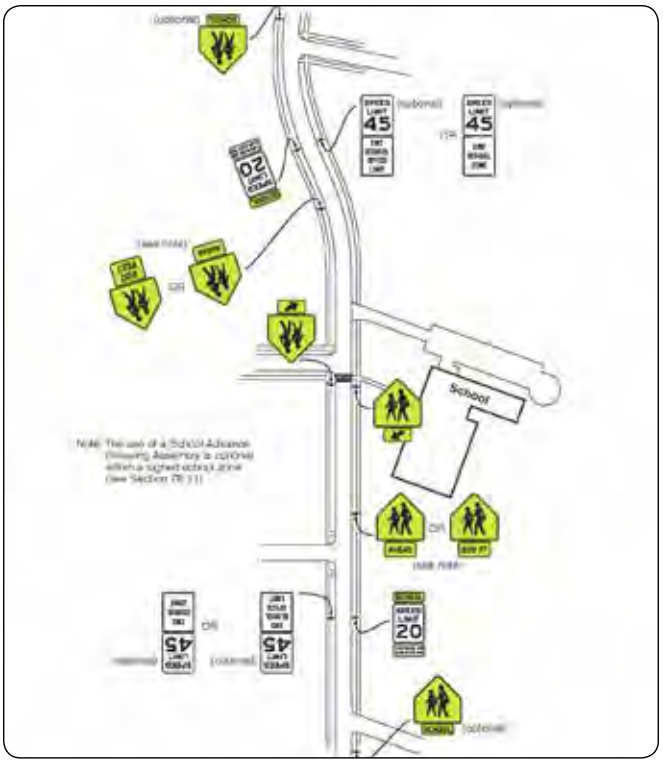
Properly designed and applied traffic calming devices encourage good motorist and pedestrian behavior in the school zone. Traffic calming measures such as high visibility crosswalks, street narrowing and signage can be in place all the time. Since school zones are locations frequented by children, making the area safe and accessible for children anytime of day is a sound investment for the community.

Properly designed and applied accessibility improvements, such as curb ramps, accessible pedestrian signals, and accessible sidewalks and pathways are also sound community investments. They benefit not only children with disabilities but also parents with strollers, senior citizens, and others with permanent or temporary mobility impairments.

Methods for addressing bicyclist and pedestrian safety and accessibility within the school zone will be discussed in this section. Topics include:

- School Speed Limit Sign
- Overhead School Flasher Speed Limit Sign
- Changeable Message Sign
- Portable Speed Feedback Sign
- School Advance Warning and Crosswalk Signs
- Pavement Markings
- Parking Restrictions

For more info on traffic calming in school zones visit the 2004 PEDSAFE "School Zone Traffic Calming" Portland, Oregon, case study at www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=38



This diagram from the MUTCD shows typical placement of SCHOOL advance warning signs, SCHOOL SPEED LIMIT signs, SCHOOL CROSSING signs and END SCHOOL ZONE signs.

Treatment: Signing and Marking the School Zone

Description/Purpose

Signs and pavement markings provide important information to drivers to improve road safety. Examples include retroreflective yellow-green SCHOOL advance warning signs and SPEED LIMIT 25 MPH WHEN FLASHING signs.

Marked crosswalks help guide children to the best routes to school.

Expected Effectiveness

The limited empirical evidence suggests that signs and pavement markings help educate drivers and improve driving behaviors in school zones.

Costs

Costs depend on the school zone treatment selected and the intensity of application. The cost for signs generally ranges from $50 to $150 per sign, plus installation costs.[3] Pavement marking costs vary by type of paint and marking design.

Keys to Success

- Schools should develop Safe Routes to School traffic control plans that include sign and marking recommendations.
- Traffic signs and pavement markings used on public streets and property must comply with the Manual on Uniform Traffic Control Devices (MUTCD). See Chapter 7 of the MUTCD for traffic control used in school areas.

Key Factors to Consider

Signs should be used judiciously; overuse may breed driver noncompliance and excessive signs may create visual clutter.

Evaluation Measures

- Pedestrian and bicyclist conflicts in the school zone.

School Speed Limit Sign

School speed limit signs vary among states, but their main objective is to alert drivers that they are entering a school zone and they need to slow down for school children. The MUTCD (http://mutcd.fhwa.dot.gov/pdfs/2009/part7.pdf) provides guidance for installing school area speed limit signs in school zones at a specified distance from marked school crosswalks or a certain distance from the edge of school property. The school speed limits typically range from 15 to 25 mph. These devices are important but should not be overused. Excessive and unreasonable use may lead drivers to ignore the devices.

School speed limit signs alert drivers that they are entering a school zone and they need to slow down for school children. The MUTCD provides guidance for installing school area speed limit signs in school zones at a specified distance from marked school crosswalks or a certain distance from the edge of school property. School speed limits vary based on state law and typically range from 15 to 25 mph. These devices are important but should not be overused. Excessive and unreasonable use may lead drivers to ignore the devices. Occasional police enforcement is also needed at these signs.

School flasher speed limit signs are sometimes used on busy streets, where they can help attract drivers' attention to the school speed limit. School flasher speed limit signs that are activated only during school hours are probably more effective at drawing a driver's attention compared to school flasher speed limit signs that flash throughout the day (AASHTO, 2004, Sec. 2.5.4).



School speed limit sign at Diggs-Latham Elementary School in Winston-Salem, NC. Image provided by Mike Cynecki.



School flasher speed limit sign at Arrowhead Elementary School in Glendale, AZ. Image provided by Mike Cynecki.

Overhead School Flasher Speed Limit Sign

School flasher speed limit signs can be installed overhead for even better driver visibility than side mounted school flasher speed limit signs. The best uses for overhead signs and beacons are at locations where drivers cannot see the marked crosswalk due to topography or other unusual barriers, such as on the crest of a hill or around a curve.



Overhead school flasher speed limit sign at Second Street School in Frankfort, KY. Image provided by Mike Cynecki.

Changeable Message Sign

Permanently mounted changeable message signs are illuminated with messages or speed limits and are used to heighten awareness of speed limits in the school zone or to establish a lower speed during school crossing times. Solar units are available for under $10,000 per sign and non-solar units are sold for under $8,000. While the non-solar equipment is less expensive to purchase, it requires a hard wire connection to a power source, which can be much more expensive.



This solar-powered changeable message sign used in Mill Valley, CA is adjacent to a school and is only operational during the school commute periods. Image provided by David Parisi.

Speed Feedback Sign

One type of changeable message sign is a speed feedback sign which shows "Your Speed" and the "Speed Limit" to alert drivers to their actual speed and the posted speed limit. Speed feedback signs can record traffic counts and are programmed via a Personal Digital Assistant. They work best if they flash or provide a SLOW DOWN message if drivers exceed a preset speed threshold. Speed feedback signs still need to be used with other standard speed limit signs, which should be placed in advance of or next to speed feedback signs.

Portable Speed Limit Signs and Radar Speed Trailers

Portable speed limit signs are movable signs that remind drivers of the posted speed limit. Radar speed trailers alert each passing driver to their traveling speed. These machines are used in some jurisdictions along with law enforcement. For example, the signs are put in place, parents are notified that law enforcement officers will be present, and then officers show up to ticket speeders and drivers who fail to stop for children in marked crosswalks. In other locations, signs are used with no further enforcement activity. Portable speed limit signs are discussed further in the Enforcement chapter.



Typical portable radar speed trailer.

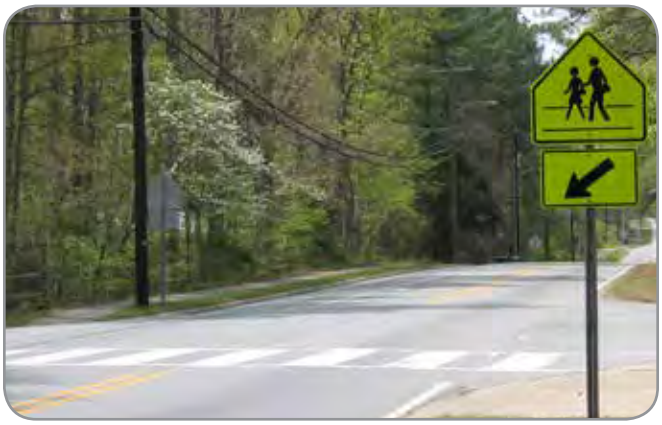
School Advance Warning and Crosswalk Signs

School advance warning and school crosswalk signs are important elements of a safe route to school. Chapter 7 in the 2009 edition of the MUTCD designates these signs to be used in advance of and at school crossings, and mandates use of fluorescent yellow green color sheeting for all new school warning signs. The MUTCD and local and state regulations should be followed when considering installation in any area. Traffic signs, as well as pavement markings, which are symbols, stencils or legends applied to the surface of a roadway or a curb along public streets, must be installed or authorized by the local traffic authority, such as the city, county or state traffic engineering department. Signs should not be overused or underused, and when installed, they need to be maintained and kept clear of tree branches and other visual obstructions.



Austin Brown

Example of a school advance warning sign.



Austin Brown

Example of a school crosswalk sign.

Post-covering

Retroreflective yellow-green post covers can be bolted onto sign-posts to draw additional motorist attention to school warning signs. This treatment is permitted in the MUTCD.

Pavement Markings

Pavement markings, or stencils, are an effective way to enhance driver awareness near schools. They can be used to supplement regulations and warnings provided by traffic signs and signals, or they can convey regulations, guidance, and warnings independently.

The use of pavement markings is governed by the MUTCD and by state regulations and guidance. In some cases, state regulations and guidance may differ from the MUTCD. For example, while the MUTCD requires white crosswalks and stencils, California calls for yellow crosswalks and stencils in school zones. Examples of stencils commonly used in school zones include SCHOOL, SLOW SCHOOL X-ING, STOP, and 25 MPH. Check with your local jurisdiction for guidance.



School warning sign with retroreflective yellow-green post covering in Phoenix, AZ. Image provided by Mike Cynecki.



Pavement markings at Morey Middle School in Denver, CO. Image provided by Mike Cynecki.

Stencils should be checked annually. Installing stencils with thermoplastic or other plastic materials may cost more initially, but these materials will last longer than paint and reduce long-term maintenance costs. In areas that receive snow, consideration must be given to the fact that stencils may be obscured by snow during the winter months, and that regular plowing may shorten the lifespan of the marking.

Parking Restrictions

Parking restrictions are needed to regulate parent parking, but care must be taken not to push motorists into adjacent neighborhoods or deny parents appropriate and adequate space for parking and drop-off activities. Curb paint and signs can be used individually or together to help convey messages regarding parking restrictions . For additional information, see Part 7 of the MUTCD.



Parking restriction sign at Latham Elementary School in Winston-Salem, NC. Image provide by Mike Cynecki.

Along the School Route

Children that walk or bicycle to school need safe and well-designed facilities between their home and school. This section describes the types of infrastructure found along the school route that improve the conditions for walking and bicycling, including:

- Sidewalks
- Bikeways
- Paths
- Connectivity





Sidewalks

Sidewalks, specifically paved sidewalks, are an important piece of a walking route to school. Paved sidewalks are "pedestrian lanes" that provide people with space to travel within the public right-of-way separated from motor vehicles and on-road bicycles. They should have a level, hard surface and be separated from motor vehicle traffic by a curb, buffer or curb with buffer. Sidewalks provide places for children to walk, run, skate and play, and are often used by young bicyclists. Continuous and accessible sidewalk networks improve mobility for all pedestrians and are particularly important for pedestrians with disabilities. They provide access for all types of pedestrian travel to schools as well as work, parks, shopping areas, transit stops and other destinations

Many roads around schools are not equipped with sidewalks and can be unsafe for walking. According to a study by the UNC Highway Safety Research Center conducted for the Federal Highway Administration, the likelihood of a site with a paved sidewalk being a crash site is 88.2 percent lower than a site without a sidewalk after accounting for traffic volume and speed limits (McMahon et al., 2002). A study of the California SRTS program has shown that providing sidewalks is one of the most effective engineering measures in encouraging children to walk to school (Boarnet et al., 2005).

Sidewalks should be part of all new and renovated development. Streets that do not have sidewalks, particularly those on routes where children walk or bicycle to school, should be identified and assessed to determine if retrofitting these streets with sidewalks is appropriate. Where feasible, sidewalks should be provided on both sides of the street. A sidewalk on only one side forces pedestrians to either walk in the street or cross the street twice to get to the side with a sidewalk and back again.



Peter Lagerwey



Peter Lagerwey

Many parents are not willing to allow their children to walk to school if there is no place for them to walk.

Design and Strategy

Sidewalk Surface Types

Sidewalks can be surfaced with a variety of materials to accommodate varying budgets and contexts. While urban, suburban and heavily used sidewalks are typically made of concrete, less expensive walkways may be constructed of asphalt, crushed stone, or other materials



While concrete is the most common sidewalk material, other construction materials may be acceptable, but may require more maintenance.

if they are properly maintained and accessible. In more rural areas, a "side path" made of a material other than concrete may be suitable and be a better fit with a rural environment.

Concrete is more expensive than asphalt to install, but it lasts longer and requires less maintenance, which may make it a better value in the long run. Although brick pavers may appeal to some designers, they can require more maintenance and create a tripping condition. Pavers may also pose a problem to pedestrians in wheelchairs if the bricks settle or become lifted. Safe sidewalk surfaces are firm, stable, and slip-resistant.

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Sidewalk Placement

Sidewalk placement, or setback, along streets should take into account worn paths and buffer zones, and provide room for snow storage where snowfall is prevalent. The worn path that pedestrians create when there is not a sidewalk demonstrates where people naturally want to walk. The area between the street and the worn path or sidewalk is a "buffer zone" which provides space between pedestrians and motor vehicles. Unfortunately, when sidewalks are built along major arterial streets many tend to not include a buffer zone, thus placing pedestrians uncomfortably close to high-speed traffic. Sidewalks also need to provide a continuous path. Just as streets are designed and built to provide a continuous network, sidewalks also should provide users with a continuous path.

Sidewalk Width

The preferred minimum sidewalk width recommended for safe routes to schools is five to six feet. Walking can be a social activity; facilities are needed to accommodate social walking. The six-foot width allows for two people to walk comfortably side by side and provides sufficient space for pedestrians crossing in the opposite direction. Sidewalks with a width of eight to ten feet or more should be built where there is no sidewalk buffer along an arterial street and along roads adjacent to school grounds where large numbers of walkers are expected.



Peter Lagerwey

Common sense dictates that these two sidewalks should be connected.



Peter Lagerwey

The worn path in this picture clearly illustrates where pedestrians want to walk relative to traffic.



Dan Burden

This narrow four-foot wide sidewalk doesn't work very well for these two children.

The Americans with Disabilities Act (ADA) of 1990 mandates the establishment of minimum walkway clearance widths and there are variety of organizations that offer sidewalk width recommendations. Updated and revised in 2004, the ADA and the Architectural Barriers Act (ADA–ABA) Accessibility Guidelines for Buildings and Facilities state that walking surfaces should have a clear width minimum of 36 inches (ADA and ABA, Sec. 4.03). This clear width minimum is the minimum width for passage and not a sidewalk width recommendation (PROW Guide, Sec. 3.2.1). The clear width is the width of section of the walkway that is completely free of obstacles, vertical obstructions and protruding objects. The 36 inch width is the minimum width required to provide sufficient space for a person who uses mobility aids to travel within the restricted space (ADAAG, Sec. 4.3). However, restricting the pedestrian zone to 36 inches prevents passing and does not allow for two-way travel. The ADA–ABA guidelines state that where sidewalks are less than five feet in width, passing spaces sufficiently wide enough for wheelchair users to pass one another or to turn around shall be provided at intervals of 200 feet (ADA and ABA, Sec. 4.03).

The walkway width recommendations stated in several pedestrian facility guides exceed the 36-inch minimum needed for accessible travel as defined by the ADA–ABA Accessibility Guidelines for Buildings and Facilities.

- The Guide for the Planning Design and Operation of Pedestrian Facilities from the American Association of State Highway and Transportation Officials (AASHTO) recommends a minimum clear width for a sidewalk of four feet, and for sidewalks that are less than five feet in width passing space at least five feet in width should be provided at reasonable intervals (AASHTO, 2004, Sec. 3.2.3).
- The Design and Safety of Pedestrian Facilities from the Institute of Transportation Engineers (ITE) recommends different sidewalk width depending on the land uses and street type adjacent to the sidewalk. For residential areas, ITE recommends sidewalks widths ranging from four feet to five feet depending on housing density and for commercial areas a sidewalk width minimum of five feet. Sidewalks are required on a local street within two blocks of a school site that is on a walking route to school (ITE, 1998).
- Designing Sidewalks and Trails for Access: Best Practices and Design Guide Part 2 (www.fhwa.dot.gov/environment/sidewalk2) from the FHWA recommends a minimum width of five feet of sidewalk that is free of obstacles (FHWA, 2001, Ch.4).

Sidewalk Buffers

The space between the sidewalk and closest lane of moving vehicles is the sidewalk buffer. In general, there are four types of sidewalk buffers:

Planting strip of grass and trees
This is the preferred buffer as it provides a more pleasant, shaded environment to walk.

Bicycle lane
If a planting strip is not possible, a bicycle lane can provide an acceptable buffer between pedestrians and motor vehicles.

Parked cars
Parked motor vehicles can provide a buffer between pedestrians and moving vehicles, but can also create a visual screen for pedestrians as they cross at midblock.

Street furniture
Examples include benches, newspaper boxes, street lighting and public art.



Peter Lagerwey

If a sidewalk buffer does not exist, an effort should be made to provide a wider sidewalk. A wider sidewalk allows a pedestrian to avoid the splash zone (area adjacent to a motor vehicle travel lane into which water spray created by a motor vehicle traveling through water on the roadway enters) and provides a snow storage area and a more comfortable separation between moving vehicles and pedestrians. Guidelines for sidewalk buffers are available in the FHWA's Designing Sidewalks and Trails for Access (Section 4.1.2) at www.fhwa.dot.gov/environment/sidewalk2/sidewalks204.htm and AASHTO's Guide for the Planning, Design, and Operation of Pedestrian Facilities (Section 3.2.4) .

Sidewalk and Landscaping Maintenance

Sidewalks and adjacent landscaping should be monitored for conditions that may impede safe pedestrian use. Sidewalks that have been damaged by tree roots, ground swelling or heat buckling present a tripping danger to pedestrians and can often be easily repaired. Sidewalks must be smooth and in good repair to accommodate wheelchairs. A smooth sidewalk is also safer for strollers, young bicyclists and skateboarders. A program to monitor sidewalks for repair should be instituted by local agencies. Parents, school officials and students are



Sidewalks should be monitored for repair.



Peter Lagerwey

These trees need trimming to provide clear access to this sidewalk, which is within 100 feet of an elementary school and along a major route to school.

an excellent source of feedback on sidewalk condition. This feedback provided to the agency can be used to list and prioritize sections of sidewalks that require maintenance.

Properly maintained landscaping along sidewalks helps maintain appropriate sight distances and makes it easier for pedestrians to use the sidewalks. Property owners are required to keep trees and bushes from blocking sidewalks and obstructing visibility at corners. If overgrowth is an issue, neighborhood "pruning parties" or friendly reminders from residents of the neighborhood can inform property owners about the need to maintain landscaping. Local public works or traffic departments can provide guidance on plantings, including the type of plants allowed along sidewalks, the distance from the sidewalk that plants can be installed and how often plants are to be maintained.

Treatment: Sidewalks

Description/Purpose

Paved walkways that clearly delineate that area of the public right-of-way for pedestrian use and typically separated from motor vehicles by a curb or buffer area.

Expected Effectiveness

Sidewalks reduce the likelihood of pedestrian crashes by more than half the likelihood in areas where sidewalks don't exist (Knoblauch et al., 1987). Another study found the likelihood of a site with a paved sidewalk being a crash site is 88.2 percent lower than a site without a sidewalk after accounting for traffic volume and speed limits (McMahon et al., 2002).

Costs

Costs vary depending on such factors as width and materials but are approximated at $15 per linear foot (PEDSAFE, 2004).

Keys to Success

- Careful planning of the sidewalk design and network to ensure functionality and coverage.
- Inclusion of curb ramps for each crosswalk at an intersection.
- Providing an adequate buffer between the sidewalk and road, such as a planting strip, bicycle lane and/or on-street parking.

Key Factors to Consider

- Overcoming previous road construction projects that ignored the need for sidewalks.

Evaluation Measures

- Frequency and percent of "walking along roadway" crashes.
- Pedestrian volume.

Street Lighting

Street lighting improves pedestrian visibility and personal security. On streets with lots of trees, street lighting scaled to pedestrians (low lights) illuminates the sidewalk even after the trees grow big and tall. Street lighting improves safety by allowing pedestrians and motorists to see each other. It also adds to personal safety and aesthetics. Two-sided lighting should be considered along wide streets, and it is especially important to provide lighting at the crossings. Lighting can also be helpful along streets adjacent to the school grounds to minimize school vandalism and improve security. While most school walking activity occurs during daylight hours, the morning school trip in the middle of winter often occurs during hours of darkness, and many school activities occur during nighttime hours.



Peter Lagerwey

The image of a newly completed boulevard with lights.

Treatment: Street Lighting

Description/Purpose

Lighting along streets, especially at crosswalks, that more clearly illuminates areas of pedestrian activity to increase driver visibility and improve nighttime pedestrian security.

Expected Effectiveness

Better street lighting can reduce nighttime pedestrian crashes and increase the vision and awareness that drivers have relative to pedestrians (Pegrum, 1972; Freedman et al., 1975). Increases actual and perceived pedestrian safety and comfort.

Costs

Costs vary widely depending on materials used, lighting design, utility service agreements and other factors. However, a general cost estimate is $2,000 to $3,000 per streetlight (Safety Toolbox, Roadway Lighting).

Keys to Success

- Installing lighting on both sides of wide streets and avoiding "dark spots."
- Using uniform lighting levels.

Key Factors to Consider

- Acquiring adequate funding.
- Design issues regarding height and existing objects, such as trees.

Evaluation Measures

- Number of nighttime pedestrian crashes.
- Percentage of all pedestrian crashes that occur at night.
- Increased pedestrian activity and reduction in crime.

ADA / Universal Design

The purpose of universal design is to provide an environment that is equally accessible and comfortable for users of all abilities and ages, including children. To help ensure access for all, the Americans with Disabilities Act (ADA) of 1990 prohibits discrimination on the basis of disability. Sidewalks and other pedestrian facilities in the public right-of-way are subject to the requirements of the ADA. In 2004 the U.S. Access Board released the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities. These guidelines contain scoping and technical requirements for accessibility to sites, facilities and buildings by all users. Much of the information on walkway and street design contained in the ADA–ABA guidelines are contained in the 1999 Accessible Rights-of-Way: A Design Guide. The Federal Highway Administration (FHWA) document Designing Sidewalks and Trails for Access also provides detailed guidance on the design of pedestrian facilities that can be used as a supplement to the ADA-ABA guidelines.

Curb Ramp Design

According to ADA guidelines, curb ramps should be perpendicular wherever possible, where each corner has two ramps installed perpendicular to the face of the curb (vs. a single ramp facing diagonally into the intersection). A big advantage of having two ramps at the corner and small curb radii is that the curb ramps can lead directly along the line of travel, guiding pedestrians into the crosswalk rather than into the middle of the intersection. Two ramps that end at the crosswalk also provide directional guidance to pedestrians with vision impairments. When a corner is retrofit with new curb ramps, the crosswalk markings may have to be moved so that the curb ramp fully aligns within the crosswalk.

Warning Strips

Truncated domes are the standard design requirement for detectable warnings on curb ramps and at transitions from sidewalks to street crossings. These small, flattened domes provide a surface that is distinguishable underfoot and by cane. ADA guidelines require the use of a truncated dome warning strip at the bottom of every newly constructed curb ramp. These domes provide a



Peter Lagerwey

This sidewalk meets ADA requirements and is easy to maneuver by people in wheelchairs as well as other pedestrians.



Dan Burden

Each corner should have two curb ramps, one for each crossing.



Peter Lagerwey

The two-foot deep truncated dome tactile strip at the bottom of the curb ramp has a contrasting color to the rest of the sidewalk.

tactile warning to pedestrians with a visual impairment who would otherwise be given warning by the presence of a curb. The truncated dome tactile strip should be two feet deep for the entire width of the ramp and should have a contrasting color with the adjacent sidewalk. There are different materials and construction methods that can be used to provide the truncated dome tactile warning strip at the base of the curb ramp.

Driveways

Driveway Design

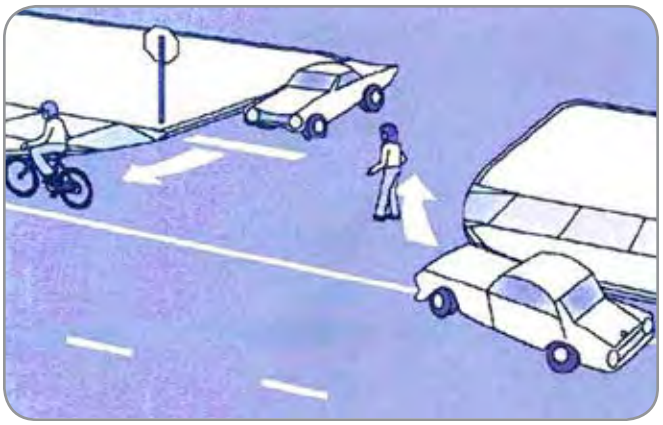
Properly designed driveways, as they cross sidewalks, can enhance pedestrian safety by providing a consistent surface and reminding drivers that they are crossing a sidewalk. The following principles should be applied to driveway design:

- The sidewalk continues across the driveway at the same elevation or level.
- The driveway apron does not go through the sidewalk.

Ramps may be necessary at intersections when pedestrians cross the street, but the rest of the sidewalk network should be continuous and at one level. At driveways, there is no need to break the sidewalk network. Driveways should not look like intersections. Radius driveway designs, like the one pictured on the right, encourage higher turning speeds and makes it less likely that the drivers will yield to pedestrians on the sidewalk.

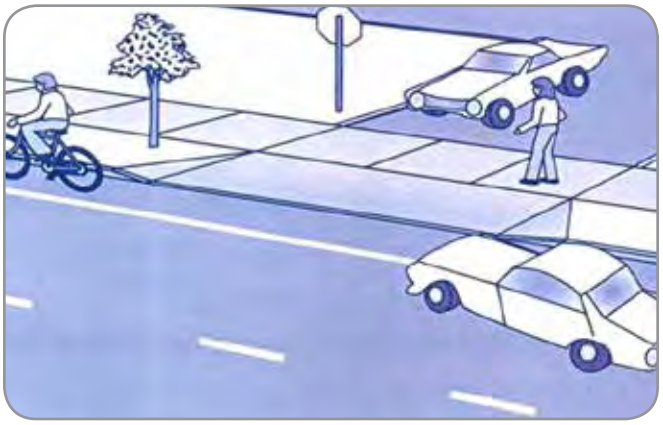
Providing a level, continuous sidewalk not only brings the sidewalk up to the standards of universal access for persons in wheelchairs, but also changes driver behavior. The driver exiting or entering the driveway is more aware that they are crossing a sidewalk, will proceed more slowly and is more likely to stop. Wing-type driveways (see illustration) also cause slower turning movements.

Alternative driveway designs for constrained spaces can be used. When there is not room for a full driveway apron, some alternative driveway designs can still comfortably maintain the level pedestrian pathway across the driveway. This will avoid cross-slope problems for wheelchair users.



Dan Burden

Radius-type driveways allow higher motor vehicle speeds. Driveways should not be designed like this.



Peter Lagerwey

Wing-type driveways provide the best pedestrian crossing as long as the driveway apron does not extend into the sidewalk area.



Peter Lagerwey

Sidewalks must allow a flat driveway crossing that is at least three feet wide with a side slope of less than 2 percent.

Fewer driveways and narrower driveway crossings will provide for improved pedestrian safety for children, especially for busy commercial zones. School walking routes should keep busy driveway crossings to a minimum. If young students are required to cross a busy school driveway, an adult should be assigned to monitor or direct the students at the driveway.

Treatment: Driveway Design and Location

Description/Purpose

Designing driveway crossings for pedestrians can improve the walking environment, improve visibility and reduce conflicts between drivers and pedestrians. Reducing the number of driveways can make it easier for people with disabilities to access and walk on the sidewalk.

Expected Effectiveness

Proper driveway design and placement can improve the safety of the pedestrian environment.

Costs

Costs will vary by project; no additional cost if part of original construction project (PEDSAFE, 2004).

Keys to Success

- For best results, driveways should be properly designed and consolidated at the outset. Local regulations can govern appropriate design when driveways are created.

Key Factors to Consider

- Projects that propose to retrofit or consolidate driveways after they are built should include an adequate level of public involvement and education to gain support from the community.

Evaluation Measures

- Reduced conflicts at driveways for pedestrians, bicyclists and drivers.

Corridor Access Management

Corridor access management is one of Federal Highway Administration's nine proven safety countermeasures. Corridor access management refers to the design, implementation, and control of entry and exit points, such as street intersections and driveways, along roads, streets and highways (Proven Safety Countermeasures, Corridor Access Management). Successful access management seeks to simultaneously provide for pedestrian and bicycle needs, preserve vehicle capacity and enhance safety of all users by managing the frequency and magnitude of conflict points (i.e., places where the travel paths of two different users may cross) along a corridor. Locations with higher densities of driveways, unsignalized crossroads, and median openings are associated with higher crash rates and injury severity (Mauga & Kaseko, 2010). Corridor access management has been effective at reducing all crash types along multi-lane rural highways, and severe and fatal crashes along urban and suburban arterial roadways (Highway Safety Manual).

Driveways and minor uncontrolled intersections can be especially problematic locations for pedestrians and bicyclists (Proven Safety Countermeasures, Corridor Access Management).

Most safety related studies on access management have focused mainly on vehicular crashes, but given that children often travel on sidewalks by foot and bicycle, corridor access management will likely benefit this group by decreasing the conflict with turning traffic, in particular left turning traffic.

On-street Bicycle Facilities

Providing student travel facilities along the street is not just about walking, but about bicycling too. Bicycling is an important way for children to travel to and from school. Bicycling can help students who live too far from school to walk to participate in active transportation. Use of on-street facilities is more appropriate for upper elementary school and older children who have sufficient bicycle handling skills and knowledge of bicycle and traffic safety rules. See the Education chapter for more information. On-street bicycle facilities discussed in this section:

- Bicycle routes and maps designating streets for bicycling.
- Bicycle lanes.
- Shared lane markings.
- Paved shoulders.
- Bicycle boulevards.

Streets

Most bicycling occurs on neighborhood streets where children live and go to school. Trails and pathways can complement, but certainly are not a substitute for, the residential street network. A considerable amount of all bicycling occurs on the street system, and for children especially, most will occur in the streets near where they live. Some communities have designated special bicycle routes that are marked with guide signs. Other communities have provided maps showing streets that are ideal for bicycling.

Children of all ages, even high school students, will bicycle to school if given the opportunity. When designating bicycle routes to encourage bicycling to school, target all age groups, including elementary, middle, junior high and high school students.

Bicycle Lanes

Bicycle lanes provide a striped and stenciled lane for one-way bicycle travel on roadways. Bicycle lanes offer a comfortable space for older or more experienced children to ride. Bicycle lanes have been positively associated with an increase in the share of commuting by bicycle to work (Nelson & Allen, 1997; Dill & Carr, 2003).



Bicycle helmet use should be strongly encouraged and mandated where required by law.



Peter Lagerwey

Older students will ride if given the opportunity.



Dan Burden

Bicycle lanes should include the lane line and bicycle lane symbol.

Typically, bicycle lanes are installed on roadways with higher traffic speeds and volumes. However, where the lane is directly serving a school, communities may elect to stripe bicycle lanes on low-traffic residential streets in order to provide an additional level of visibility for younger bicyclists.

Bicycle lanes located next to motor vehicle parking should be at least five feet wide. The preferred width of bicycle lanes next to a curb is also five feet, although four feet, excluding the gutter pan, may be adequate. Bicycle lanes should not be wide enough to accommodate a motor vehicle as drivers may attempt to use a wide bicycle lane as a travel lane. Bicycle lanes should be designated through the use of signs or painted symbols and motor vehicle parking restrictions. Accommodating bicycle lanes within an existing roadway right-of-way may be a challenge.

Some communities have established school bicycle safety routes and bicycle lanes that are functional just during school commute hours. Because these installations can conflict with existing on-street parking, some cities have experimented with "time-of-day" bicycle lanes; the parking lane becomes a bicycle lane during school hours and then reverts to on-street parking for evening and overnight. One disadvantage to this concept is that overnight parking may block the bicycle lane during the start of the bicycle lane hours.

Shared Lane Markings

A Shared Lane Marking (SLM) is placed in a travel lane to indicate the lateral positioning of a bicyclist. Where parking is allowed, it may help reduce the chance of a bicyclist impacting the door of a parked car. This marking may also help to increase the distance between a bicyclist and an overtaking motorist.



Shared Lane Markings are particularly useful when marked bike lanes are not an option due to street width or other factors, and can be used to link bicycle lanes within a comprehensive bicycle network.

Note that Shared Lane Markings should not be placed on roadways that have a speed limit above 35 mph and can not be placed on road shoulders or in designated bicycle lanes.

Information on Shared Lane Markings, including proper placement, can be found in Section 9C.07 of the 2009 MUTCD and in the UNC Highway Safety Center's 2010 evaluation (http://www.fhwa.dot.gov/publications/research/safety/pedbike/10041/10041.pdf).

Shoulders

Paved shoulders benefit both bicyclists and drivers. They provide a place for bicyclists to ride that is removed from the motor vehicle travel lane and reduce the likelihood of crashes from motor vehicles drifting out of their travel lane (run off the road crash). Building shoulders on existing roadways or including them in new roadway projects can often be justified by the safety benefit provided to drivers. While pedestrians can walk along shoulders, shoulders should not be considered a good substitute for sidewalks in urban areas.



Wide shoulders can accommodate groups of bicyclists.

Paths

Separated multi-use paths (sometime known as shared-use paths) are passageways that are used to increase the connectivity of the pedestrian and bicycle network. Paths can connect neighborhoods directly with schools and shorten the distance children must walk or bicycle. However, paths must be designed properly, especially where they intersect roadways, to minimize the risk of pedestrian and bicyclist crashes. Guidelines for designing paths are available in the Federal Highway Administration's Designing Sidewalks and Trails for Access Part 2 Best Practices and Design Guide and in the American Association of State Highway and Transportation Officials' Guide for the Development of Bicycle Facilities.

Guidelines for the width of a multi-use path can range from eight to 14 feet or more (AASHTO, 1999). Under most conditions, the recommended minimum width for a two-direction path designed for bicyclists and pedestrians is ten feet. However, when heavy traffic is expected, a path width of 12 to 14 feet is preferred. In some instances, a width of eight feet can be adequate, especially if the proportion of bicyclist or pedestrian travel is small and the overall number of users is not large (Turner et al., 2004).



Separate multi-use paths often provide a safe and more convenient alternative to riding or walking along a street and can be an integral part of the school walking and bicycling route plan.

Abandoned rail lines and utility corridors often make excellent corridors for multi-use paths. Pavement for multi-use paths can be asphalt or concrete. Measures should be taken to keep motor vehicles off of the path, yet allow maintenance vehicles to have access. This can be accomplished with removable posts (bollards) that lock into place. The space between posts should typically be about five feet wide to prevent motor vehicle access, but comfortably allow bicycle access. Agencies need to monitor conditions along the path for maintenance and repair. School officials, students and other path users can be a good source of information to alert the agency when bushes need trimming along the path or the surface is in need of debris removal or repair.

Treatment: Paths

Description/Purpose

Paths are passageways that are used to increase the connectivity of the pedestrian and bicycle network.

Expected Effectiveness

The presence of paths can increase the number of walking and bicycling trips made and decrease the time and distance it takes to travel from one point to another.

Costs

Costs vary by project conditions and scope. Availability of right-of-way can significantly change the total cost of projects.

Keys to Success

- Provide signs to show pedestrians and bicyclists how to access the path network and where it leads.
- Path designs should incorporate the appropriate width and/or number of lanes for the anticipated pedestrian and bicycle traffic.
- Paths should connect frequently visited origins and destinations.

Key Factors to Consider

- Considerations for lighting, maintenance and safety should be made.
- Acquiring easements can be a challenge.

Evaluation Measures

- Pedestrian and bicycle volume.

Connectivity

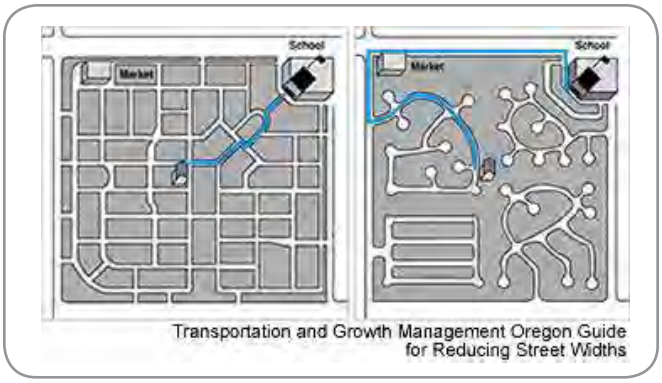
The connectivity of various bicycle and pedestrian facilities directly impacts the ability to walk or bicycle to school. Characteristics of a well-connected road or path network include short block lengths, numerous three and four-way intersections and minimal dead-ends (cul-de-sacs) (VTPI). As connectivity increases, travel distance decreases and route options increase. A network of streets, sidewalks, bicycle lanes and paths in which all parts are well-connected to each other reduces the distance children have to travel to get from home to school, allows for the use of more local streets rather than major roadways and provides a greater choice of routes to travel to and from school.



David Parisi

Paved paths connect cul-de-sacs in this community.

Street layout directly impacts the ability to walk or bicycle to school. Frequently, the layout of subdivision streets makes distances much longer than they need to be. Long neighborhood block lengths and cul-de-sacs contribute to this problem. Neighborhoods that are designed with long blocks and numerous cul-de-sacs are often barriers to walking and bicycling to school; they reduce connectivity and increase travel distance between the home and school.



Transportation and Growth Management Oregon Guide for Reducing Street Widths

The diagram on the left illustrates a street layout based on a grid system and the diagram on the right illustrates a layout which consists of many dead end streets with few exits or entrances. The diagram on the left provides a greater street connectivity than the diagram on the right. A trip from home to school for a child who lives in the neighborhood on the left is feasible on foot or by bicycle. It features a short distance using local streets, with no major streets to navigate. For the child who lives in the neighborhood on the right, the trip is longer and takes place mostly on busy streets. As a result, many parents will choose to drive their child to school which will overburden the arterial street system and create unnecessary traffic congestion at the school.

To help solve the cul-de-sac issue, connector paths between cul-de-sacs and other destinations can be constructed:

- At the time when the subdivision is first developed.
- As a voluntary retrofit.
- As a mandatory retrofit when the property is sold or redeveloped.



Peter Lagerwey

Connectivity is an important consideration when making a community walkable.

Treatment: Increasing Connectivity

Description/Purpose

Increasing connectivity of streets, paths and sidewalks reduces travel distances and makes it easier for pedestrians and bicyclists to access destinations.

Expected Effectiveness

The presence of paths, bridges or other neighborhood connectors can increase the number of walking and bicycling trips and decrease the time and distance it takes to travel from one point to another.

Costs

Costs vary by project conditions and scope; no additional costs are associated when connectivity is included in initial construction.

Keys to Success

- Sidewalk and roadway connectivity should be considered at the outset of design.
- Developments can be retrofitted for connectivity with the use of cut-throughs.

Key Factors to Consider

- Increasing roadway connectivity may sometimes cause an increase in unwanted through-vehicle traffic. Appropriate studies should be performed to estimate the effects of increasing roadway connectivity.
- It may be possible to retrofit existing, poorly connected street networks with a pedestrian path, bridge or sidewalk to increase connectivity.

Evaluation Measures

- Pedestrian and bicycle volume.

Bike Racks

Students must have a functional, secure place to park their bike once they reach school. Not having a well planned bicycle parking option can lead to several undesireable outcomes, such theft, damage and locked bikes in or on critical safety infrastructure like emergency exits, hand rails and fire hydrants.

According to the Association of Pedestrian and Bicycling Professionals Bicycle Parking Guidelines, there are four elements to a bicycle rack system:

1. **The Rack Element**
   The rack element is the part of the bike rack that supports one bicycle. A good bike rack element holds the bike frame without bending the wheel and should have no moving parts. Rack elements are typically constructed of metal in an inverted u-shape, which allows for a variety of bicycle sizes and locks.

2. **The Rack**
   A rack is one or more rack elements joined on any common base or arranged in a regular array and fastened to a common mounting surface. Anchor the rack so that it cannot be stolen with the bikes attached and provides easy, independent bike access. Inverted u-shaped rack elements mounted in a row should be placed on 30" centers, allowing two bicycles to be secured to each rack element.

3. **The Rack Area**
   The rack area is a bicycle parking lot where racks are separated by aisles and may contain one or more racks. If possible, the rack area should be protected from the elements using any combination of structures, like a wall and awning. Try to avoid locating a bike rack area on grass or dirt as a rainy day can turn the bicycle parking lot into a mess. Instead, locate the bike rack area on a concrete pad.

4. **The Rack Area Site**
   The rack area site is the relationship of the rack area to a building entrance and approach. Locate the bike rack area within visibility of the building entrance it serves and consider the route cyclists' use to approach that entrance. Bike rack areas should be sited in a space that minimizes vandalism and maximizes use, while avoiding conflicts with driveways, buses, and large numbers of pedestrians.

Ideally, rack areas should be sited as close, or closer, than the nearest car parking space and provided near all high traffic building entrances. When choosing between a larger bicycle rack area or multiple smaller rack areas, it is preferred to choose multiple locations that are more convenient to users.



Crossing the Street

A child's journey to school on a bicycle or by foot will likely require crossing one or more streets. Many situations arise at street crossings that can impact the safety of the crossing for all pedestrians. Underlying good, safe design at pedestrian crossings is the need to keep the street crossing simple. The development of safe crossings for children is guided by several principles including the need to:

1. Establish or identify good crossing locations.
2. Reduce crossing distances.
3. Provide crossings that are direct, so that children with visual impairments can easily negotiate them,
4. Use appropriate traffic controls such as marked crosswalks, traffic signals and warning signs or flashers.
5. Slow motor vehicle speeds.

Engineering improvements recommended for creating safer routes to school are based on these principles. This section describes a variety of treatments that are used to create safer street crossings:

- Tools to reduce crossing distances for pedestrians.
- Marked crosswalks.
- Traffic signals.



Dan Burden

Street crossings are a vital part of the safe school route.

Putting It Into Practice: School Crossing Audit Procedure
Phoenix, AZ

Phoenix, Arizona, has developed an audit procedure to evaluate individual school crossings to identify if any improvements can be made at the crossing and to identify locations where extra attention is needed. The audit procedure normally is conducted by a traffic engineer, a police representative and representatives from the school and school district. A separate audit form is completed for each individual crosswalk, and audits are performed on the major crossings. Audits are conducted when children are crossing, which allows for an evaluation of the crossing guard procedures. This also allows the guard to provide their input on traffic and other conditions at the crossing. A point system was developed for various conditions at the crossing; once the audit is completed, a letter summarizing findings and recommendations is sent to the principal and the district offices. Once the improvements are implemented, a follow-up audit is conducted to further monitor conditions. Over 200 audits have been completed and they have resulted in various improvements including new signs and crosswalks, street lights, curb ramps, larger waiting pads, stand-back lines, specialized crossing guard training, extra law enforcement and the installation of traffic signals.

See the City of Phoenix's School Crossing Safety Audit at www.saferoutesinfo.org/guide/engineering/phoenix_school_crossing_safety_audit.pdf

Putting It Into Practice: Swansfield Walk To School Day

Swansfield Elementary School, Columbia, MD

Swansfield Elementary School in Columbia, MD held its first Walk to School Day in 2005. The event was so popular that the school launched a Safe Routes to School program soon afterwards. From the outset, Swansfield's program involved students with disabilities. During Walk-to-School days, the school designated an alternative bus drop-off location a short distance from the school (along a school walking route) so that children who could not walk to school would be able to participate — including students with disabilities who receive special busing services. Teachers and parent volunteers were posted at the alternative location to assist special education students so that they were fully involved in the event and were able to walk to school with their peers.



Jennifer Toole

In addition to ensuring that SRTS encouragement programs included students with disabilities, Swansfield used SRTS grant money (including federal and local funds) to improve accessibility to the campus, including eliminating key sidewalk gaps and installing ADA-compliant curb ramps.

Tools to Reduce Crossing Distances

Wide, multilane roads are barriers to walking and bicycling to school. If children cannot cross multilane roads then they are, in essence, trapped in their neighborhoods, unable to walk or bicycle to school or to play and explore outside of their immediate neighborhood.

School walking routes and big roads do not mix. High-speed, busy, multilane roads are a barrier to walking and bicycling. In an effort to provide safe routes for children, such roads should mark the boundary of a school walking zone. Ideally, school attendance boundaries should be designated along the major arterial streets to avoid the need for young children to cross them, and schools should be built within neighborhoods, not on the other side of busy streets from students' homes.

The distance required to cross a street and the length of time that a pedestrian is exposed to traffic can be shortened with curb extensions and crossing islands. Curb extensions, also known as curb bulbs or bulb-outs, reduce the distance pedestrians must walk in the street, while crossing islands also simplify a crossing by breaking it into two pieces.



Dan Burden

Wide crossings can be barriers to children.



Elementary school children should not have to walk across wide, complex intersections like these for their school commute.

Pedestrian and Bicycle Bridges and Underpasses

There are locations where a pedestrian bridge or underpass is the only way for pedestrians and bicyclists to cross the street, such as when children would otherwise be forced to cross freeways or major multi-lane arterial streets to get to or from school. However, the benefits of bridges and underpasses must be weighed against their substantial costs, which can be $2 million or more. The convenience of bridges and underpasses should also be considered. If they require pedestrians and bicyclists to follow an indirect path, they are unlikely to be used. Some schools station adult crossing guards at nearby bridges to ensure that students use them.



Pedestrian bridge at Isaac Middle School in Phoenix, AZ. Image provided by Mike Cynecki.

Curb Extensions

Curb extensions narrow the roadway and reduce the crossing distance by providing an extension of the sidewalk area into the parking lane. This brings pedestrians out from behind parked motor vehicles and helps pedestrians and drivers to better see each other. This is especially important for smaller children who are often invisible behind parked motor vehicles and may take longer to cross the street. For main streets, reducing the crossing time permits the green-light time for the major street traffic to be increased proportionately (AASHTO, 2004). A curb extension also can slow turning vehicles and prevent drivers from parking on or near a crosswalk. Curb extensions must be designed to accommodate drainage. There are cases where curb extensions may not be needed or desirable on every leg of an intersection, such as when the street leg is narrow, parking is not permitted, or the curb would interfere with a bicycle lane or the ability of fire trucks or other large vehicles to negotiate a turn (AASHTO, 2004).



Curb extensions prevent motorists from parking too close to the intersection.

Treatment: Curb Extensions

Description/Purpose

The extension of the curb out from the sidewalk and into the street, typically at an intersection. Curb extensions increase pedestrian visibility and decrease pedestrian exposure distance in the street, crossing time and vehicle turn speeds.

Expected Effectiveness

- Better sight distances for pedestrians and drivers.
- Motor vehicles cannot park in, or too near, crosswalks if curb extensions are properly designed.
- Increases driver awareness of pedestrians.

Costs

Costs vary widely, ranging from $2,000 to $20,000, depending on details of design, drainage and movement or removal of utility poles or controller boxes (PEDSAFE, 2004).

Keys to Success

- Adequate lighting is needed to keep drivers from running into the curb extension.

Key Factors to Consider

- Curb extensions work best when installed on streets that have on-street parking (parallel, diagonal or perpendicular).
- Curb extensions should be designed to accommodate large vehicles and bicycles, as appropriate.
- Drainage issue must be addressed.

Evaluation Measures

- Number of crashes involving pedestrians.
- Severity of crashes.
- Speeds of through and right-turning motor vehicles.

Crossing Islands

The pedestrian crossing island, also known as a raised median or refuge island, is a raised island placed in the middle of the street at intersections or midblock locations. The island separates crossing pedestrians from motor vehicles and narrows the travel lanes at that location. By breaking the crossing into two phases, crossing islands decrease pedestrian wait time, reduce crossing distance and allow pedestrians to focus on one direction of traffic at a time. Raised medians and pedestrian crossing islands are one of Federal Highway Administration's nine proven safety countermeasures. Pedestrian crossing islands are effective techniques to reduce vehicle-pedestrian crash frequency and severity on multi-lane streets with both marked and unmarked crosswalks and on two-lane roads with and without a center left-turn lane (Bowman & Vecellio, 1994; Zegeer et al., 2002; Harkey et al., 2008; Chen et al., 2012).

Overall, crossing islands simplify and reduce the pedestrian exposure time to approaching motor vehicles at a crossing. These benefits are especially important for children, who tend to cross intersections more slowly and have less experience with crossings than adults. Crossing islands are designed with an opening that is level with the street to allow wheelchairs and pedestrians to cross through the island. Crossing islands improve safety at signalized intersections, providing refuge for those who begin crossing too late or are too slow to cross the entire street in one signal cycle (AASHTO, 2004).

While the crash-reduction safety benefits of pedestrian

Treatment: Crossing Islands

Description/Purpose

Raised medians in the middle of a street at an intersection, midpoint of the block or continuously along street. They protect crossing pedestrians from oncoming traffic by serving as a barrier from motor vehicles, reduce crossing distance and allow pedestrians to focus on one direction of traffic at a time.

Expected Effectiveness

Significant reduction in pedestrian crashes on multi-lane streets and on multi-lane streets with marked and unmarked crosswalks at unsignalized crossing locations (Bowman & Vecellio, 1994; Zegeer et al., 2002).

Costs

- Costs vary widely depending on the length and type of individual crossing islands, ranging from $6,000 to $200,000 (Safety Toolbox, Pedestrian Refuge Island).
- Continuous raised medians cost $15,000 to $30,000 per 100 feet depending on conditions (PEDSAFE, 2004).

Keys to Success

- Most effective on high volume, multi-lane streets.
- Should be accessible to pedestrians with a visual impairment or in wheelchairs.
- Adequate lighting and markings can help to ensure driver awareness of crossing islands.
- Efforts should be made to slow traffic using advanced stop or yield lines and traffic calming measures for multi-lane pedestrian crossings (Leden, Garder, & Johansson, 2006).

Key Factors to Consider

- Landscaping, utilities and maintenance issues must be addressed in the overall design.
- Can benefit motor vehicle safety as well by reducing head-on vehicular crashes.
- Potential business opposition due to loss of left-hand turn ability.
- May conflict with right-hand turns for large vehicles.
- Must be Americans with Disabilities Act-compliant.

Evaluation Measures

- Number of pedestrian crashes.
- Number of vehicular crashes, especially left-hand-turn crashes, angle crashes at driveways and head-on vehicle-vehicle crashes.

crossing islands and raised medians are well documented, evaluations of the impacts of pedestrian crossing islands on child pedestrians, particularly near schools, is limited. Such evaluations require being able to discern the unique safety effects of pedestrian islands within school crossing environments. Often streets near schools where pedestrian crossing islands are present also have special school signs and markings and crossing guards. This combination makes it difficult to isolate their respective safety contributions at a particular location.

Crossing Islands for Offset or Two-Stage Crossings

Another innovation in crossing islands is to stagger or offset the two halves of the crosswalk at the island. This further reinforces the concept of a two-stage crossing and separates the crossing of each direction of traffic.



Michael Cynecki

Two-stage crossing island at Sunnyslope High School in Phoenix, Arizona.



Diagrammatic sign on a two-stage crossing island in Phoenix, AZ. Image provided by Mike Cynecki.

The median island is fenced and directs the pedestrian to face traffic once they reach the center island, before crossing the second half of the street. The median island must be fully wheelchair accessible.

A diagrammatic sign installed in a two-stage crossing island can be quite helpful in alerting pedestrians about possible dangers from moving vehicles when the closest lane of traffic stops.

For more information on staggered medians visit PedSafe "Staggered Median" case study Tucson, Arizona (http://www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=34).

Waiting Areas and Stand-back Lines

Larger waiting areas and stand-back lines are low cost measures to improve safety at busy crossings. Large groups of students should not be waiting to cross immediately next to high-speed moving traffic. Waiting areas at crosswalks can be provided along with stand-back lines painted to keep children further back from busy streets when waiting to cross.

When adequate waiting areas and stand-back lines are provided, the adult school crossing guard should be the only person between the curb and the stand-back line. The stand-back line gives the guard something to point at when telling children to stand back from the street.



Michael Cynecki

Waiting areas and stand-back lines keep students further back from busy streets when waiting to cross in Phoenix, Arizona.

Treatment: Waiting Areas

Description/Purpose

Extra paving at busy crossings where large numbers of pedestrians can congregate before crossing the street without having to stand on landscaping, dirt or mud.

Expected Effectiveness

Waiting areas provide a separation between moving traffic and students, bicyclists and parents with strollers waiting to cross.

Costs

Costs range from $500 to $1,500 depending on the size of the additional waiting area.

Keys to Success

- Working with schools to evaluate the crossing and making sure the waiting area is large enough to accommodate potential pedestrian volumes.

Key Factors to Consider

- Potential need for larger sidewalk easement.
- Potential relocation of landscaping and/or utilities.

Evaluation Measures

- Pedestrian capacity of waiting area.

Treatment: Stand-back Lines

Description/Purpose

A painted line on the sidewalk at a crossing, typically 5 to 10 feet from the back of the curb line, which pedestrians wait behind before crossing.

Expected Effectiveness

Increases pedestrian safety by increasing the distance between waiting pedestrians and vehicular traffic. The line also gives something for the crossing guard to point at when telling students where to wait before it is safe to cross the street.

Costs

Stand-back lines are extremely inexpensive, with an average cost of $50; however, the lines may need repainting annually.

Keys to Success

- Ensuring a large enough waiting area, but stand back-lines can also be effective on narrow sidewalks.

Key Factors to Consider

- Ensuring the stand-back line is in good condition (visible) at the start of each school year. Colors for blue-stake markings should not be used.

Evaluation Measures

- Pedestrian-vehicle conflicts.

Putting It Into Practice: Student Waiting Pads and Stand Back Lines
Phoenix, AZ

These images highlight the differences before and after a waiting area and stand-back line were installed at RE Miller Elementary School in Phoenix, AZ.



Before Michael Cynecki



After Michael Cynecki

Unfortunately, many school crossings are at busy streets, and many of the sidewalks in Phoenix were built prior to the time when sidewalk buffer areas were required as a part of the design to separate pedestrians and motor vehicle traffic. It is important to provide a separation between moving vehicles and young children waiting to cross a busy street. This is not possible with a five foot-wide sidewalk.

One such school crossing was identified by the Washington Elementary School District in northwest Phoenix. This is a crossing for RE Miller Elementary School for nearly 100 children over a busy five-lane street with nearly 40,000 motor vehicles per day. Despite the presence of two crossing guards and a 15 mph school zone, the school district expressed a concern about the large groups of children waiting on a five-foot wide sidewalk before crossing.

The school district, City, and property owners worked together on a solution to provide a safe area for students to wait. The property owner (church) provided an easement to build a 10 ft by 20 ft waiting area behind the sidewalk. The school district moved the existing wood fence behind the new student waiting pad, and the City modified the landscaping behind the sidewalk, poured a concrete pad for students, and placed a 'Stand-Back' line between the sidewalk and student waiting area. These low-cost and low-tech measures provided a considerable safety benefit at the crosswalk. Since then, Phoenix has built nearly 80 student waiting areas at major crossings where large numbers of students congregate before crossing. Even more of the painted 'stand-back' lines have been installed at numerous school crossings.

This example illustrates that you do not have to spend a lot of money to obtain a big safety dividend. Some of the least expensive measures can have a big impact on safety.

Road Diets

A "road diet" occurs when one or more travel lanes or parking lanes which primarily serves motor vehicles is reallocated to serve another mode of travel. This most commonly involves converting an undivided four lane roadway into three lanes made up of two through lanes and a center two-way left turn lane with bicycle lanes added. The reduction of lanes allows the roadway to be reallocated for other uses such as bicycle lanes, pedestrian crossing islands, and/or parking (Proven Safety Countermeasures). The road diet is recognized as a proven safety countermeasure by the Federal Highway Administration. Studies demonstrate that road diets reduce vehicle-to-vehicle and pedestrian-to-vehicle crashes and lower vehicle speeds (Huang, Stewart, & Zegeer, 2002; Harkey et al., 2008; Chen et al., 2012; PEDSAFE, 2004 Ch. 5; Gates et al., 2007; Keuper, 2007). Street crossings are safer for pedestrians when there are fewer lanes to cross because a pedestrians' exposure to traffic is reduced. Multiple-lane threat is a problem that arises when pedestrians have to cross more than one lane in each direction. A multiple-threat pedestrian crash is a crash type that occurs when a motor vehicle in one lane stops and provides a visual screen to the motorist in the adjacent lane. The motorist in the adjacent lane continues to move and hits the pedestrian. This type of collision, where the pedestrian is hit in the second, third or fourth lane is common on multilane roads and typically results in a serious injury or death producing collision due to a higher impact speed. Additionally, providing advance yield lines or stop lines as well as crossing islands also reduce the risk of a multiple threat crash, as discussed later in this chapter.

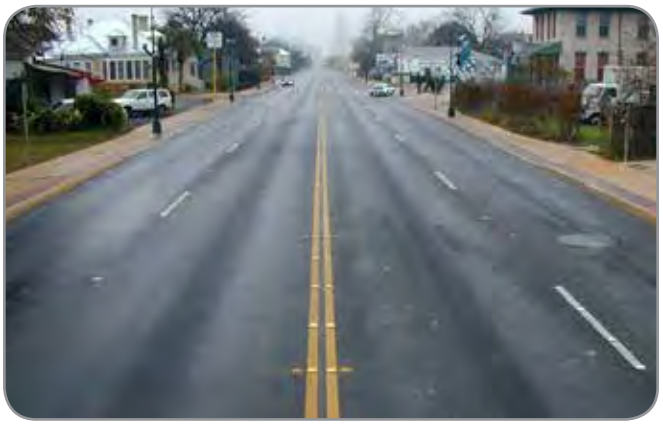
By decreasing the width of the road and number of travel lanes that pedestrians must cross, a road diet helps lower vehicle speed and reduces the multiple-lane threat to pedestrians. In settings with large numbers of children, speed management has great potential for injury prevention. Pedestrian crashes involving a child most often result from the child's error, thus slower speeds give motorists more time to react and can lessen injuries when crashes do occur (Retting, Ferguson, & McCartt, 2003).

While road diets offer motorist and the general pedestrian population certain safety benefits, there is little



Peter Lagerwey

In this image, the pedestrians have crossed over the first of two lanes. The driver in the inside lane has stopped to let them cross. However, the driver in the outside lane has not seen the pedestrians and is still moving.



Dan Burden

This four-lane road is difficult for pedestrians to cross before the road diet.



Dan Burden

This shows the same road converted to three lanes plus bicycle lanes after the road diet.

research that has specifically examined the impact of road diets on children. Children face special challenges to safely cross a multi-lane street such as impulsiveness; slower walking speeds; small body size that limits their visibility; less experience with traffic and still-developing cognitive abilities that make it difficult to accurately judge vehicle speed and traffic stream gaps (Rodergerdts et al., 2010; Fitpatrick et al., 2006). These factors lend support for considering the need for adult supervision such as parents, caregivers or crossing guards at street crossing locations near elementary schools during arrival and dismissal times.

Road diets can be low cost if planned in conjunction with reconstruction or pavement overlay projects, since a road diet mostly consists of reallocating roadway space with restriping. More capital-intensive conversions can include curb realignments or addition of center medians or median islands. If curbs are realigned, space can be allocated to green space or other buffers or to increase sidewalk width. Roadways with Average Daily Traffic (ADT) of 20,000 or less may be good candidates for a road diet and should be evaluated for feasibility (Proven Safety Countermeasures, Road Diet; HSIS, 2010). Most studies indicate that roadways were able to maintain vehicle capacity after the road diet was installed, (Harkey et al., 2008; Gates et al., 2007; Keuper, 2007), (ITE, 2010; HSIS, 2010), although one report found some delays during peak travel hours (Knapp & Giese, 2001). Three-lane roadways, like those created by road diets, can improve emergency response by creating space, via a two-way center turn lane, for emergency vehicles to bypass congestion (Daisa, 2010). Driveway density, transit routes, the frequency and design of intersections along the corridor, as well as operational characteristics are some considerations to be evaluated before deciding to implement a road diet (Proven Safety Countermeasures, Road Diet).

The next three images illustrate the "diet" applied to a four-lane roadway that is difficult to cross. Pedestrians must cross four travel lanes, there is no center pedestrian crossing island, no buffer between the road and sidewalk, and there is no designated space for bicyclists. Additionally, it is difficult for motorists to make left turns into the driveways and side streets along this road.



Dan Burden

Pedestrian crossing islands can be added in the center lane at select crossing locations.

Through the road diet, the roadway has now been reduced from four lanes to three lanes, one lane in each direction, plus a two-way center turn lane. There is now room to install bicycle lanes, and the bicycle lanes create a sidewalk buffer for pedestrians. This road diet was accomplished with paint, which has a relatively small cost and requires no construction.

A much better pedestrian connection along this roadway is now possible. The restriping of this roadway improves pedestrian crossings along the entire corridor since pedestrians only cross two through lanes, versus four lanes of travel. This roadway configuration also allows for the placement of crossing islands at some locations, which provide the pedestrian a refuge and allow the pedestrian to focus on traffic from one direction at a time. Adjacent residents and businesses also benefit from this change because left turns into and out of their property are now easier. Thus, road diets can benefit pedestrians, bicyclists, motorists, and adjacent businesses.

Treatment: Road Diet

Description/Purpose

Road diets are reductions of lanes on multilane roadways that can reduce crossing distances, as well as motor vehicle speeds, providing safety benefits to pedestrians, bicyclists and drivers. Road diets can also redistribute space to bicyclists and pedestrians by creating room for bicycle lanes and sidewalks.

Expected Effectiveness

Narrowing roadways and/or reducing the number of lanes that pedestrians are required to cross can result in slower motor vehicle speeds and reduced crossing exposure time, corresponding to a reduction in pedestrian crashes.

Costs

Costs vary depending on the scope and scale of the road diet.

- The cost of restriping a four-lane street to one lane in each direction, a two-way left-turn lane and bicycle lanes is about $5,000 to $20,000 per mile, depending on the number of lane-lines that must be repainted.
- Net costs may be lower for road diets when restriping a roadway after a resurfacing project.
- The cost of adding sidewalks and raised medians is much higher, estimated at $100,000 per mile or more (PEDSAFE, 2004).

Keys to Success

- Considerations must be made for overall safety and roadway capacity operation.
- It is also desirable to include the entire affected area in the decision-making process.

Key Factors to Consider

- Reducing the number of lanes may result in lower motor vehicle capacity and increased delay for drivers in some situations.
- A level-of-service analysis should be conducted to determine whether the number of lanes on a roadway is appropriate and how alternative routes will be impacted by a road diet.

Evaluation Measures

- Reduction in motor vehicle speed or reduction in crashes and/or crash severity involving crossing pedestrians or bicyclists.

Marking Crosswalks

A marked crosswalk can benefit pedestrians by directing them to cross at locations where appropriate traffic control, including traffic signals or adult school crossing guards, either currently exist or can be provided. However, marked pedestrian crosswalks in and of themselves do not slow traffic or reduce pedestrian crashes.

It may be helpful to install marked crosswalks at signalized intersections or locations where crosswalks are typically marked, at key crossings in neighborhoods with designated school walking routes, and at uncontrolled crossings.

There are several reasons to install marked crosswalks, a few being:

- To indicate a preferred pedestrian crossing location.
- To alert drivers to an often used pedestrian crossing.
- To indicate school walking routes.

Marked Crosswalks at Uncontrolled Crossings

Marked crosswalks at uncontrolled intersections must be carefully designed to ensure that they enhance, rather than reduce, pedestrian safety. In some circumstances marked crosswalks should not be installed unless measures are taken to reduce traffic speeds, shorten crossing distances, enhance driver awareness, and/or provide an active warning of pedestrian presence.

Marked crosswalks alone (without other substantial treatments) should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph or either:

- The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or
- The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater.

Note: The wording above complies with the 2001 Traffic Control Device Handbook, Chapter 13. The exact wording in the 2009 MUTCD on this issue is currently worded slightly differently and is being considered for revision by FHWA.



IWALK 2005

A marked crosswalk guides students along the school walking route to Ocoee Elementary School in Orlando, Florida.

It is important that both drivers and pedestrians clearly see the crossings.

Marked crosswalks should be designed to minimize crossing distances and should be straight, to make them easier for children with visual impairments to navigate. In many cases, crosswalk enhancements including raised median islands, traffic and pedestrian signals, or street lighting may also be needed. More substantial improvements are typically needed on high-volume multilane roads.

Treatment: Marked Crosswalks

Description/Purpose

Marked crosswalks are painted pedestrian crossings that specify proper locations for pedestrians to cross the street.

Expected Effectiveness

Properly placed marked crosswalks can encourage pedestrians to walk at preferred crossing locations while increasing the visibility of a pedestrian crossing and driver awareness. There is no proven reduction in pedestrian crashes resulting from marking crosswalks without adding other more substantial crossing treatments such as raised medians, traffic and pedestrian signals or improved nighttime lighting.

Costs

Costs range from $100 for a regular striped crosswalk to $300 for a ladder crosswalk to $3,000 for a patterned concrete crosswalk (PEDSAFE, 2004). Maintenance costs should also be considered based on the paint material used.

Keys to Success

- Locations chosen to have marked crosswalks should be convenient, accessible and in the direct pedestrian route (AASHTO, 2004). For more information see the Institute of Transportation Engineers' Traffic Control Devices Handbook, 2001 and Zegeer, 2002.

Key Factors to Consider

- On multilane, high volume roads, substantial treatments, including raised medians, are also needed so pedestrian crash risks do not increase.
- Crosswalk markings must be placed so that the curb ramp is within the crosswalk.

Evaluation Measures

- Reduction in motor vehicle conflicts and increase in pedestrian activity within the crosswalk.

High-Visibility Crosswalks

Marked crosswalks guide pedestrians and alert drivers to a crossing location, so it is important that both drivers and pedestrians clearly see the crossings. Crosswalks can be marked in paint or a longer lasting plastic or epoxy material embedded with reflective glass beads. Although more expensive, longer-lasting crosswalk marking materials are a better value over time as they require less maintenance.

The minimum crosswalk width is six feet wide, but school-related crosswalks should be 10 to 15 feet wide or wider at crossings with high numbers of students. School-related crosswalks should be checked annually before the start of the school year. If necessary, fresh paint should be applied and other improvements made to keep the crosswalks in good condition.

The MUTCD allows for two high-visibilty crosswalk designs, ladder and diagonal markings.



Crosswalk A is a traditional parallel line crosswalk. Crosswalk B is high-visibility crosswalk with a ladder design

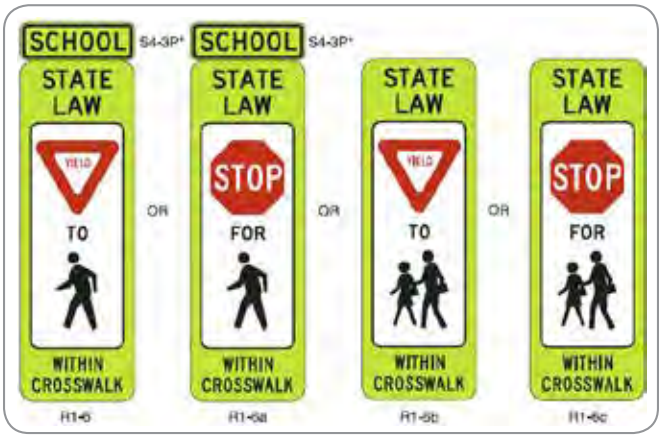
Signing Crosswalks

In-street signs

In-street crosswalk signs can be installed at unsignalized pedestrian crossings to make the crosswalk more visible and increase driver yielding. They are more effective on two-lane, low-speed streets than on multi-lane, high-speed streets, and are prohibited by the 2009 MUTCD at signalized intersections. They can be easily damaged and need to be reset or replaced when struck.

In-street pedestrian crossing signs should be placed at the crosswalk in the street or on a median, but should not obstruct the pedestrian path of travel. In-street signs can be permanently installed in the roadway or mounted on a portable base to allow them to be taken in and out of the street during the school day. When portable in-street signs are used for school crossings, they should be monitored by a school official or adult school crossing guard.

The MUTCD allows for two high-visibilty crosswalk designs, ladder and diagonal markings.



In-street yield and and stop signs. The 2009 MUTCD added a new option to use the schoolchildren symbol rather than the pedestrian symbol when an in-street sign is used at a school crossing. Image from the 2009 MUTCD.

Overhead signs and flashing beacons

School crosswalks with overhead signs (and sometimes flashing beacons) may be helpful in alerting drivers of a busy crossing at a wide or higher speed street. These are usually placed at mid-block crossings but can be used at intersections with uncontrolled crossings. Overhead signs are easier for drivers to see in cases where on-street parking, street trees, or other visual obstructions. Flashing beacons at a marked crosswalk may draw additional attention to the crosswalk. In a busy urban environment, flashing beacons may not provide much benefit, while on a rural road, they may increase driver awareness of the crosswalk. In other locations the beacons are set with a timer to flash only during crossing times, or are pedestrian-activated by an automatic detector or push button and only flash when pedestrians are present.



Overhead pedestrian crossing sign. The 2009 MUTCD allows the use of the schoolchildren symbol as shown in the modified image above. Image from the 2009 MUTCD.

Rectangular Rapid Flashing Beacon

Rectangular rapid flashing beacons (RRFBs) are active warning devices used to alert motorists of crossing pedestrians at uncontrolled crossings. They remain dark until activated by pedestrians, at which point they emit a bright, rapidly flashing yellow light, which signals drivers to stop.

Studies suggest that RRFBs can significantly increase yielding rates over standard pedestrian warning signs. Results have shown that motorist yielding can be increased from baselines averaging 5% to 20% with the standard pedestrian warning sign treatment to sustainable yielding rates of 80% with this device.

RRFBs should be installed on both the right and left sides of the crosswalk, or in a median if available. They are not currently included in the MUTCD, but jurisdications can use them if they obtain approval from FHWA.



Image: Provided by PBIC Designing for Pedestrian Safety Course.

In-pavement Flashers

Crosswalks with in-pavement flashers, or 'flashing crosswalks,' consist of embedded lights that are activated when a pedestrian pushes a button or starts walking across the crosswalk. The 2009 MUTCD allows them at uncontrolled crossings to further alert drivers to crosswalks at night but does not allow them at crosswalks controlled by traffic signals, STOP signs or YIELD signs. Crosswalks with in-pavement flashers are expensive to install and maintain, and should not be selected without first considering other solutions.

A 2009 review of literature on in-pavement flashing lights may be found on the Pedestrian and Bicycle Information Center's website. For more information on case studies related to in-roadway warning lights visit 2004 PEDSAFE "School Zone Improvements" (http://www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=27). Cupertino, California case study. Evaluations of use of in-roadway warning lights are available from Washington and Florida.



In-pavement flashers at crosswalks are also an option that can be considered.

Advance Stop/Yield Line

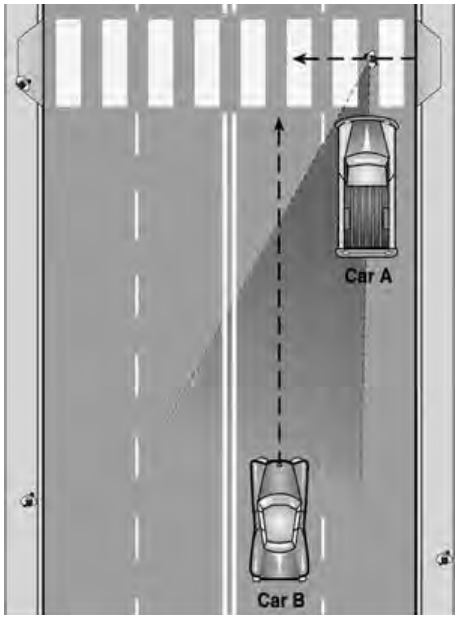
Advance stop or yield lines encourage drivers to stop further back from the crosswalk, promoting better visibility between pedestrians and motorists, and helping to prevent multiple-threat collisions particularly at midblock or uncontrolled crossings.

A multiple-threat collision is a pedestrian crash type that occurs when pedestrians have to cross more than one lane in each direction. A motor vehicle in one lane stops and provides a visual screen to the motorist in the adjacent lane. The motorist in the adjacent lane continues to move and hits the pedestrian.

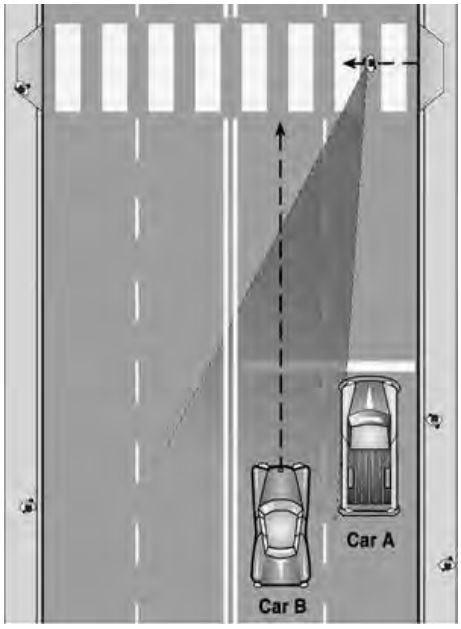
The 2009 MUTCD recommends that yield or stop lines used at uncontrolled multi-lane crossings be placed 20 to 50 feet in advance of the crosswalk; however, a distance of 30–50 feet is preferable. This distance is far enough away to provide for improved sight distance in the adjacent lanes. If the bars are placed more than 50 feet away, motorists are more likely to ignore the line and stop only a few feet prior to the crosswalk. At signalized midblock locations, the 2009 MUTCD recommends separation of at least 40 feet between the stop line and the nearest signal indication.



Painted triangles (shark's teeth) are used as the yield line at unsignalized locations.



Problem: Car 1 stops to let pedestrian cross; car 1 masks car 2, obstructing the pedestrian's and car 2's view of one another. Car 2 doesn't stop and may hit the pedestrian at a high rate of speed.



Solution: place advance stop/yield line so car 1 stops further back; car 1 no longer masks car 2, which can better see and be seen by the pedestrian.

The following signs can be used to reinforce advance stop or yield lines.



R1-5



R1-5a



R1-5b



R1-5c

Parking Restrictions

Restricting parking at corners will improve visibility of the crossing for both drivers and pedestrians. At a minimum, 30 feet should be kept clear in advance of marked crosswalks to help pedestrians and drivers see each other better. Distances greater than 30 feet are generally better, but parking restrictions have to be balanced with the need of the driver. For example, if parent parking is severely restricted or completely removed near schools, parents may ignore all parking restrictions.



Charlie Zegeer

Removing parking from corners can improve visibility between pedestrians and approaching drivers.

Treatment: Parking Restrictions at Corners

Description/Purpose

Restricting how close motor vehicles may park to a crosswalk (20-foot minimum per MUTCD) to improve pedestrian and driver sight distance.

Expected Effectiveness

Eliminating parking spaces too close to a crosswalk will improve pedestrian and motor vehicle visibility, which can reduce the likelihood of pedestrian-vehicle conflicts and collisions.

Costs

Costs involve new street markings, signs, enforcement and public education efforts. Roadway reconstruction issues may also affect the overall cost (Zegeer et al., 2004).

Keys to Success

- Accurately identifying problem locations and appropriate improvements.
- Educating the public about the purpose of proposed improvements.
- Enforcing parking restrictions.

Key Factors to Consider

- Potentially strong resistance to the loss of parking spaces by business owners and local residents, especially in areas with limited parking.

Evaluation Measures

- Number of crossing pedestrian crashes.
- Number of pedestrian-vehicle conflicts.

Traffic Signals

Signalizing busy intersections and providing signalized crosswalks help create safe routes to schools for children. New traffic signals are very expensive and must be warranted or they could cause more harm than good. Warrants for installing traffic signals are provided in the Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition Chapter 4C at http://mutcd.fhwa.dot.gov/pdfs/2009/part4.pdf.

Traffic signals are the highest form of traffic control. However, their benefit to the pedestrian network is contingent upon the application of several principles including:

Mark all legs of an intersection.
Pedestrian paths (marked crosswalks) should be provided on all sides of an intersection where pedestrian crossings are desired. A school walking route plan may limit crossings to three or fewer legs, but all options should be available for school officials to select the most desirable crosswalks to use.

Provide pedestrian signal heads in all directions.
Pedestrian signal indications (WALK, flashing DON'T WALK, DON'T WALK or walking man and raised hand symbols) should be provided at every signalized crossing.

Only use pedestrian pushbuttons if they are needed.
Push buttons are generally appropriate at locations with low or intermittent pedestrian activity. If used, they should be in clear view, wheelchair accessible and responsive to those who push the buttons.

Install landings on all corners.
Fully accessible landings should be in place on all corners to provide a safe place for people to wait.

Paint stop bars for motor vehicles on all approaches.
Stopping motor vehicles in advance of the marked crosswalk keeps the crosswalk clear for pedestrians and can reduce right-turn-on-red conflicts

Install curb ramps on each corner.
Two curb ramps per corner; eight per intersection is generally recommended, although there are situations where one diagonal ramp per corner is an acceptable option (e.g., where there is a wide turning radius and two ramps per corner is not feasible).

Provide streetlights on all four corners.
Proper illumination is critical at signalized intersections. Children are smaller and more difficult for motorists to see, especially in darker conditions, such as occur during arrival in the winter months.



Dan Burden

Pedestrian signal indications (WALK, flashing DON'T WALK, DON'T WALK, or walking man and raised hand symbols) should be provided at every signalized crossing.

Treatment: Traffic Signal Installation

Description/Purpose

Signals that control the flow of traffic and provide sufficient time for safe and efficient pedestrian crossings.

Expected Effectiveness

When signals are installed at appropriate locations (where warranted) they should improve pedestrian safety and also reduce the severity of motor vehicle crashes, even though total motor vehicle crashes (including rear-end collisions) may increase. Research is limited on the effect of traffic signals on pedestrian crashes, although some pedestrian signal timing schemes have been shown to significantly reduce pedestrian crash risk.

Costs

Costs range from $30,000 to $140,000 (PEDSAFE, 2004).

Keys to Success

- Signal cycles should be kept short.
- Marked crosswalks encourage pedestrians to cross at the signal.
- Pedestrian actuation (pushbuttons) should only be used if the pedestrian volume is low enough to support it and must be placed in accessible locations. Consider audible signals if students with visual impairments are present.

Key Factors to Consider

- Potential increase of vehicular crashes (especially rear-end collisions).
- Potential traffic diversion to adjacent streets.

Evaluation Measures

- Motor vehicle–pedestrian crashes.
- Pedestrian ability to complete their crossing before the steady DON'T WALK is displayed.
- Signal compliance of pedestrians.

Timing

The signal phasing and/or timing can be modified to increase the time available for pedestrians to cross, to give priority to the pedestrian at an intersection, and/or to provide a separation in time of motor vehicle and pedestrian crossings. The timing or phasing of traffic signals is a complex issue, impacted by the signal timing itself as well as other conditions at the crossing including pedestrian and driver behaviors. Factors that contribute to the complexity of traffic signal timing and phasing include:

- Duration of time pedestrians must wait for the WALK signal.
- Number of motor vehicle movements that conflict with the pedestrian WALK signal.
- Amount of time that is provided for people to cross the street.
- Speed at which people are walking.
- Presence or absence of a button people have to push to get a walk indicator and adequate time to cross the street.
- Presence or absence of one or more adult school crossing guards available to assist younger students while crossing the street. See Adult School Crossing Guard Guidelines for more information at www.saferoutesinfo.org/guide/crossing_guard/index.cfm.
- The potential for conflicts between pedestrians and right-turning motor vehicles.



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Treatment: Modified Traffic Signal Phasing and/or Timing

Description/Purpose

The signal phasing and/or timing can be modified to increase the time available for pedestrians to cross, to give priority to the pedestrian at an intersection and/or to provide a separation in time of motor vehicle and pedestrian crossings. Lead Pedestrian Interval is an example of modified signal phasing/timing treatment.

At signalized intersections, Leading Pedestrian Intervals allow the crosswalk/ pedestrian movement to begin crossing 3-6 seconds before the green light is given to motor vehicle traffic in the same direction. This gives pedestrians a head start, making it more likely that drivers will see them while turning. Leading Pedestrian Intervals are appropriate at signalized intersections where there is relatively heavy pedestrian volume or significant conflicts with turning vehicles. A "No Turn On Red" or "No Turn On Red When Pedestrians Are Present" sign should be considered in such situations, according to the 2009 MUTCD.

Expected Effectiveness

Studies of exclusive pedestrian timing have shown a reduction in pedestrian crashes by 50 percent in some downtown areas with high pedestrian volumes and low vehicle speeds and volumes. Other signal modifications have also resulted in a decrease in motor vehicle–pedestrian conflicts at intersections (e.g., leading pedestrian interval) (Zegeer, Opiela, & Cynecki, 1985).

Costs

The cost for adjusting signal timing is relatively low. The cost for installing new signals ranges from $20,000 to $140,000 (PEDSAFE, 2004).

Keys to Success

- Ensure that signals are placed so that they are visible to pedestrians and pushbuttons, if provided, are easy to reach.
- To ensure pedestrians gain the full benefit of the leading pedestrian interval, a "No Turn on Red" (R10-11) sign should be posted to prevent motorists from turning into crossing pedestrians. At locations where it is desirable to allow drivers to turn on red outside of school hours, a plaque (R10-20aP) can be placed beneath the "No Turn on Red" sign stating the hours during which it the restriction is in effect.

Key Factors to Consider

- Signal cycles should be kept fairly short to minimize pedestrian delay, but wider intersections may require longer cycle lengths.
- The speed and volume of motor vehicles should also be considered in signal timing calculations and decisions.

Evaluation Measures

- Number of conflicts with motor vehicles (especially turning vehicles) and pedestrians at intersections.

Accessible Pedestrian Signals

Accessible pedestrian signals are audible signals that indicate when it is or is not appropriate to cross the street. Federal ADA guidelines encourage the use of accessible pedestrian signals where there is a need to accommodate pedestrians with visual impairments. Accessible signals come in a variety of designs but include an audible signal and tactile guidance for pedestrians. See the 2009 MUTCD for additional information on accessible signals.

Minimize Pedestrian Wait Time

The longer people must wait to cross the street, the more likely they will decide to cross against the signal. Pedestrian wait time can be reduced by shortening the overall signal cycle length or by providing an actuated demand-responsive pedestrian signal. Some pedestrians, especially large groups of children, may need more than the 4 feet per second standard that is used to calculate the time needed for the pedestrian clearance interval. However, longer pedestrian clearance intervals may result in longer signal cycle lengths, and thus longer wait times between 'Walk' signals.

Increase Pedestrian Clearance Intervals

The pedestrian clearance interval is the time remaining for pedestrians to cross the street once the flashing red hand indication is diplayed on a pedestrian signal. The 2009 MUTCD requires this interval to be calculated based on a minimum walking speed of 3.5 feet per second. However, some pedestrians, especially large groups of children, may need additional time to cross. Consideration should be given to increasing the pedestrian clearance interval if a pedestrian signal must accommodate pedestrians that need more time to cross. However, these considerations should be balanced against the potential for increased wait times between 'Walk' signals.



This accessible pedestrian push button not only has an audible tone when the WALK signal comes on, but it also has a vibro-tactile signal. This is for a crosswalk at a midblock traffic signal.

Treatment: Accessible Pedestrian Signals

Description/Purpose

Audible signals for the visually impaired that indicate when it is or is not appropriate to cross the street.

Expected Effectiveness

- Audible signals increase awareness of all pedestrians, including those visually impaired, which can lead to fewer pedestrian crashes (Houten et al., 2000).
- Can decrease pedestrian cross time.

Costs

Costs range from $400 to $600 per signal (Safety Toolbox, Accessible Pedestrian Signals).

Keys to Success

- Locator tones should be used to help persons with visual impairment find pushbuttons.
- Appropriate sound levels should be used to limit audible intrusion into the surrounding neighborhood.

Key Factors to Consider:

- APS may be unclear as to which crosswalk it refers.
- Directional guidance may be needed at wide, skewed or angled intersections.

Evaluation Measures

- Motor vehicle–pedestrian crashes.
- Motor vehicle–pedestrian conflicts.
- Pedestrian crossing ability at current clearance interval.

Pedestrian Pushbuttons

Pedestrian pushbuttons are electronic buttons used by pedestrians to change traffic signal timing to accommodate pedestrian crossings. Pushbuttons may be needed at some crossings, but their use should be minimized. Signals can be put in pedestrian "recall" for key time periods of day such as school crossing times. During these periods the pedestrian WALK signal would be displayed every signal cycle. As traffic signals become more complex pedestrian pushbuttons are needed. If buttons exist, pedestrians must push them to get enough time to cross the street. Standard pushbuttons often result in longer waits to cross the street, especially if the pedestrian fails to push the button. Only about 50 percent of pedestrians actually push the buttons based on a FHWA research project (Zegeer, Opiela, & Cynecki, 1985). If used, they should be clearly visible and within easy reach for people in wheelchairs. Pushbuttons need to be checked periodically to assure that they are working and will place a call into the signal.



Studies show that 50 percent or fewer pedestrians use the push button to cross, yet if they do not use the button they may not get enough time to cross (Zegeer, Opiela, & Cynecki, 1985).

Treatment: Pedestrian Pushbuttons

Description/Purpose

Electronic buttons used by pedestrians to change traffic signal timing to accommodate pedestrian crossings.

Expected Effectiveness

- Improves pedestrian travel time and compliance.
- Reduces delay to vehicular traffic when pedestrians are not present.

Costs

Costs range from $400 to $1,000 per pushbutton (Safety Toolbox, Accessible Pedestrian Signals).

Keys to Success

- Must be well-signed, easily locatable and within reach of all pedestrians.
- Should not be used where pedestrian traffic is frequent, as the pedestrian phase should be built into the cycle.
- Buttons for neighboring crosswalks should be located at least 10 feet from each other.
- Locator tones can assist visually impaired pedestrians to find the pushbutton.

Key Factors to Consider

- Visually impaired pedestrians may have difficulty determining if a pushbutton is present.
- Accessible pedestrian signals may need to be considered at some locations.

Evaluation Measures

- Pedestrian volume.
- Pedestrian compliance to WALK/DON'T WALK signal.

No Turn on Red

Pedestrian and motor vehicle conflicts are a common occurrence when driver get a green light and pedestrians get a green light or a WALK signal at the same time. While drivers are required to stop for pedestrians, conflicts are likely to occur. One solution is to install a "leading pedestrian interval" (LPI) which illuminates the pedestrian WALK signal, while the motor vehicle signal remains red for the first few seconds of the cycle. The LPI gives pedestrians an opportunity to start walking and establish a presence in the crosswalk before drivers can begin their turn. The LPI is usually about three seconds or more.

For more information visit the 2004 PEDSAFE "Leading Pedestrian Interval (2 of 2)" St. Petersburg, Florida, case study at www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=66.

Motorists making a right-turn on a red light are often looking left towards oncoming traffic and do not pay attention to pedestrians who may be approaching from the right. Restricting right-turn-on-red (RTOR) is another way to reduce conflicts between pedestrians and motorists at traffic signals. The RTOR restrictions can be limited to certain times of the day or can apply to all hours, prohibiting drivers from turning right without a green signal. The MUTCD identifies two conditions related to pedestrians when restricted RTOR may be most effective including:

- Where an exclusive pedestrian phase exists.
- Where an unacceptable number of pedestrian conflicts result from RTOR, especially conflicts involving children, older pedestrians or persons with disabilities (MUTCD).

When RTOR is prohibited, there may be more right-turn-on-green conflicts between motor vehicles and pedestrians when both the right turning drivers have a green light and the pedestrian has the WALK signal on the adjacent crosswalk. The use of leading pedestrian intervals can reduce this effect. Prior to deciding to restrict RTOR, the advantages and disadvantages must be carefully considered.



Dan Burden

Standard concurrent signal timing illustrates conflicts that can arise between crossing pedestrians and turning motor vehicles.

Restricting right-turn-on-red is another way to reduce conflicts.



PBIC Image Library

NO TURN ON RED sign may reduce some pedestrian conflicts in the near-side crosswalk, but may increase conflicts in the adjacent crosswalk.

Treatment: Right-turn-on-red Restrictions

Description/Purpose

Right-turn-on-red (RTOR) restrictions, which can be limited to certain times of the day or can apply to all hours, prohibit drivers from turning right without a green signal. Restricting this turning movement can reduce conflicts with pedestrians crossing at intersections.

Expected Effectiveness

Studies differ in terms of effectiveness, but the 2009 MUTCD identifies two conditions related to pedestrians when restricted RTOR may be most effective: 1) Where an exclusive pedestrian phase exists. 2) Where an unacceptable number of pedestrian conflicts result from RTOR, especially conflicts involving children, older pedestrians or persons with disabilities (Zegeer & Cynecki, 1985; MUTCD).

Costs

Costs associated with this treatment will vary widely based on conditions at the site, but are relatively low compared to other treatments. The average cost for a basic sign ranges from $30 to $150 plus installation costs of approximately $200 per sign (PEDSAFE, 2004).

Keys to Success

- NO TURN ON RED signs should be installed adjacent to the signal on the right side of the street and clearly visible to right-turning drivers. Enforcement programs can help establish compliance with the law.

Key Factors to Consider

- RTOR restrictions may increase delay at intersections for motor vehicles and cause an increase in right-turn-on-green conflicts, but the use of leading pedestrian intervals can reduce this effect.

Evaluation Measures

- Number of crashes and conflicts.
- Pedestrian and driver compliance with intersection regulations.

Pedestrian Countdowns

Adequate time must be provided for pedestrians to cross the street safely. Countdown signals help by giving pedestrians information about how much crossing time remains. There is a good deal of confusion by most pedestrians on the meaning of the flashing DON'T WALK signal. While it technically means don't start walking if the pedestrian has not yet started to cross the street, some pedestrians and drivers think that they are supposed to see the WALK signal for the entire crossing and they will not have enough time to cross as soon as the flashing begins. The countdown signal shows the number of seconds remaining to cross the street. Some studies have shown that countdown signals reduce the number of stragglers in the street when the signal changes, although some people may still start late.



Michael Cynecki

Countdown pedestrian signals provide pedestrians with more information on how much time is left and are very well-received by pedestrians.

Treatment: Countdown Pedestrian Signals

Description/Purpose

A timer display that counts down the seconds remaining for a pedestrian crossing.

Expected Effectiveness

- Reduces the number of pedestrians caught in the crosswalk when the cycle ends.
- Increases pedestrians' perceived safety.

Costs

Costs range from $300 to $800 per signal (Safety Toolbox, Countdown Signals).

Keys to Success

- Should give WALK message with countdown indication each cycle in areas with sufficient pedestrian volume.
- Signals should be easily visible from both sides of crosswalks.
- The countdown signals are more applicable where pedestrians are crossing streets with multiple lanes in each direction.

Key Factors to Consider

- For wide streets, countdown pedestrian signals may be of particular benefit, especially if there are a substantial number of older pedestrians or persons with mobility disabilities who cross.

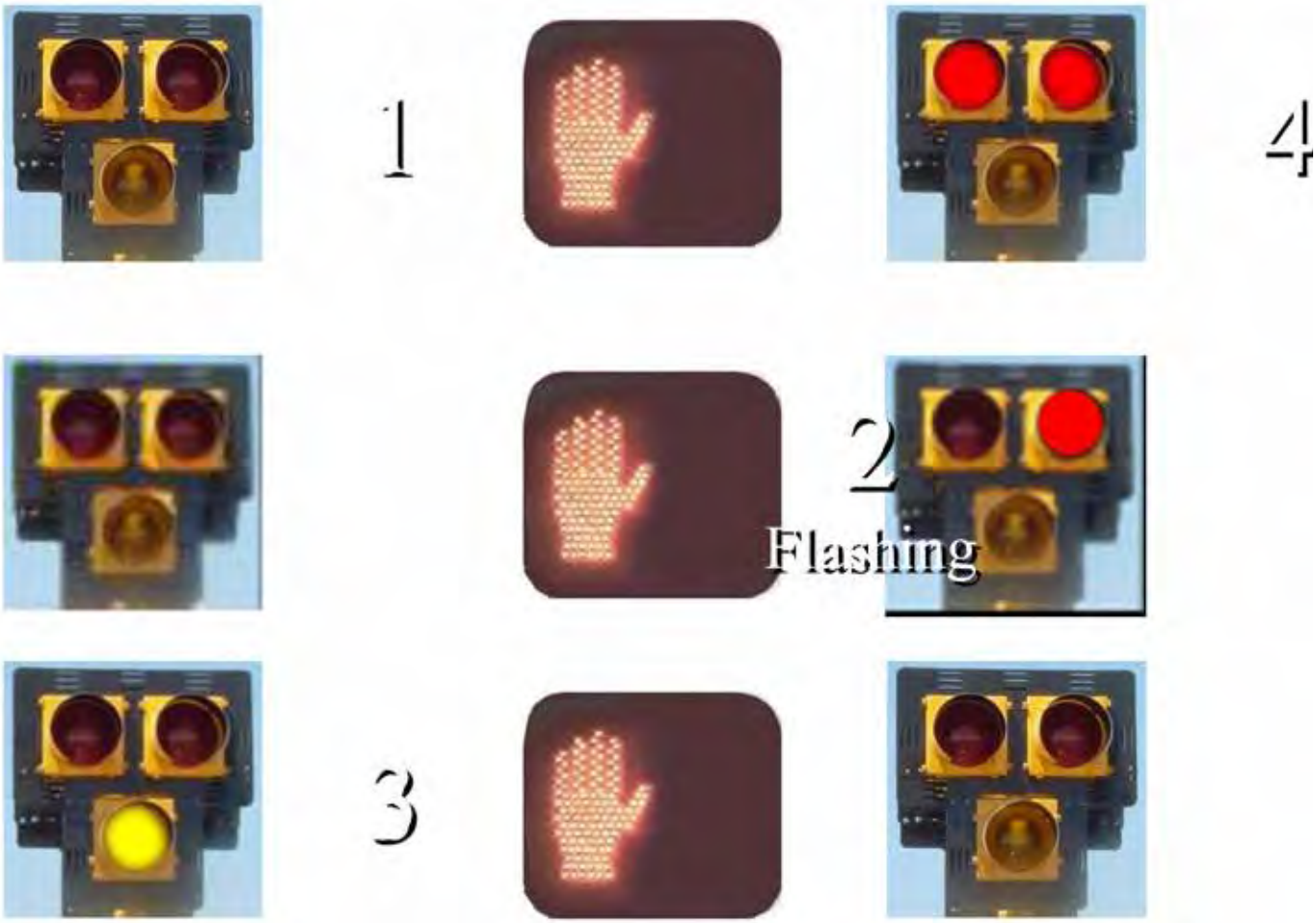
Evaluation Measures

- Number of pedestrians caught in the crosswalk when the cycle ends.
- Perceived pedestrian safety.

Pedestrian Hybrid Beacon

The pedestrian hybrid beacon, also known as the High intensity Activated crossWalK (HAWK), is one of Federal Highway Administration's nine proven safety countermeasures. This designation is largely based on research that has shown pedestrian hybrid beacons to improve pedestrian safety at unsignalized intersections (Fitzpatrick & Park, 2010). The 2009 Manual on Uniform Traffic Control Devices (MUTCD) contains the basic principles that govern the design and use of traffic control devices in the United States. The MUTCD presently recommends when installation of a pedestrian hybrid beacon is justified, it should be used at midblock locations. However, the National Committee on Uniform Traffic Control Devices has a pending request to update the MUTCD to allow the pedestrian hybrid beacon also be allowed at intersection locations which is consistent with the researched locations which justified its inclusion into the MUTCD. Use of a hybrid beacon at an intersection is thus, presently considered experimental until the MUTCD is updated to explicitly allow the hybrid beacon to be installed at an intersection.

The pedestrian hybrid beacon is a potential solution for midblock crossing locations where neighborhoods are located on the opposite side of a wide or busy street from a school. It is often difficult to get drivers to stop or yield to pedestrians at uncontrolled crossings on high volume, high speed, or multi-lane roadways, even if crosswalk markings and advance pedestrian warning signs are installed. At the same time, there may not be enough pedestrians crossing to warrant a full traffic signal. The warrants for the pedestrian hybrid beacon are much easier to meet, compared to the warrants of a full traffic signal.



The pedestrian hybrid beacon is an intermediate option between the operational requirements and effects of a rectangular rapid flash beacon and a full pedestrian signal (Fitzpatrick & Park, 2010). The signal phasing of this type of beacon provides a controlled crossing for pedestrians without delaying motorists unnecessarily (Shroeder et al., 2010). The pedestrian hybrid beacon signal head consists of two red lenses over a single yellow lens located on the roadside or on mast arms over midblock pedestrian crossings. Activating the beacon is typically done by push-button activation, which results in a sequence of a yellow traffic signal display, followed by dual red traffic signal display, which indicates to drivers when to stop for crossing pedestrians. After pedestrians have had time to cross the street on a steady red light, the red display begins flashing to indicate to driver that they should come to a complete stop. They can then proceed with caution after pedestrians have completed crossing the street (Shroeder et al., 2010; Proven Safety Countermeasures, Pedestrian Hybrid Beacons).

The pedestrian hybrid beacon should only be used in conjunction with marked crosswalks. As currently specified in the MUTCD, the pedestrian hybrid beacon, when used, should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs (Shroeder et al., 2010), unless installed with experimental approval at an intersection. Locations with vehicle speeds that are too high to permit pedestrians to cross safely, inadequate gaps in traffic to permit pedestrians to cross, or with excessive pedestrian delays may be good places to consider installing the pedestrian hybrid beacon (Proven Safety Countermeasures, Pedestrian Hybrid Beacons).

Since some pedestrians may be unfamiliar with pedestrian hybrid beacons, it is important to educate the public before implementation to minimize confusion about how the beacon operates and what drivers and pedestrians should do when encountering it (Shroeder et al., 2010).

While the pedestrian hybrid beacon has shown a significant reduction in crashes among the general pedestrian population (Fitzpatrick & Park, 2010), little is known about the beacon's safety impact on child pedestrians because few studies have specifically examined children using the beacon.

Children (particularly those under ten years of age) face special challenges to safely crossing a street including impulsiveness, slower walking speeds; small body size that limits their visibility; less experience with traffic; still-developing cognitive abilities that make it difficult to accurately judge vehicle speed and traffic stream gaps; and a general perception that drivers will be able to stop instantly (Fitpatrick et al., 2006; Shroeder et al., 2010). These factors lend support for considering the need for adult supervision such as parents, caregivers or crossing guards at crossing locations near elementary schools during arrival and dismissal times.

Slowing Down Traffic

High-speed motor vehicles pose a serious threat to the safety of children who are crossing streets. One of the biggest challenges in providing children with safe walking and bicycling routes to school involves slowing down traffic.

Slower motor vehicle speeds allow drivers to stop in a shorter distance and reduce the chance of injuring a pedestrian or bicyclist. A motor vehicle traveling on a level surface at a rate of 40 mph will need nearly 300 feet between the vehicle and the child to stop in time to avoid a collision. This distance is reduced to approximately 197 feet for a vehicle traveling at 30 mph, 112 feet for a vehicle traveling at 20 mph and 77 feet for a vehicle traveling at 15 mph (AASHTO, 2001).

Pedestrian crash severity is also much lower at low motor vehicle speeds. If a pedestrian is struck by a motor vehicle traveling at 40 mph there is an 85 percent likelihood that the pedestrian will be killed. This percentage drops to 45 percent at 30 mph and 5 percent at 20 mph. Thus, slowing motor vehicle speeds not only reduces the chance of a crash due to the shorter stopping distance that is required, but it also reduces the chance of a pedestrian fatality or serious injury (UK DOT, 1987).

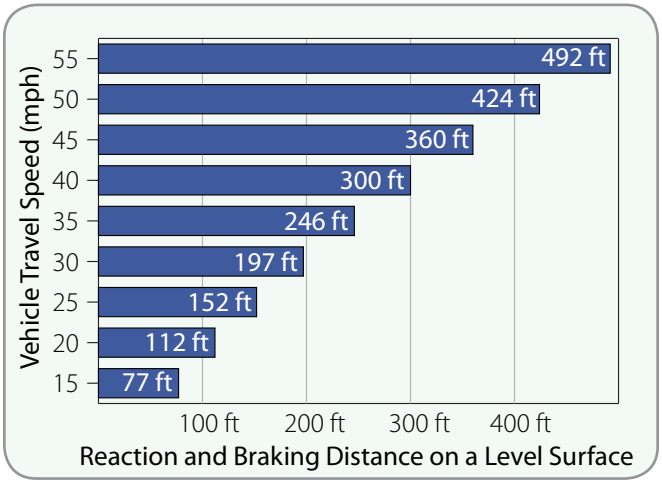
When slowing or "calming" traffic, the right design invites the right driver response. The guiding principle of traffic calming is to influence driver speed and behavior through good design whenever possible, rather than by traffic control measures such as traffic signals and STOP signs.

There are many design and engineering tools that can be used to slow down traffic and make it safer for children to walk and bicycle to school including:

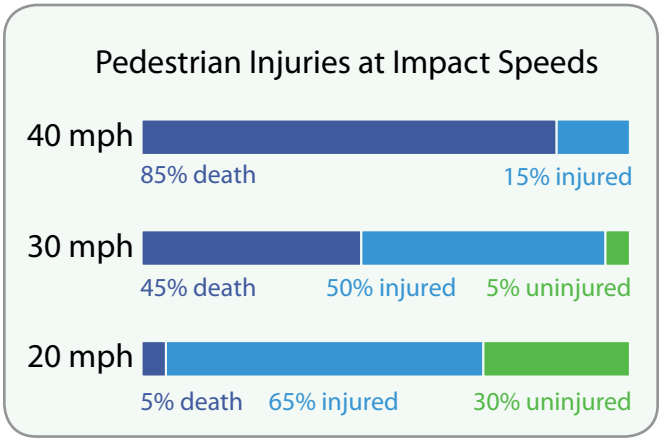
- Narrow lanes.
- Chokers and chicanes.
- Speed humps.
- Raised pedestrian crosswalks.
- Neighborhood traffic circles.
- Reduced corner radii.
- Speed sensitive signals.



Wide high-speed streets can create a barrier to walking to school. This is the type of condition that should not occur along a child's route to school.



Relationship between motor vehicle speed and braking distance when traveling on a level surface.[41]



The relationship between pedestrian injury severity and motor vehicle impact speeds (UK DOT, 1987).





City of Auburn, Indiana

Which street has lower speeds? The street on the right with trees and a narrower pavement width will naturally result in slower driver speeds.

Narrow Lanes

There are several ways to narrow a street. Paint is a simple, low cost and easy way to narrow the street or travel lanes. If the narrower lanes can result in a striped shoulder, the shoulder will provide a buffer for pedestrians, a place for bicyclists to ride and a refuge for disabled motor vehicles. The shoulder stripe will also provide better driver guidance. Interior traffic lanes can be narrowed to 10 feet wide to encourage slower speeds. Narrow lanes can also result from road-diet projects which can include painted medians, center turn lanes, bicycle lanes or parking lanes.



Peter Lagerwey

As there is no sidewalk along this child's route, reducing the lane width works to slow motor vehicles and provide a place to walk.

Treatment: Narrow Lanes

Description/Purpose

The reduction of lane widths to increase pedestrian safety.

Expected Effectiveness

- The narrower lanes can reduce motor vehicle speed, which may reduce total pedestrian crashes.
- They also reduce lengths of pedestrian crossings.

Costs

Costs vary by technique.

- Reducing the width of lanes due to adding bicycle lanes costs approximately $1,000 per mile.
- Completely restriping a street to reduce lanes, add bicycle lanes or add on-street parking costs approximately $5,000 to $10,000 per mile.
- Adding a raised median or widening a sidewalk is approximately $100,000 or more per mile (PEDSAFE, 2004)

Keys to Success

- Adequate planning for large and emergency vehicles.
- Capacity and level of service should be analyzed to ensure appropriate design.
- Community involvement is needed to ensure balanced street safety throughout the area.

Key Factors to Consider

- Potential diversion of traffic onto neighboring streets.
- Potential adverse effects on large vehicles and bicycles.

Evaluation Measures

- Pedestrian crashes and severity.
- Reduction in motor vehicle speeds.

Chokers and Chicanes

Traffic calming can also result from narrowing the street through the use of chokers and chicanes. Chokers narrow both sides of the street to form a section of about 20 to 24 feet wide. Chicanes provide alternating narrow and wide sections, and a curved driving path similar to a slalom. Chicanes work best when supplemented with centerline striping and in some cases edgeline striping. Both chokers and chicanes need to have a vertical element in the narrowed section such as landscaping so the narrowed section can be seen easily by approaching drivers. Lighting at the narrowed section is also helpful. If drivers do not see and perceive the narrowing treatments, they may not slow down, and may even collide with the narrowed street section. Care must be used to accommodate storm water runoff when designing chokers and chicanes, and they should not be used if it will result in the loss of bicycle lanes or badly needed on-street parking.



Michael Cynecki

A choker has been installed on this street to calm traffic.

Treatment: Chokers and Chicanes

Description/Purpose

Parallel or offset curb extensions that effectively reduce road width for a specific distance are intended to reduce motor vehicle speeds and cut-through traffic, and make drivers aware of pedestrian activity.

Expected Effectiveness

Few formal evaluations have been performed, but these treatments are implemented based on the assumption that they do in fact benefit pedestrians by slowing motor vehicle traffic, reducing the number of severe crashes and increasing safety.

Costs

Costs for chokers range from $5,000 to $20,000, depending on site conditions and landscaping. Costs for landscaped chicanes range from $10,000 (for a set of three chicanes) on an asphalt street to up to $30,000 on a concrete street. Drainage and utility relocation often represent a significant portion of the cost for both chokers and chicanes (PEDSAFE, 2004).

Keys to Success

- For chokers to perform effectively, the street must be narrowed such that motor vehicles approaching from opposite directions do not have enough room to pass.

Key Factors to Consider

- Ensure that bicycle safety and mobility is not compromised and that streets are still wide enough to accommodate emergency motor vehicles.
- Chicanes may reduce the number of on-street parking spaces.

Evaluation Measures

- Motor vehicle speeds.

Speed Humps

Speed humps represent one type of traffic calming measure that has been used by many local agencies for slowing traffic. Modern speed humps are 12 to 14 feet wide and have a rounded appearance that is 2.5 to 4 inches high at the center. Longer and flatter speed humps are referred to as speed tables. Speed humps have been shown to reduce motor vehicle speeds on streets where they were installed (PEDSAFE, 2004). Despite their ability to reduce motor vehicle speeds, speed humps have certain disadvantages and are generally disliked by many drivers, fire departments and other emergency service providers. They often are not feasible on collector streets or arterial streets due to their impact on emergency response times. Other problems with speed humps include their impact on storm water runoff and snowplowing, and complaints about drivers driving onto the sidewalk to avoid the hump. The presence of speed humps also complicates street resurfacing.

While speed humps have been used extensively by some agencies, other traffic calming measures such as street-narrowing traffic circles or traffic diverters to eliminate cut-through traffic are often more effective and appropriate. Speed humps have been removed at some locations in the U.S., Europe and the Netherlands.

Treatment: Speed Humps

Description/Purpose

An elongated section of raised pavement designed to reduce motor vehicle speeds. Longer and flatter speed humps are referred to as speed tables.

Expected Effectiveness

An overall reduction of motor vehicle speeds. More specifically, 85th-percentile speeds reduced by 4 to 23 mph.

Costs

Speed humps cost approximately $1,000 each. Speed tables range from $2,000 to $15,000 each (PEDSAFE, 2004).

Keys to Success

- Selection of appropriate areas, which are primarily low-volume residential streets.
- Complete coverage of lane width to ensure drivers do not veer into bicycle lane to avoid the hump.
- Should not be used on sharp curves.

Key Factors to Consider

- Potential increase in noise.
- Potential drainage issues on some streets.
- Increase in cost and complexity of resurfacing.
- Appropriate design important to prevent motor vehicle passenger discomfort.

Evaluation Measures

- Number of crashes and motor vehicle–pedestrian conflicts.
- Motor vehicle speed and driver delay.

Raised Pedestrian Crosswalks

Raised pedestrian crosswalks serve as traffic calming measures by extending the sidewalk across the road and bringing motor vehicles to the pedestrian level. The raised crosswalks allow the pedestrian to cross at nearly a constant grade without the need for a curb ramp and makes the pedestrian more visible to approaching drivers. They have a trapezoid-shaped cross-section to slow drivers at the pedestrian crossing where the slowing will be most effective. Speed tables outfitted with crosswalk markings are used on local streets, but they may not be applicable for some collector streets due to an increase in emergency vehicle response time.

Roadways are not the only places traffic calming devices can be useful. Raised crosswalks can be used in school parking lots to slow traffic and more safely allow pedestrians to cross the parking lots. When used, care must be taken to accommodate drainage in the parking lot and to prevent water from pooling.

Treatment: Raised Pedestrian Crosswalks (Speed Tables)

Description/Purpose

A speed table the width of a typical crosswalk stretching across an entire intersection, slowing traffic and keeping the crossing at grade with the sidewalk.

Expected Effectiveness

- Decrease in motor vehicle speeds generally occurs.
- An increase of vehicular yield rate by as much as 45 percent due to adding speed tables (Hawkey et al., 1992).

Costs

Costs range from $2,000 to $15,000 (PEDSAFE, 2004).

Keys to Success

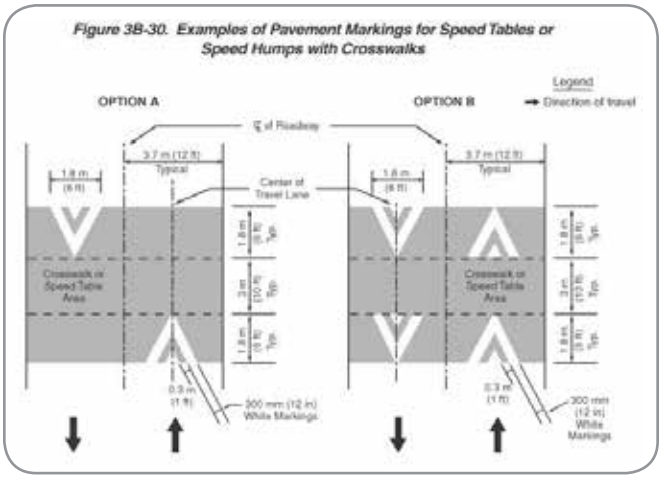
- Should not be used on sharp curves or steep grades.
- Visually impaired pedestrians need warning strips at edges to indicate the beginning of the crosswalk.
- Colors and special paving materials can be used for an urban design effect.

Key Factors to Consider

- May not be appropriate if the intersection is part of a bus or emergency route.
- Potential drainage issues.

Evaluation Measures

- Number of crashes.
- Severity of crashes.
- Motor vehicle speeds.
- Traffic volume.



At a speed table, a marked crosswalk provides a level area for pedestrians crossing the street. Traffic is slowed as drivers must go up and over the crosswalk.



The raised crosswalk in this picture slows traffic at the sidewalk crossing and draws more attention to the pedestrian crossing.

Roundabouts

The modern roundabout is one of Federal Highway Administration's nine proven safety countermeasures. This designation is based on research that has shown roundabouts to greatly improve safety compared to traditional intersections (Proven Safety Countermeasures). The frequency of crashes resulting in injury are lower at roundabouts compared to traditional intersections with the crash reductions being most pronounced for motor vehicles, less pronounced for pedestrians and the overall the same for bicyclists (Rodergerdts et al., 2010). When injuries do occur, they tend to be less severe than those sustained in crashes at traditional intersections.

The modern roundabout is a form of circular intersection in which traffic travels at low speeds counterclockwise around a central island. Vehicles entering a roundabout must yield, or stop if needed, to circulating traffic. Roundabouts allow for more continuous traffic flow compared to conventional stop or signalized intersections. Additionally, compared to conventional stop or signalized intersections, roundabouts reduce and simplify the number of places where motor vehicles would potentially conflict with other vehicles (cars and bicycles) and pedestrians. Roundabouts are designed to slow vehicles as they enter, travel through and exit the circular intersection. The lower design speed of roundabouts is likely to improve yielding, safety, and comfort for pedestrians and bicyclists. In settings with large numbers of children, lowering vehicle speed has great potential for injury prevention. Pedestrian crashes involving a child most often result from the child's error, thus slower speeds give motorists more time to react and can lessen injuries when crashes do occur (Retting, Ferguson, & McCartt, 2003). Roundabouts can be single-lane or multiple-lane. Near elementary and middle schools, single-lane roundabouts are generally preferable to multiple-lane roundabouts due to lower vehicle speeds, simpler crossings for children and the greater comparative crash safety benefit (Rodergerdts et al., 2010).

At locations where it is determined a multi-lane roundabout is necessary to accommodate traffic volumes, it should be anticipated that vehicle speeds through the roundabout may be higher during non-peak periods, motorists may be less likely to yield to pedestrians in crosswalks, and pedestrians are exposed to the multiple

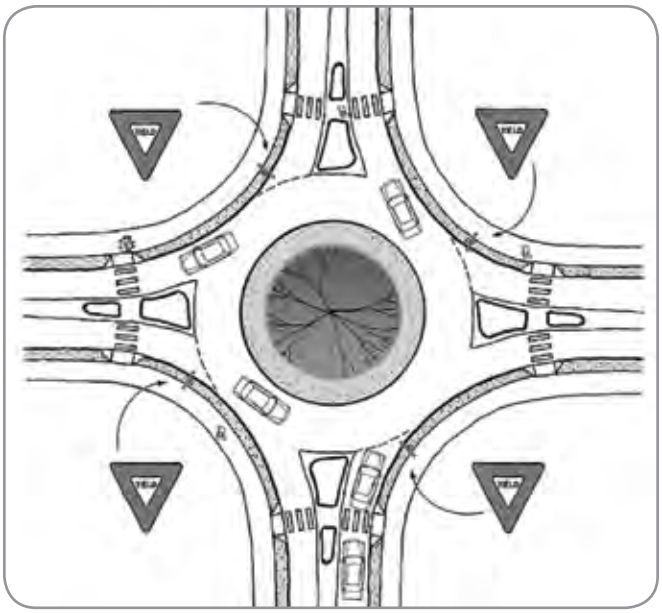


Image from ITE's Intersection Design Guidelines, Chapter 10.
A typical single-lane modern roundabout design.



Image provided by Ron Reed and Creative Commons
Properly designed single-lane roundabout can accommodate all users including large trucks.

threat crash. To mitigate these challenges, consideration should be given to providing a pedestrian crossing island and/or an actuated rapid flashing beacon or pedestrian hybrid beacon (PHB) at each crossing.

Well-designed modern roundabouts that have replaced traditional two-way stop, all-way stop, and signal controlled intersections have reduced motor-vehicle crash frequencies and crash severity in urban, suburban, and rural settings (Shroeder et al., 2010). Vehicle collisions in modern roundabouts are typically less severe than those that occur at signalized intersections because the roundabout lowers vehicle speeds and helps prevent certain types of crashes such 90 degree ("T-bone") collisions and head-on crashes.

Compared to traditional intersections, single-lane roundabouts, typically offer the following safety benefits and features for pedestrians:

- Lower motor vehicle speeds and increased yielding behavior (Rodergerdts et al., 2010).
- Fewer conflict points (Rodergerdts et al., 2010).
- Higher visibility of pedestrians in the crosswalk (Rodergerdts et al., 2010).
- Shorter wait time for pedestrians to cross than at signalized intersections
- Lower exposure to motor vehicles because of the shortened crossing distance (Rodergerdts et al., 2010).
- Simpler crossing due to the splitter islands, which provide mid-crossing refuge and allow the pedestrian to focus on traffic from one direction at a time (Rodergerdts et al., 2010).

While roundabouts offer the general pedestrian population certain crossing and safety benefits, there is a dearth of research about the ability of child and elderly pedestrians, and those with mobility impairments to cross safely at roundabouts (Rodergerdts et al., 2010). Children face special challenges to safely crossing a street. Factors include: impulsiveness, slower walking speeds; small body size that limits their visibility; less experience with traffic; still-developing cognitive abilities that make it difficult to accurately judge vehicle speed and traffic stream gaps; and a general perception drivers will be able to stop instantly (Rodergerdts et al., 2010; Fitpatrick et al., 2006). These factors lend support for considering the need for adult supervision such as parents, caregivers or crossing guards at roundabout and other street crossing locations near elementary schools during arrival and dismissal times.

Bicyclists face similar conflicts as motor vehicles at roundabouts. Additionally, bicyclists may experience uncomfortable passing or be cut off on roundabout entrances and exits if they ride on the right edge of a curb lane or in any lane of a multi-lane roundabout (Rodergerdts et al., 2010). As with conventional intersections, a bicyclist using a roundabout can proceed either as a motor vehicle or as a pedestrian using the sidewalk and marked crosswalks (PBIC). Given the varying cognitive abilities and bicycling skills of children, it is recommended that children dismount their bicycles and proceed through the roundabout as a pedestrian using the sidewalk and marked crosswalks. To allow bicyclists to operate as pedestrians through roundabouts, and in particular at locations near schools, consideration should be given to designing bicycle curb ramps and wider sidewalks to accommodate transitions for bicyclists between the roadway and sidewalk system (Rodergerdts et al., 2010). Wider sidewalks and crosswalks can help mitigate potential conflicts between pedestrians and bicyclists.

Neighborhood Traffic Circles

Traffic circles can help slow traffic on local and collector streets and calm traffic for pedestrians. While traffic circles are typically not ideal for use at a school crossing location, they can help calm traffic along a street, making the crossing locations on that street safer. Traffic circles typically have less of an impact on emergency vehicles than speed humps or speed tables, and can add to the aesthetics of the street. Neighborhood traffic circles on local streets do not need to have raised splitter islands, but they should be illuminated with streetlights. Landscaping also is important for aesthetics and making the islands visible to drivers. Provisions are needed for maintaining the landscaping and providing water to the landscaping.



Michael Cynecki

Example of a traffic circle used in a neighborhood.

Treatment: Neighborhood Traffic Circles

Description/Purpose

Neighborhood traffic circles are raised islands in residential intersections intended to reduce motor vehicle speeds.

Expected Effectiveness

In a study in Seattle, Washington, minicircles were found to reduce motor vehicle crashes by an average of 90 percent.[45] They also slowed motor vehicle speeds, reducing the likelihood and severity of pedestrian crashes.

Costs

The cost for a landscaped traffic circle on an asphalt street is about $6,000 and ranges from $8,000 to $12,000 for a landscaped minicircle on a concrete street (PEDSAFE, 2004).

Keys to Success

- Keep turning radii tight to avoid compromising pedestrian and bicyclist safety.
- Accommodate larger motor vehicles by providing a mountable curb on the outer portion of the traffic circle.

Key Factors to Consider

- Landscaping in the circle should not block sight distance.
- The needs of blind pedestrians should be considered when determining the design and placement of neighborhood traffic circles.

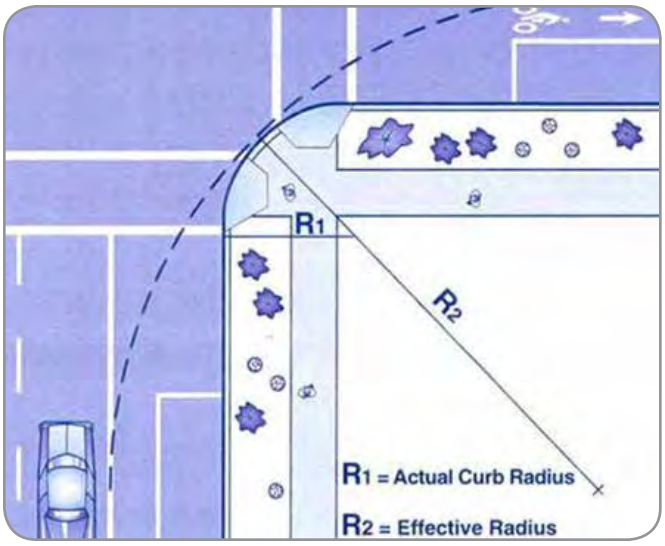
Evaluation Measures

- Crashes and injury severity.

Reduced Corner Radii

There is a direct relationship between the size of the curb radius and the speed of turning motor vehicles. A large radius may easily accommodate large fire trucks, other large trucks and school buses, but it also allows other drivers to make high speed turns, and it increases the crossing distance for pedestrians. Drivers who drive faster are less likely to stop for pedestrians. A larger radius will also result in a longer crossing distance for the pedestrian. The solution is to reduce the curb radius.

When designing curb radii, consider what motor vehicles actually need when turning. Instead of assuming that every corner needs to be cut back, look at other factors such as on-street parking and bicycle lanes to determine how much space a turning motor vehicle will need. The effective radius that exists should include the width of parking lanes and bicycle lanes on both streets. Large trucks do not need to stay on their half of the street when turning on local streets. There is not a need to design for the largest vehicle that may use a street, especially for streets inside neighborhoods.



The effective radius that exists should include the width of parking lanes and bicycle lanes on both streets.



A large turn radius allows drivers to make higher speed turns and increases the crossing distance.

There is a direct relationship between the size of the curb radius and the speed of turning motor vehicles.



PBIC Image Library

Treatment: Reduced Corner Radius

Description/Purpose

The reduction of a corner radius to produce a tighter turn results in decreases in turning speeds, improved motor vehicle and pedestrian site distances, and a shortened pedestrian crossing distance.

Expected Effectiveness

Reduces the most common type of pedestrian crash by decreasing right-turn motor vehicle speeds. Shortening of crossing distance can improve signal timing and reduces the exposure of pedestrians to motor vehicles.

Costs

Costs range from $2,000 to $20,000 depending on drainage, utilities and other site features (PEDSAFE, 2004).

Keys to Success

- The needs of all road users including pedestrians, bicyclists, buses, trucks and cars need to be considered in designing or retrofitting corner turn radii.
- Appropriate design based on street type, angle of intersection, land uses, etc. should also be considered.

Key Factors to Consider

- Designing for maintenance vehicles, emergency vehicles and school buses. Pedestrians are at risk if large vehicles ride over the curb.

Evaluation Measures

- Right-turning motor vehicle–pedestrian crashes.
- Total pedestrian crashes.

Speed Sensitive Signals

Some agencies have installed innovative traffic control measures, such as speed sensitive traffic signals, to reduce motor vehicle speeds. These devices involve using pavement loops to detect the speed of a motor vehicle. If the speed exceeds the speed limit, the traffic signal ahead will display a red light. Drivers learn that speeding on such streets will require them to stop at the traffic signal and be further delayed. This treatment is not applicable to local streets inside neighborhoods that do not have traffic signals, but can be applicable to collector and some arterial streets. Some communities are timing their traffic signals to a preset reasonable speed. Drivers who exceed the preset speed will be stopped at the next traffic signal. Signs with SIGNAL SET AT XX MPH can be installed along the street to alert drivers.



Peter Lagerwey

Boulder, Colorado.

Putting It Into Practice: Speed Sensitive Signals

Boulder, CO; Arlington, VA; and Washington, D.C.

High-speed motor vehicles pose a serious threat to the safety of children who are crossing arterial streets near schools and are one of the largest challenges in providing Safe Routes to School. Innovative measures have been used to reduce motor vehicle speeds such as the speed sensitive signals used in Boulder, Colorado; Arlington, Virginia; and Washington, D.C.

The signals use pavement loops to detect the speed of a motor vehicle. If the motor vehicle exceeds the speed limit, the traffic signal ahead displays a red light. Drivers learn that speeding on such streets will require them to stop at the light and be further delayed. The sign SPEED SENSITIVE SIGNAL conveys that message to drivers.

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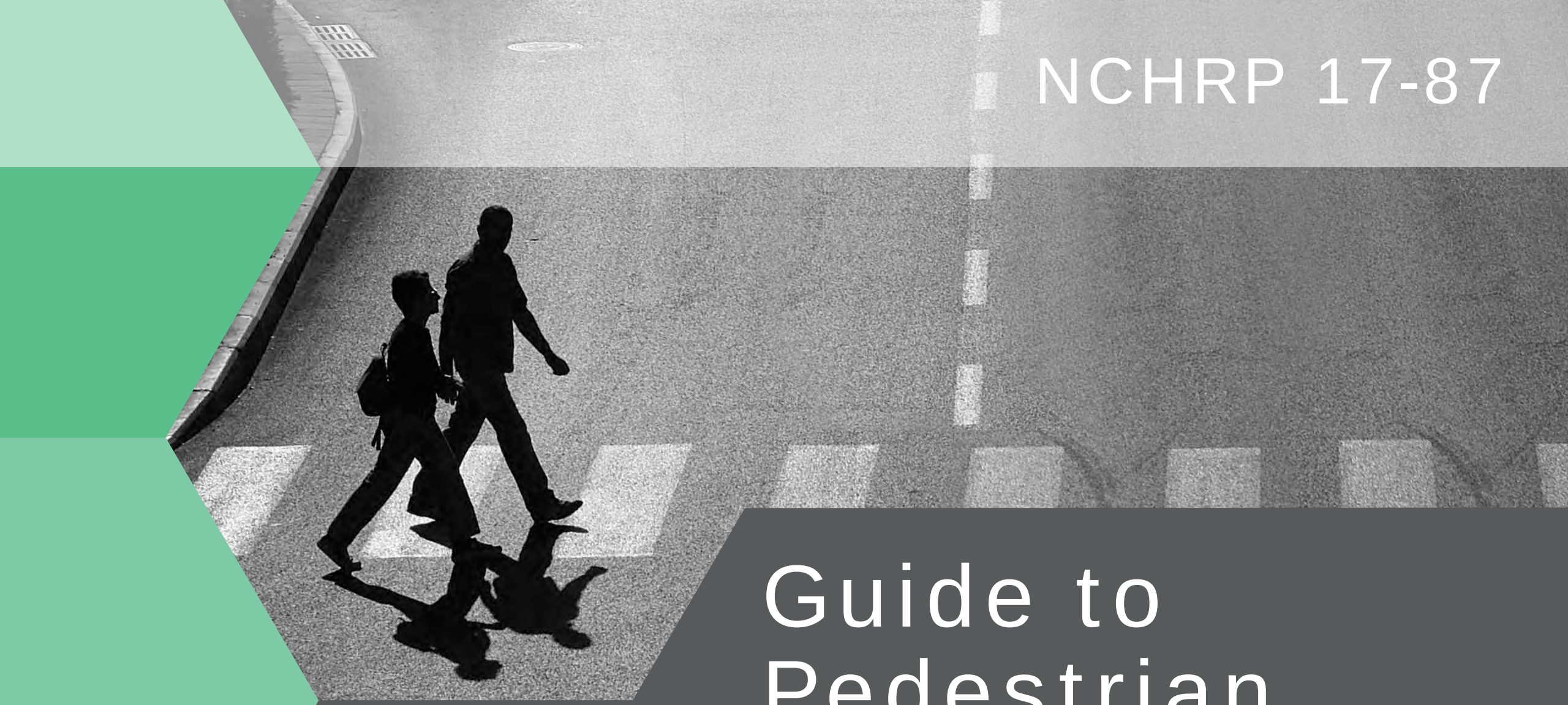
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NCHRP 17-87



Guide to Pedestrian Analysis



Pedestrian Safety Analysis

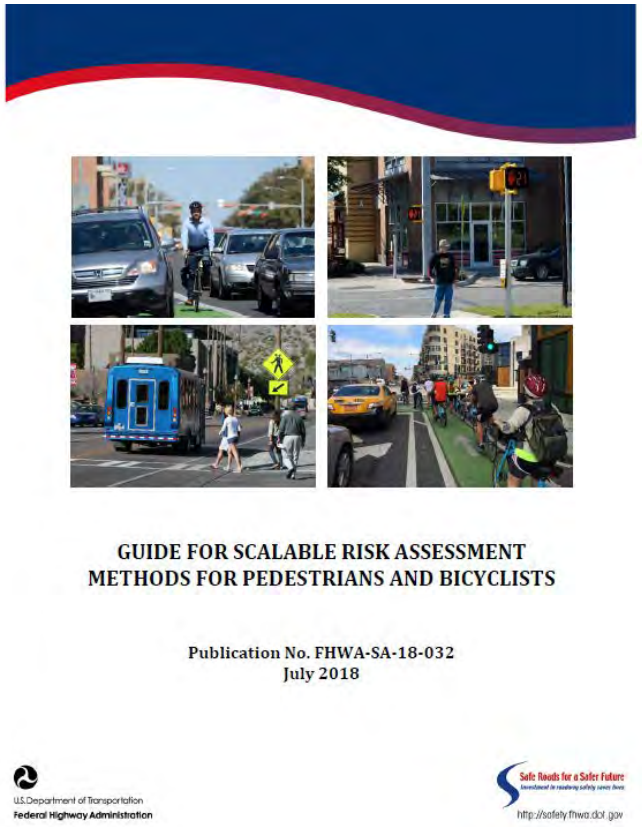
Roadmap

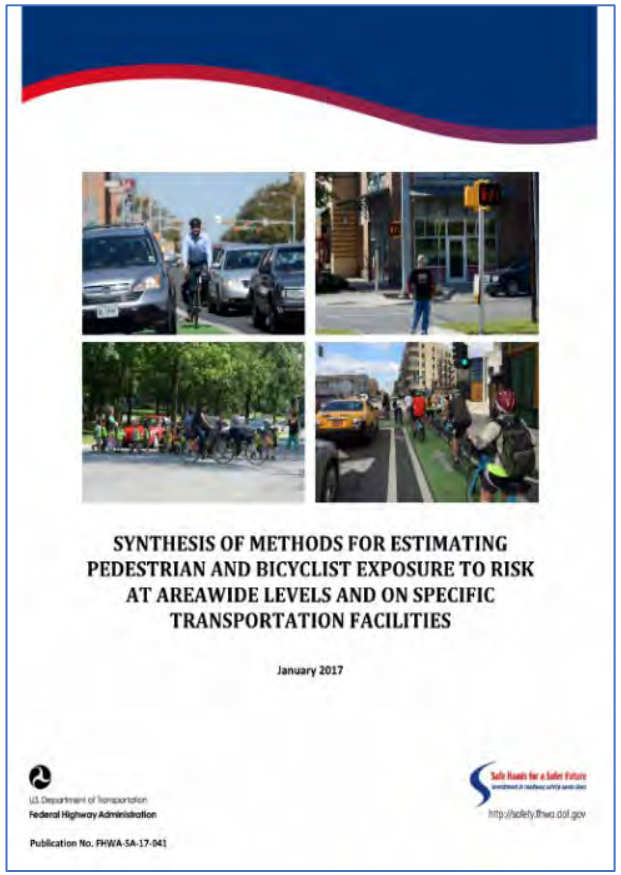
- Methods for estimating pedestrian exposure to crash risk
  - Potential applications of exposure data
- 3 approaches to identifying locations for pedestrian safety improvements
- Examples of pedestrian safety countermeasures
  - Methods for selecting countermeasures to address specific issues
- The association between selected countermeasures and pedestrians' perceived QOS using crossings



Pedestrian Exposure Estimation

Exposure Estimation Resources



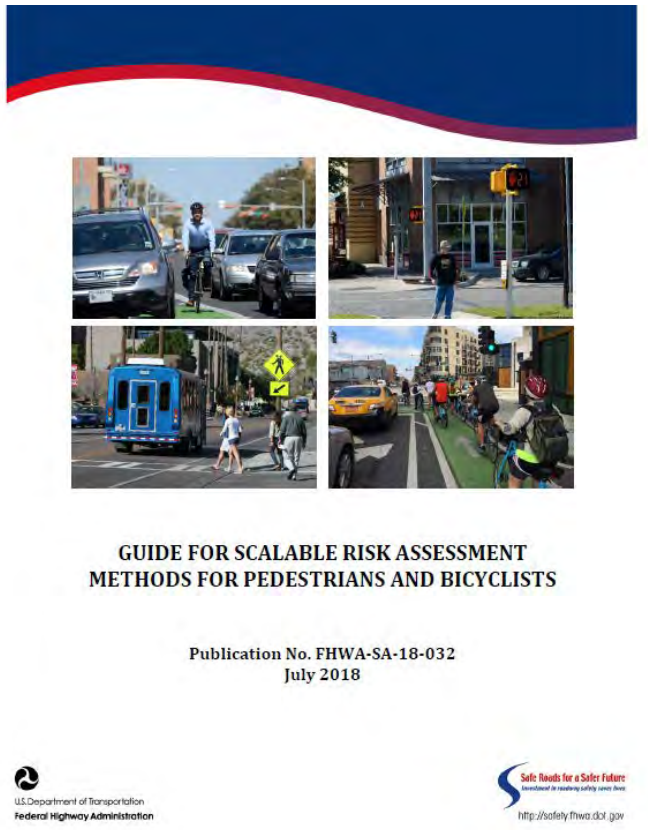




NCHRP 17-87: Guide to Pedestrian Analysis

Defining “Exposure”

“A measure of the number of potential opportunities for a crash to occur.”



Categories of Exposure Measures

- **Population-based**—people or people who regularly walk in an area
- **Trip-based**—# **of** walking trips made in an area
- **Volume-based**—pedestrian or motorized traffic volume along a facility or crossing at an intersection
- **Distance-based**—total length traveled by pedestrians, e.g., along a facility or across a crossing
- **Time-based**—total time spent by persons while walking, e.g., person hours of travel along a facility or time to walk across a crossing

Table 3-1. Broad Categories of Exposure Definitions

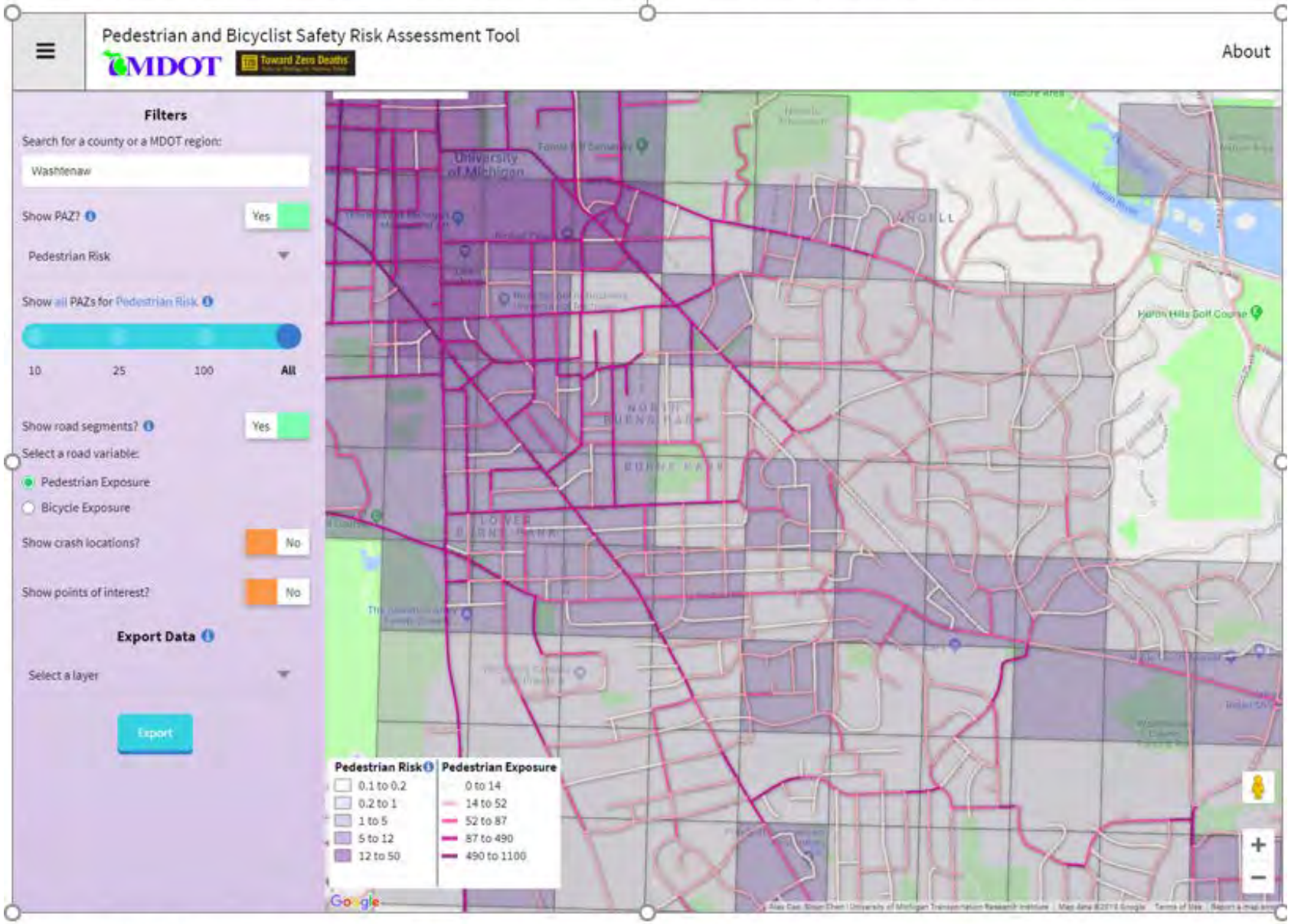
	Basis for Defining Exposure				
	Population	**Trips**	**Volumes**	**Distance**	**Time**
Appropriate Uses	▪ Areawide analysis, when detailed information about pedestrian activity is infeasible to collect	▪ Assessing pedestrian and bicyclist behavior in large areas; walking trip common characteristics ▪ Compare exposure at the areawide level, e.g., for a specific jurisdiction	▪ Estimating pedestrian volume and risk at a specific location ▪ Compare exposure at the micro level, i.e., for specific transportation facilities	▪ Estimating exposure at micro and macro level ▪ Estimating whether pedestrian risk increases with distance traveled ▪ Assessing how crossing distance affects risk	▪ Estimating exposure at micro and macro level ▪ Estimating whether pedestrian risk increases linearly with walking time ▪ Comparing risk between travel modes ▪ Comparing risk between different length crossings and individuals with different walking speeds
Data Sources	▪ American Community Survey (ACS): population by segment ▪ Travel demand surveys showing propensity to make walking trips on a regular basis	▪ Travel surveys	▪ Manual or automated counts	▪ Travel surveys ▪ Manual or automated counts of pedestrians, combined with the length of the specific area or corridor of interest	▪ Travel surveys ▪ Manual or automated counts of pedestrians and the measurement of the time traveled
Advantages	▪ Easy to obtain and low-cost; data available for most geographic regions ▪ Can adjust for differences in the underlying resident population of an area ▪ Vehicular volume likely to be related to area population ▪ Only way to represent exposure if no direct measurements are available	▪ Appropriate for use in large areas ▪ Best metric to assess relationship of walking with trip purpose ▪ Trips can be assessed as a function of person, household, and location attributes	▪ Relatively simple to collect as opposed to measures such as distance or time ▪ Data collection can be costly if done for longer durations ▪ Automated methods for counting are improving over time	▪ More information than manual or automated pedestrian counts alone ▪ Can be used to measure exposure at micro and macro level ▪ Common measure of vehicle exposure	▪ More information than manual or automated counts alone ▪ Can be used to measure exposure at micro and macro level ▪ Accounts for the traveler speed and different paths taken by the traveler to reach destination ▪ Allows for accurate comparison between travel modes
Dis-advantages	▪ Does not accurately represent levels of pedestrian activity ▪ Does not account for distance or time that pedestrians are exposed to traffic	▪ Does not accurately represent levels of pedestrian activity ▪ Does not provide enough detail needed to assess risk at specific locations ▪ Trip-based measures are not meaningful for facility-specific geographic scales	▪ Does not differentiate by walking speed, age, or other factors that may influence individual risk ▪ Does not account for time or distance walked ▪ Does not account for exposure over a macro level, i.e., city, county	▪ Relatively difficult to collect data ▪ Assumes risk is equal over distance traveled ▪ Does not account for traveler speed or different paths taken by the traveler	▪ Relatively difficult to collect data ▪ Assumes risk is equal over entire time travelling ▪ Time spent is overestimated ▪ Trips are underreported, i.e., short trips are usually forgotten by people
Common Measures	▪ Number of people in an area, potentially segmented by age, gender, race, socio-economic status, etc.; number of people in an area who walk regularly	▪ Number of trips, possibly by purpose	▪ Number of pedestrians per time period; number of people crossing; average daily, weekly, or annual pedestrian volume; product of pedestrian and vehicle volumes (interactions)	▪ Total or average miles traveled per pedestrian, total or average miles crossed per pedestrian	▪ Total or average amount of time spent traveling, total or average time taken by pedestrian crossing an intersection

Sources: Adapted from *Estimating Pedestrian Accident Exposure* (3) and *Guide for Scalable Risk Assessment Methods for Pedestrians and Bicycles* (2).

A Few Purposes of Estimating Exposure

- Develop pedestrian crash rates for a facility or geographic area
- Assess pedestrian safety trends over time and the effectiveness of safety countermeasures
- Assess crash rates based on metrics such as time of day, land use density, socioeconomic characteristics, gender, or facility type
- Conduct cost–benefit analyses of safety improvements
- Develop crash modification factors (CMFs) for safety countermeasures
- Develop safety performance functions (SPFs) for different vehicle-pedestrian crash and location types

Figure 3-2. Example of Michigan DOT's Pedestrian and Bicyclist Safety Risk Assessment Tool



Source: *MDOT Pedestrian and Bicyclist Safety Risk Assessment Tool* (6).

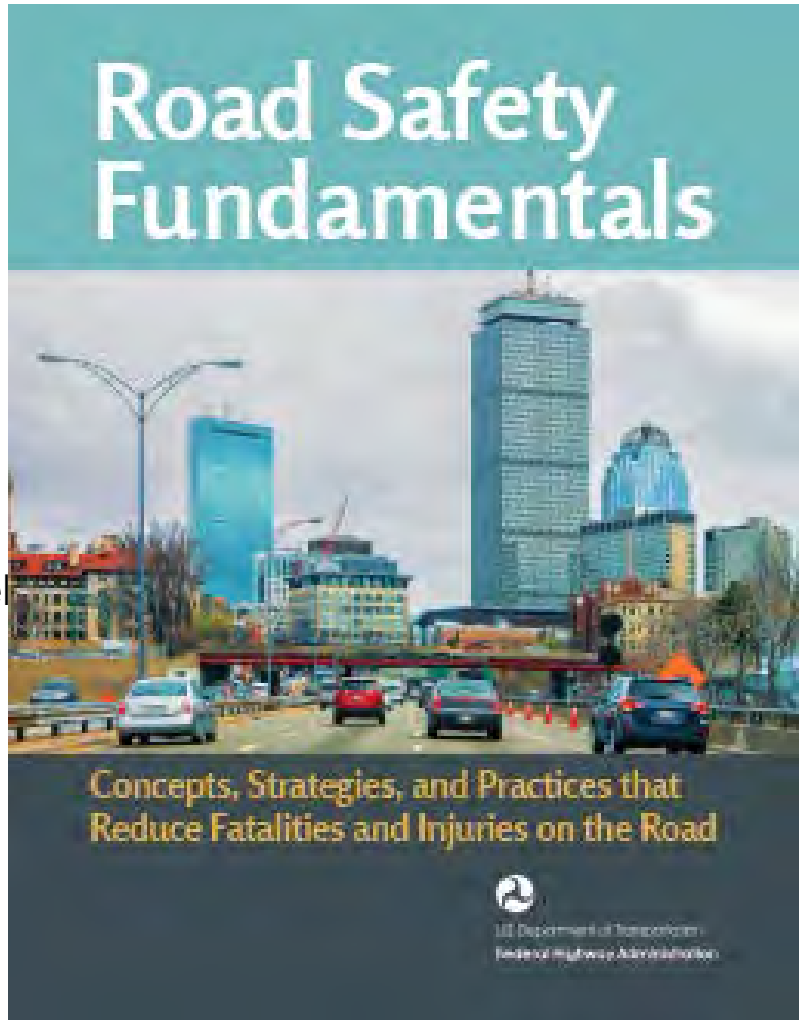
Exposure Scale and Coverage

Facility-specific	**Street crossing** (intersection or mid-block) *Example: The number of pedestrians crossing an intersection and the number of vehicles conflicting with pedestrians can be used to estimate exposure for each crossing movement.* **Road segment** (between intersections) *Example: The number of pedestrians crossing a mid-block location, where exposure is estimated based on crossing distance.*
Areawide	**Network** (traffic analysis zone, census tract, census block group) *Example: The number of pedestrian crashes in a census tract can be compared to the total population of the census tract.* **Regional** (city, county, metropolitan area, or state) *Example: The number of walking commuters or the number of pedestrian fatality rates per million population in a state.*

Typical Data Needs

Critical
- Vehicle–pedestrian crashes, including location, time, and severity
- Traffic volumes
- Some measure of pedestrian **exposure to crash risk**
- Road characteristics

Supplemental
- Traffic citation data (e.g., speeding, drivers failing to yield to crossing pedestrians)
- Vehicle–pedestrian conflicts and avoidance maneuvers
- Sight distance at intersections and driveways
- Injury surveillance and emergency medical systems data on pedestrian injury
- Law enforcement operations and observations data
- Public survey on perceptions of pedestrian safety
- Direct field observation data, including from pedestrian safety assessments or road safety audits
- Sociodemographic data (US Census), e.g., population and employment densities
- Travel behavior data (travel diaries and surveys including the National Household Travel Survey)
- Transit data (stop locations, boardings/alightings, routes)
- Infrastructure data
- Sidewalk and path locations
- Sidewalk physical and effective (i.e., usable) widths
- Sidewalk conditions
- Crosswalk dimensions
- Traffic signal timing for pedestrians
- Output from Walk Score or transportation demand models



Evaluating Countermeasure Impacts—Performance Measures

- **Crash frequency**—# of crashes occurring per year or other unit of time

- **Crash rates**—# of crashes normalized by a population or **metric of exposure**
  - E.g., # crashes per 100,000 people living in a city, per miles traveled or licensed drivers
  - Can be measured by the types of injuries sustained to the people involved in the crash (e.g., by injury severity)

Exposure Estimation Methodologies

NCHRP 17-87: Guide to Pedestrian Analysis

Sketch Planning – Areawide Analysis

Sketch planning includes methods to estimate exposure that are simple to apply and provide an alternative to complex models. They may be implemented in a spreadsheet or geographic information system and incorporate travel survey data. The methods primarily depend on the available data (e.g., nationally collected survey data) and require little effort in terms of data collection and no specialized expertise. They typically use simple computations, rules of thumb, and population estimates.

References and Resources (to name a few): (*7–14*)

UNITS OF EXPOSURE


Population


Distance traveled


Number of commuters who walk
Number of persons who regularly make walking trips


Time spent traveling

DATA SOURCES

National Household Travel Survey (NHTS)

American Community Survey (ACS)

Regional travel surveys

GEOGRAPHIC SCALE

City, county, metropolitan area, state, country

ADVANTAGES

- Utilizes data that are available
- Includes simple computations and estimations
- Creates simple and practical solutions
- Requires limited resources
- Does not require specialized expertise

DISADVANTAGES

- Relatively low accuracy
- Challenging to validate
- Mostly aggregated estimates

EXAMPLES

The National Association of City Transportation Officials (NACTO, *7*) used ACS data to assess the risk of injury or death to cyclists. The analysis was also conducted at a city level for a variety of locations in the United States.

A study used regional household travel survey and crash data to estimate exposure based on the number of trips, distance traveled, and travel time. Injury rates were disaggregated based on location and demographic characteristics, e.g., density, gender and age (*12*).

Network Analysis Model – Specific Transportation Facilities

Network analysis models are much more complex than sketch planning models and are based on a pedestrian network representation. They typically use a four-step modeling approach for trip generation and distribution. Space Syntax is one of the most well-known examples of network analysis models and was first developed in the mid-1980s in London. These models are used to estimate volumes for specific facility types (e.g., street segments or intersections) over an entire area of interest, such as a neighborhood or city. Beginning with base data collection and ending with forecasting future pedestrian volumes based on network changes, there are seven steps to create a Space Syntax predictive model.

Reference and Resource: (*15*)

UNITS OF EXPOSURE	
	Average Annual Pedestrian Volume
DATA SOURCES	Manual counts Census data
GEOGRAPHIC SCALE	Point
ADVANTAGES	▪ Good detail ▪ Reasonable accuracy ▪ Limited data requirements ▪ Useful for estimating pedestrian flows along corridors ▪ Applied widely in Europe and Asia ▪ Appropriate to urban volume analysis
DISADVANTAGES	▪ Relatively unused in the United States ▪ Model must be calibrated with pedestrian counts ▪ Requires existing GIS data ▪ Must be submitted to sensitive test ▪ Process is not intuitive (does not follow traditional trip generation and distribution steps)
EXAMPLE	A study applied the Space Syntax Model to estimate pedestrian volumes at intersections in Oakland, California. The output volumes were then used in a safety analysis for the city's first pedestrian master plan (*15*).

Direct Demand Model – Specific Transportation Facilities

Direct demand models are among the most widely used tools for pedestrian volume estimation and modeling. These models are also used as primary tools to measure pedestrian exposure for safety analysis. These models are very similar to aggregate demand models, although the analysis is performed at a larger level in the aggregate models.

References and Resources: (*16–19*)

UNITS OF EXPOSURE



Weekly Crossing Pedestrian Volume, Million Pedestrians per Unit of Time, Pedestrian Volumes



100 Million Miles Traveled

DATA SOURCES

- Manual counts
- Automated counts
- Population and land use data
- Crossing distances
- Vehicle average daily traffic

GEOGRAPHIC SCALE

Point, segment

ADVANTAGES

- Highly accurate
- Detailed
- Utilizes available data
- Limited sample size required

DISADVANTAGES

- Does not capture behavioral structure
- Not easily transferable

EXAMPLES

A study developed a Poisson log–linear regression model to estimate pedestrian counts at signalized intersections. The independent variables in the model included land use variables and the day characteristics. Using this model, the total number of pedestrian miles traveled were estimated, representing exposure (*18*).

A study estimated a generalized linear regression model using number of lanes, area type, and sidewalk system as the independent variables. The dependent variable was the weekly pedestrian crossing volume, representing pedestrian exposure in safety analysis (*19*).

Discrete Choice Model – Specific Transportation Facilities

Discrete choice models utilize information about crossings and crossing behavior to model pedestrian crossing behavior. Crash risk exposure can be estimated for any location along a pedestrian trip where a pedestrian interacts with a vehicle (i.e., a location where a pedestrian is likely to cross). Thus, these discrete choice models are used to develop pedestrian behavior choice models for each location along an entire trip.

References and Resources: (*20, 21*)

UNITS OF EXPOSURE



Vehicle volume encountered while crossing, Product of vehicle volume and pedestrian volume (interactions)

DATA SOURCES	Manual counts Manual field surveys
GEOGRAPHIC SCALE	Segment
ADVANTAGES	▪ Detailed ▪ Highly accurate
DISADVANTAGES	▪ Relatively few studies ▪ Significant initial data requirements
EXAMPLES	A study developed a nested logit model for developing a hierarchical choice structure between junctions and mid-block crossings. The model included origins, destinations, traffic characteristics, and pedestrian facilities as independent variables (*20*).

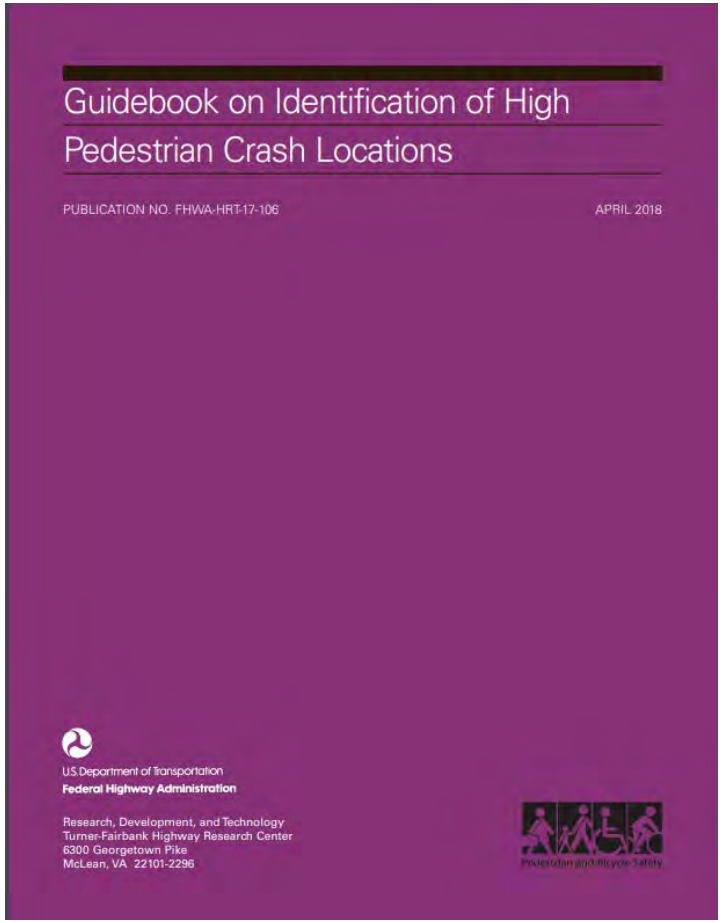
Treatment Location Identification

Approaches to Identify and Prioritize Locations for Safety Treatments

- **Crash-based (reactive)**—focusing on locations with high numbers or rates of crashes
- **Systemic (proactive)**—focusing on locations with similar characteristics with the greatest potential to prevent future crashes
- **Hybrid**—combining elements of both the crash-based and systemic approaches

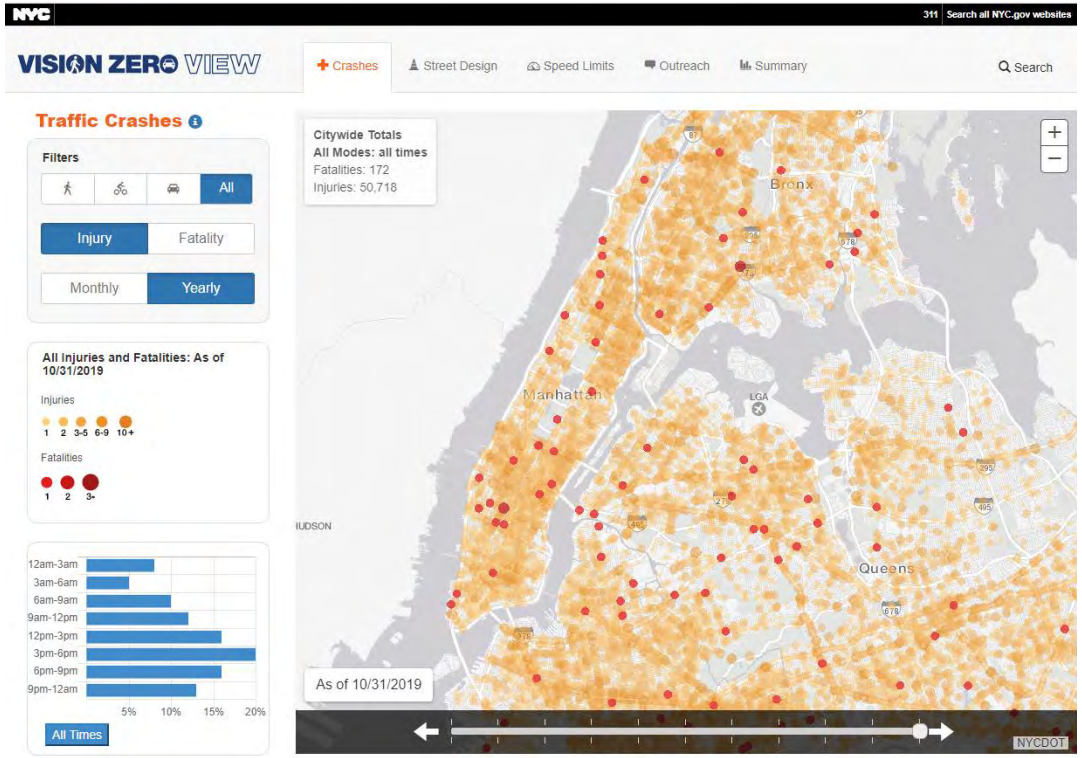
Crash-Based Approach

- Select Analysis Scale
- Select Performance Measures
- Select Screening Method
- Assign Crashes to Network Elements
- Prioritize Sites to Receive Treatment



Example Crash-Based Approaches





Systemic Approach

- Step 1: Define the Study Scope
- Step 2: Compile Data
- Step 3: Determine Risk Factors
- Step 4: Identify Treatment Sites
- Step 5: Select Potential Countermeasures
- Step 6: Refine and Implement Treatment Plan
- Step 7: Evaluate Program and Project Impacts



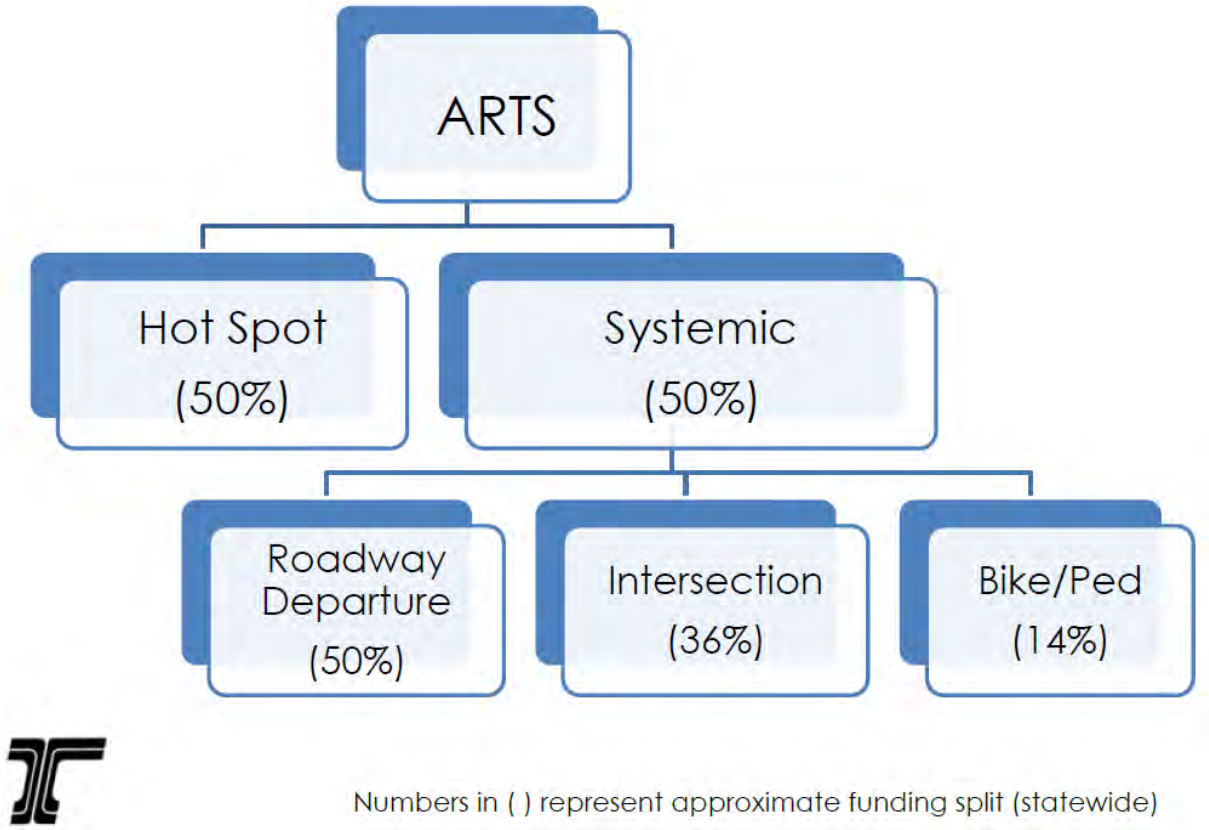
Figure 2. A systemic approach addresses sites with similar risk factors, regardless of crash history. The approach falls along a spectrum of other approaches to safety that are more or less proactive in treating sites based on risk or prior crash history.

Source: NCHRP Research Report 893: Systemic Pedestrian Safety Analysis

Hybrid Approach

Integrates the strengths of both the **crash-based** and **systemic approaches** to arrive at a prioritized list of treatment locations based upon:

- Historical crash patterns
- Clusters of risk factors



Oregon Department of Transportation's "All Roads Transportation Safety (ARTS) Program"

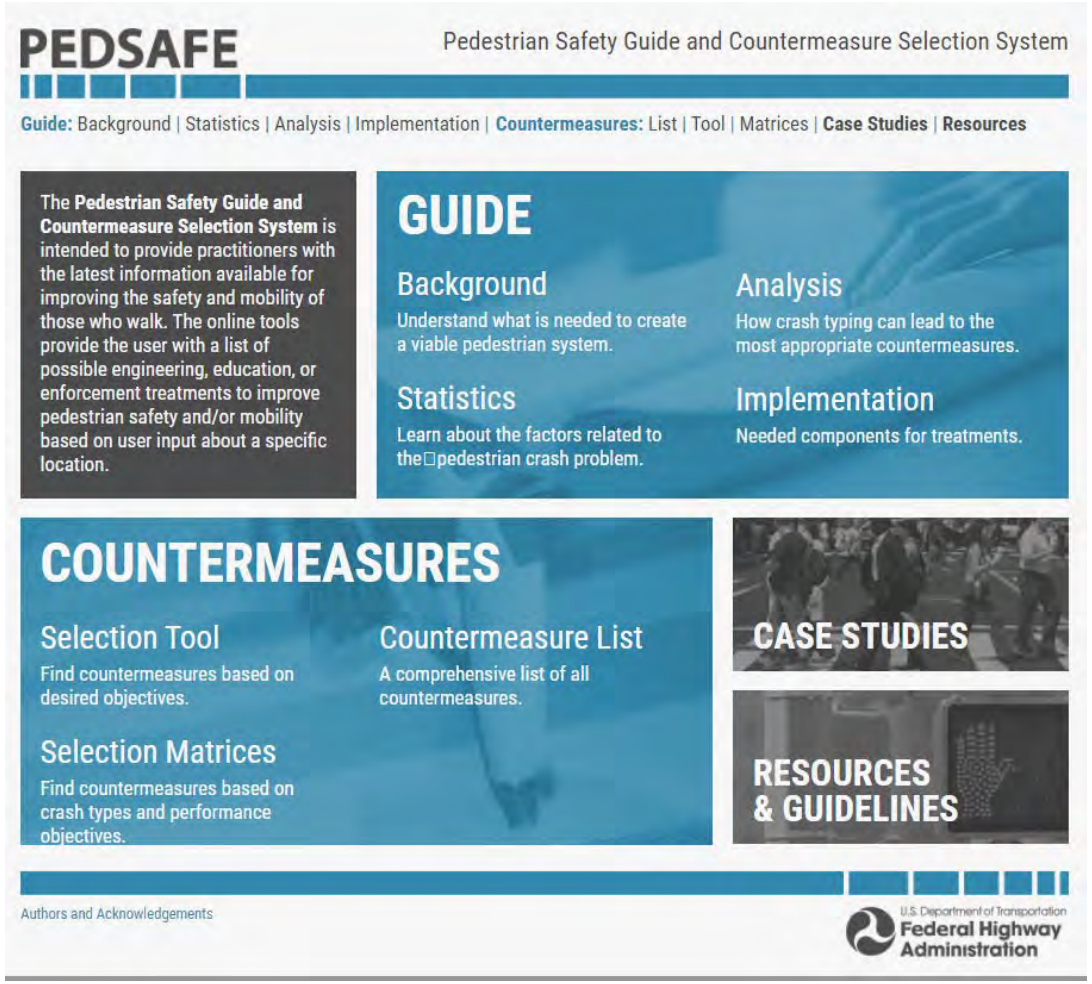
Source: oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/Pages/ARTS.aspx

Pedestrian Safety Countermeasure Selection

NCHRP 17-87: Guide to Pedestrian Analysis

Categories of Pedestrian Safety Countermeasures

- Along the roadway
- At crossing locations
- Transit access
- Roadway design
- Intersection design
- Traffic calming
- Traffic management
- Signs and signals



Selecting Countermeasures

For example, based upon:

- Posted speed limit and vehicle AADT
- Roadway configuration

Figure 3-3. Example Countermeasure Identification Matrix

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5 7 9	❶ ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① 3 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 ❾	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 ❾	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

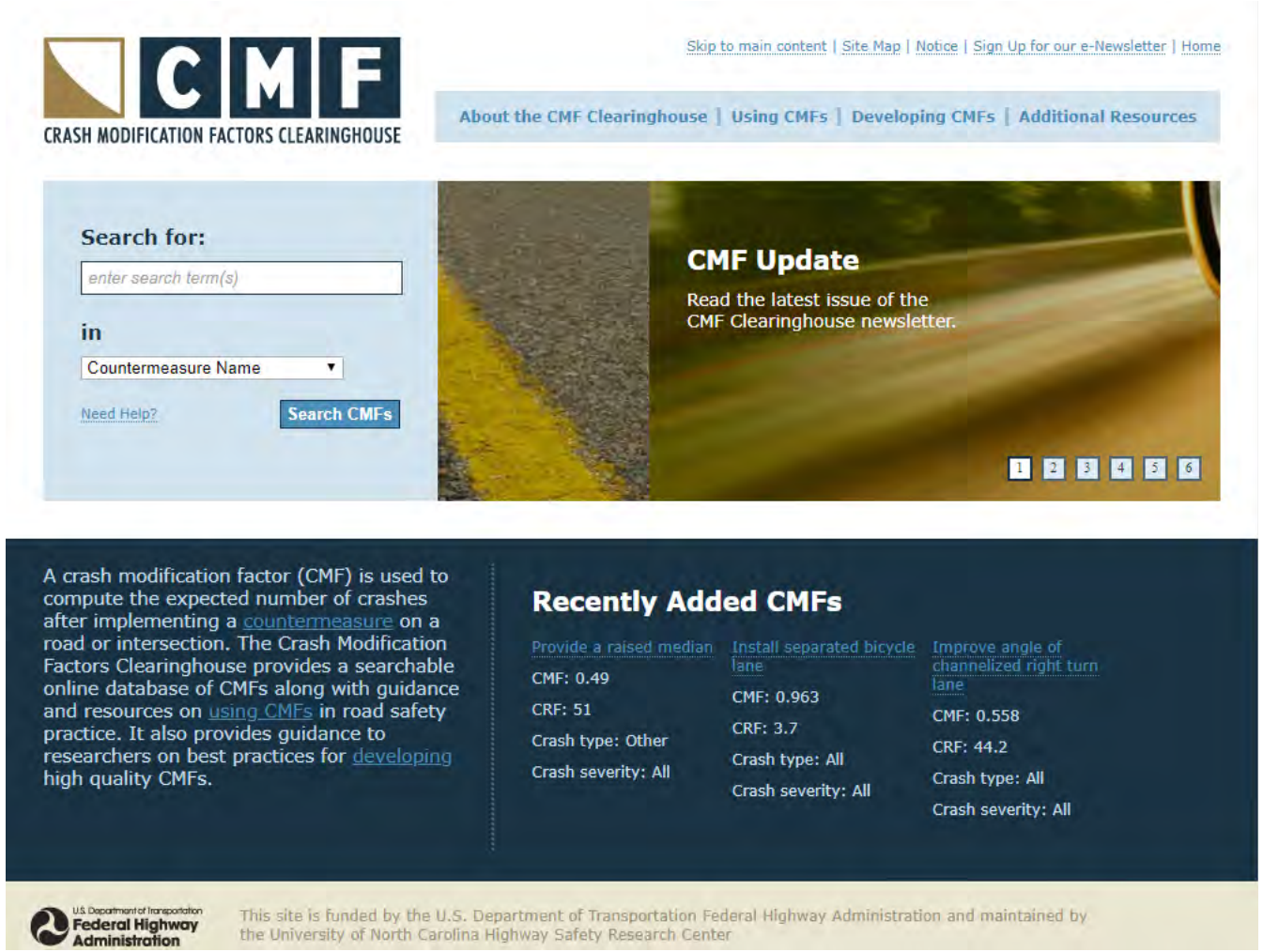
1 High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2 Raised crosswalk
3 Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line
4 In-Street Pedestrian Crossing sign
5 Curb extension
6 Pedestrian refuge island
7 Rectangular Rapid-Flashing Beacon (RRFB)**
8 Road Diet
9 Pedestrian Hybrid Beacon (PHB)**

Source: FWHA *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*

Selecting Countermeasures

For example, based upon:

- CMFs from the literature or Crash Modification Factors Clearinghouse—cmfclearinghouse.org



Pedestrian Safety Countermeasure Examples

NCHRP 17-87: Guide to Pedestrian Analysis

High-Visibility Crosswalk*

*countermeasure included in NCHRP 17-87 study

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
High-visibility crosswalk—vertically arranged street markings designed to improve the visibility of the crosswalk compared to traverse parallel lines.	0.52 in urban locations (*30*) 0.63 for high visibility yellow/green markings in urban school zones (*31*) In both studies, the high-visibility markings replaced standard parallel markings.	

Source: Cambridge, MA; pedbikeimages.org

Raised Crosswalk

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
Raised crosswalk/speed table—an elevated section of pavement with a marked crosswalk to encourage drivers to slow down.	0.55 (32) for areawide traffic calming	 Source: Cambridge, MA; pedbikeimages.org

Median Crossing (Refuge) Island

*countermeasure included in NCHRP 17-87 study

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
Median crossing (refuge) island—a protected space placed in the center of the street to facilitate pedestrian crossings by allowing pedestrians to cross only one direction of traffic at a time.	0.68–0.71 (install raised median) (*33–35*)	 Source: Beverly Hills, CA; pedbikeimages.org

R1-6 Signs Gateway Treatment

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
In-roadway YIELD TO PEDESTRIAN sign (R1-6) installed as a gateway treatment—R1-6 signs placed at a crosswalk along the edge of the road and on all lane lines, thus requiring drivers to slow down to drive between two signs.	No CMFs yet available. Motorist yielding has been highest with a gateway configuration (*35*). Speed reductions in some applications (*37, 38*).	

Source: Ann Arbor, MI; Michigan DOT

Pedestrian Hybrid Beacon (PHB)

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
Pedestrian Hybrid Beacon (PHB) (HAWK signal)—a traffic control device used to stop motor vehicle traffic to allow pedestrians to cross safely.	0.31 (*39*) 0.45 (*33, 34*) 0.43 PHB plus advance stop or yield line (*33, 34*)	 Source: Phoenix, AZ; pedbikeimages.org

Leading Pedestrian Interval (LPI)

*countermeasure included in NCHRP 17-87 study

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
Leading Pedestrian Interval (LPI)—provides pedestrians with a 3–7 second head start when entering an intersection, relative to the green signal for parallel vehicular traffic.	0.41–0.95 (*40–42*)	 Source: Seattle, WA; pedbikeimages.org

Rectangular Rapid-Flashing Beacon (RRFB)

*countermeasure included in NCHRP 17-87 study

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
Rectangular Rapid-Flashing Beacon (RRFB)—user-actuated amber LED blocks that supplement warning signs at unsignalized intersections or mid-block crosswalks. They can be manually activated by pedestrians using a push button or can be passively activated by a pedestrian detection system.	0.53–0.64 (*33, 43*)	 Source: Davis, CA; pedbikeimages.org

Sidewalk

Countermeasure	CMFs or Other Estimated Pedestrian Safety Benefits	Example
Sidewalk—a paved path for pedestrians set along the side of a roadway.	0.26 (*44*)	 Source: Pittsford, NY; pedbikeimages.org

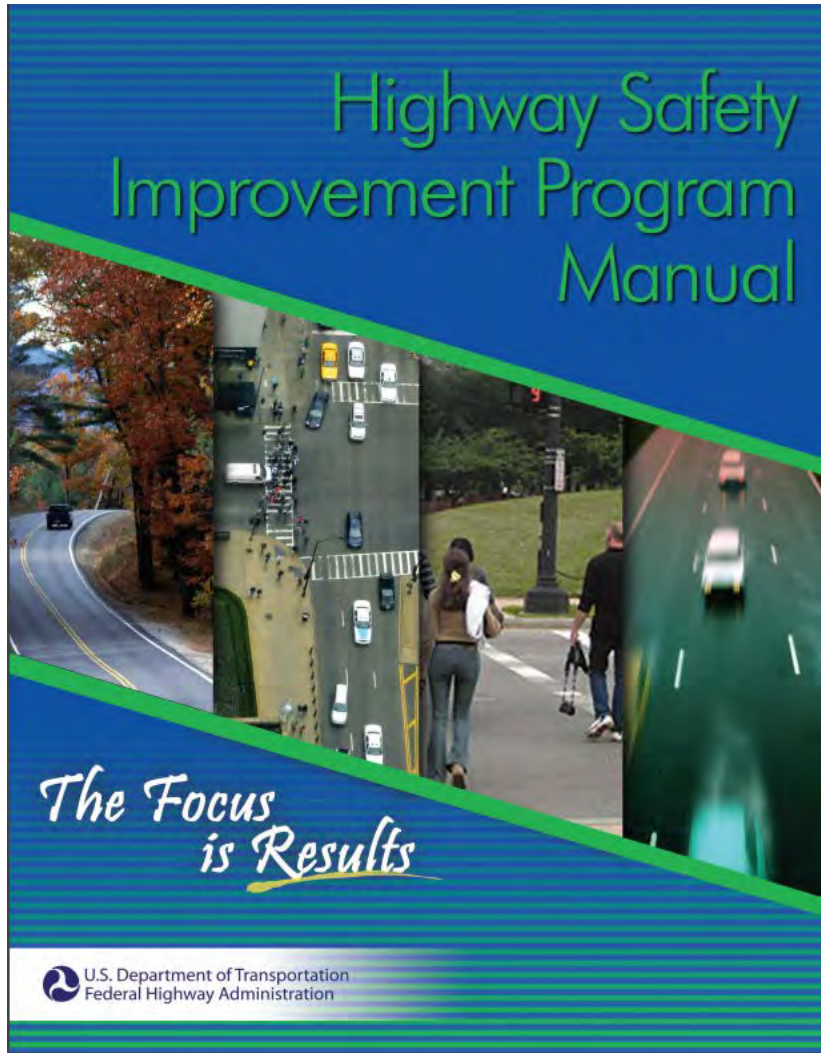
Matching Countermeasures to Risk Factors

Pedestrian safety risk is a composite of:

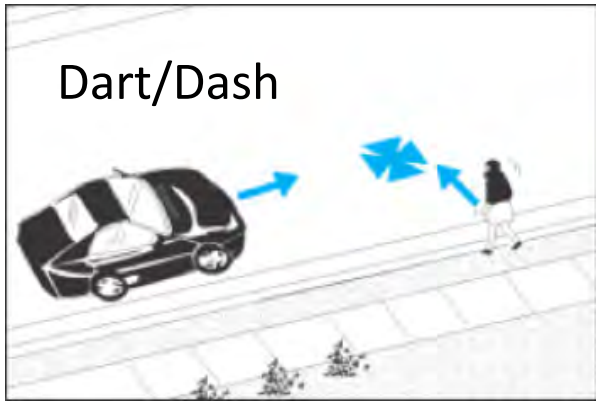
- **Crash-contributing factors**—elements of the environment, the persons involved in a crash, road user behaviors, etc. that may have played a contributing role in the crash
- **Crash types**—the sequence of road user movements that immediately lead up to the crash

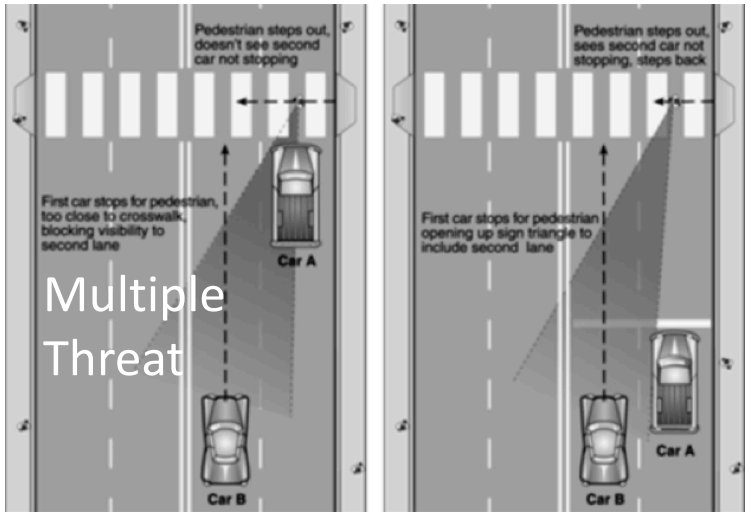
Pedestrian Crash-Contributing Factors

- Vehicle speed
- Driver and pedestrian compliance with regulations and traffic devices
- Pedestrian crossing behaviors
- Built environment or land use area type
- Intersection presence and types of traffic control devices
- Pedestrian crossing distance
- Time of day/day of week/seasonal factors
- Alcohol impairment on the part of pedestrians or drivers
- Demographics
- Special populations, such as school-aged children, older adults, and persons with disabilities
- Presence of transit stops



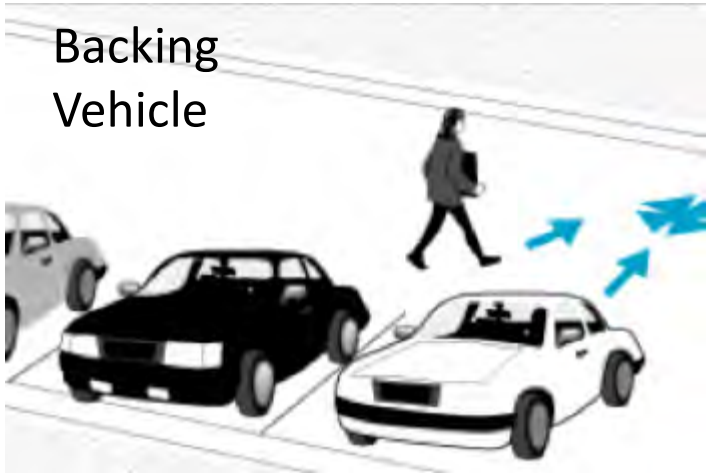
Pedestrian Crash Types











Source: pedbikesafe.org

Assessing Countermeasure Effectiveness

- Crash reduction
- Motorist yielding
- Pedestrian satisfaction

Crash Reduction

- **Crash-modification factors (CMFs)**—provide an estimate of a countermeasure's ability to reduce certain types and severities of crashes following installation
- **Safety performance functions (SPFs)**—estimate the average number of crashes at a particular location based on certain characteristics present at the location (e.g., traffic volume, traffic speed)

Motorist Yielding

Table 3-2. Motorist Yielding Rates Associated with Different Crossing Treatments

Crossing Treatment	Sample Size (sites)	Motorist Yielding Rate (%) Average	Range
No treatment (unmarked)	37	24	0–100
Crosswalk markings only (any type)	55	34	0–95
Crosswalk markings, plus:			
Pedestal-mounted flashing beacon	2	35	12–57
Overhead sign	6	37	0–52
Overhead flashing beacon (push-button activation)	14	51	13–91
Overhead flashing beacon (passive activation)	29	73	61–76
In-roadway warning lights	11	58	53–65
Median refuge island	21	60	0–100
Pedestrian crossing flags	6	74	72–80
In-street pedestrian crossing signs	17	74	35–88
Rectangular rapid-flashing beacon (RFFB)	42	79	45–100
School crossing guard	1	86	—
School crossing guard and RFFB	1	92	—
Pedestrian hybrid beacon (HAWK)	69	88	83–100
Mid-block crossing signals, half signals	6	98	96–100

Source: NCHRP Project 17-87 final report (*48*), compiling data from references (*48–65*).

Pedestrian Satisfaction—Uncontrolled Crossings

Marginal mean probability of satisfaction by countermeasure type (most to least):

- **Median islands with RFFBs**—0.739
- **Median islands**—0.667
- **Marked crosswalks**—0.497
- **Unmarked crosswalks**—0.294

N = 418. Controls: AADT, driver yielding, pedestrian slowed during crossing

Pedestrian Satisfaction—Signalized Crossings

Marginal mean probability of satisfaction by countermeasure type at signalized intersections:

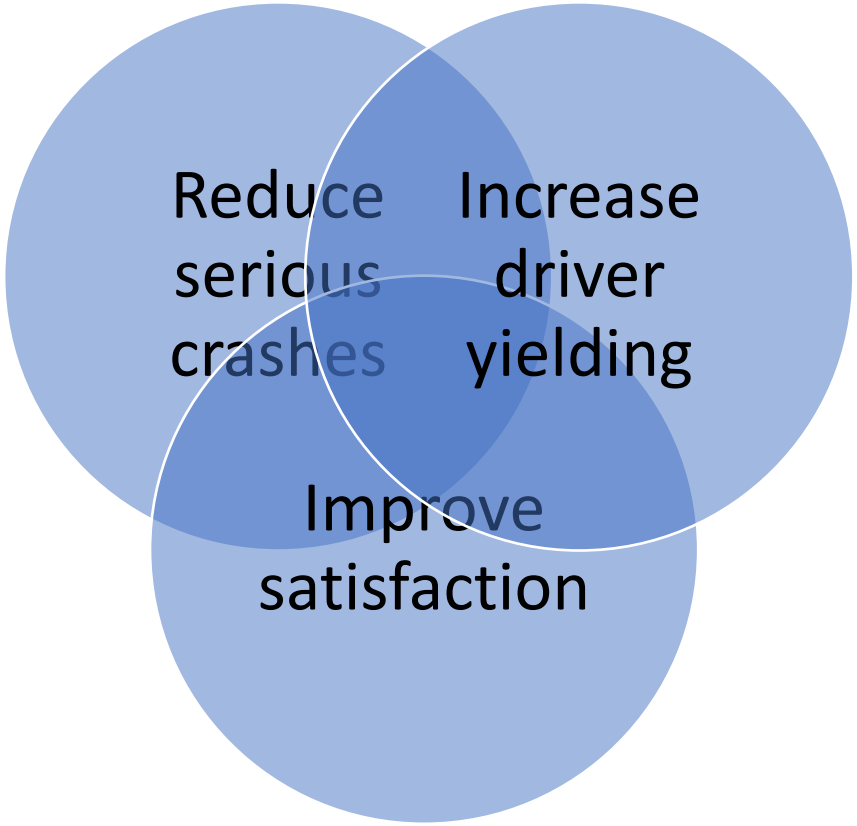
- **LPI**—0.678
- **Non-LPI**—0.535

N = 418. Controls: AADT, driver yielding, pedestrian slowed during crossing

Other Research on Treatments

- **Road diet** (reducing number of vehicle through lanes): *moderately improves satisfaction* (*Elias, 2011; Choi, Sangyoup, Dongchan, Dongmin, & Sungkyu, 2016*).
- **Street lighting**: *moderately improves satisfaction* (*Bivina & Parida, 2019*)
- **Sidewalk with buffer from traffic**: *strongly improves satisfaction* (*Choi, Sangyoup, Dongchan, Dongmin, & Sungkyu, 2016: Zhao, Bian, Rong, Liu, & Shu, 2016*)

Countermeasure Effectiveness



Building Safer Routes to School



Every day, children and their parents walk or ride their bicycles to school. However, busy roads can mean the difference between being able to walk or ride a bike to school or needing to ride in a car.

Children face unique limitations when crossing roads. Because of their small body size and developing minds, they often have difficulty detecting and judging speed and safe gaps in traffic. Speed management is key near schools, parks, and other settings with large numbers of children. Slower speeds give motorists more time to react.

> "Today more than ever, there is a need to provide options that allow all children, including those with disabilities, to walk and bicycle to school safely."
>
> — National Center for Safe Routes to School

Road Diets can improve roadway conditions near areas children frequent, like schools and parks. In these locations, safety can be drastically improved for motorists by calming traffic and improving the line of sight for children and drivers alike.

Road Diets are a Proven Safety Practice

Road Diets are a proven safety countermeasure that keep traffic flowing while reducing crashes, reducing high-risk speeding, and addressing safety concerns. Implementing a Road Diet is an easy and cost effective way to manage and improve mobility and accessibility for all users, including pedestrians, bicyclists, and those using public transportation. This is done by reconfiguring roadways using pavement marking modifications.

Why go on a Road Diet?

Road Diets have the potential to improve safety, convenience, and quality of life for all road users. These are the most common benefits of Road Diets:

- Increased safety / reduced collisions
- Improved traffic flow
- Improved mobility, connectivity, and access to essential services



Ocean Park Boulevard Road Diet, Santa Monica

Collisions were reduced by 65% near schools as a result of this Road Diet.

Eileen Fogerty, City of Santa Monica [1]

Case Study: Santa Monica, California – Ocean Park Boulevard

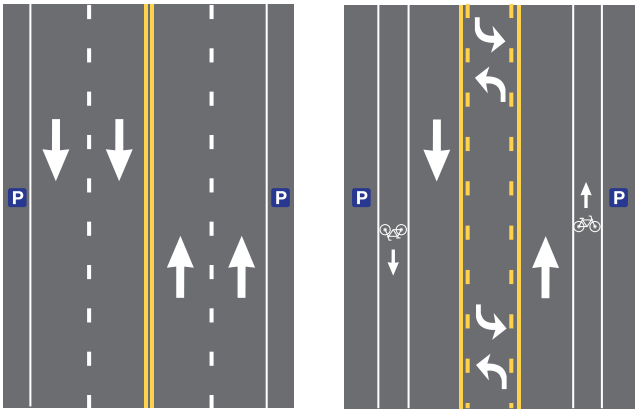
The City of Santa Monica recently installed a Road Diet on Ocean Park Boulevard with hopes of improving safety for pedestrians and bicyclists, including school motorists, in the area. Extending 1.1 miles, the Road Diet comprised of restriping, bicycle lanes, and on-street parking. The corridor is a transit route and carries approximately 23,000 vehicles per day. The speed limit on the corridor is 35 mph, with a school zone area of 25 mph when children are present.

Addressing Safety Concerns

The Will Rogers Elementary School, John Adams Middle School, and recreational facilities are located near Ocean Park Boulevard. With such a high volume of student activity in this area, vehicles speeding and a recent increase in crashes were a major cause for concern.

Results

In the first 9 months following the reconfiguration, crash data indicated there was a 65 percent reduction in collisions— as compared to the same 9-month period in the year prior to the Road Diet installation. Furthermore, many people appreciated the improved conditions for bicyclists and pedestrians. Read more online: Ocean Park Blvd Road Diet



BEFORE AFTER

Funding Road Diets

A Road Diet can be a low-cost safety solution, particularly in cases where only pavement marking modifications are required to make the traffic control change. In other cases, the Road Diet may be planned in conjunction with reconstruction or simple overlay projects, and the change in cross section allocation can be incorporated at no additional cost.

Road Diets are typically eligible for Surface Transportation Program (STP) Set-Aside, Highway Safety Improvement Program (HSIP) or other Federal-aid funds such as any remaining SAFETEA-LU SRST funds. Other funding sources available vary widely from state and local sources, including such sources as Safe Routes to School grants, state DOT pedestrian and bicycle funds, and Federal Transit Administration program grants.

Get more information about Road Diets: www.safety.fhwa.dot.gov/road_diets

1. Santa Monica Information Item: Fogarty, Eileen (2011, Feb 28). Ocean Park Boulevard Reconfiguration. Retrieved from file:///C:/Users/579771/Downloads/Ocean_Park_Blvd.pdf

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Since its inception in 1999, the Pedestrian and Bicycle Information Center's mission has been to improve the quality of life in communities through the increase of safe walking and bicycling as a viable means of transportation and physical activity. The Pedestrian and Bicycle Information Center is maintained by the University of North Carolina Highway Safety Research Center with funding from the U.S. Department of Transportation Federal Highway Administration.

Notes to Presenter

- This slide deck was prepared by the UNC Highway Safety Research Center and Toole Design Group in support of the FHWA-sponsored Pedestrian and Bicycle Information Center.
- It is intended to serve as an open source resource for anyone who needs to prepare and deliver a presentation on the topic of pedestrian safety and arterial streets for non-commercial purposes.
- Please inform PBIC (info@pedbikeinfo.org) when you use the deck and please share your feedback with us!

Pedestrian and Bicycle Information Center

Arterial Roads and Pedestrian Safety

A Resource for State, Metropolitan Planning Organization, and Local Planners and Engineers

Presenter Name

Date

Overview of Presentation

1. Purpose and Context
2. Background
3. Pedestrian Safety and Arterials
4. Systemic Safety, Vision Zero, and Complete Streets
5. Safety Treatments
6. Resources
7. Conclusion



Photo source: Toole Design Group

1. Purpose and Context



Photo source: Toole Design Group

Purpose and Context

Key Takeaways

- Understand characteristics, context, and history of arterial roadways
- Identify specific pedestrian safety issues
- Identify strategies for applying systemic safety, safe systems, and Complete Streets principles
- Learn common impediments to pedestrian safety and associated countermeasures
- Identify resources for more information

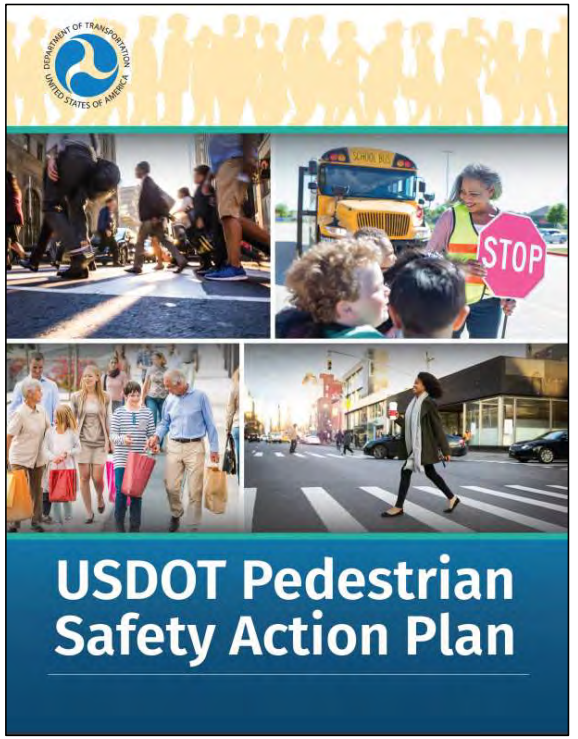


Photo source: Toole Design Group

USDOT and FHWA Priorities

- Creating a safe road system
- Zero deaths
- Pedestrian safety and livability
- Ongoing initiatives:
  - USDOT Pedestrian Safety Summit 2020
  - USDOT Pedestrian Safety Action Plan





2. Background



Photo source: Toole Design Group

Historical Context: Changes in Land Use and Function



Photo source: Getty Open Content Program



Photo source: Toole Design Group

Urban Renewal Context:
Part of a Larger History of Injustice

Lower Hill Neighborhood, 1952



Lower Hill Neighborhood Demolished, 1957



Arterial Roads connecting to suburbs, and new Civic Center, 1964





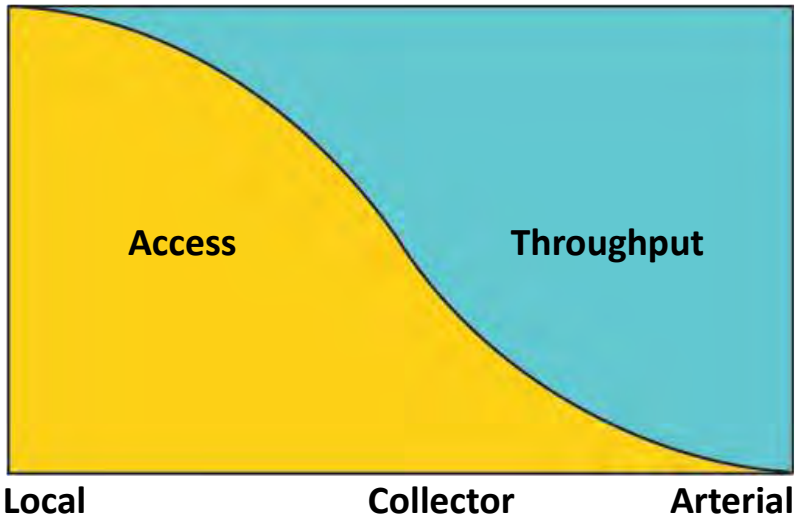




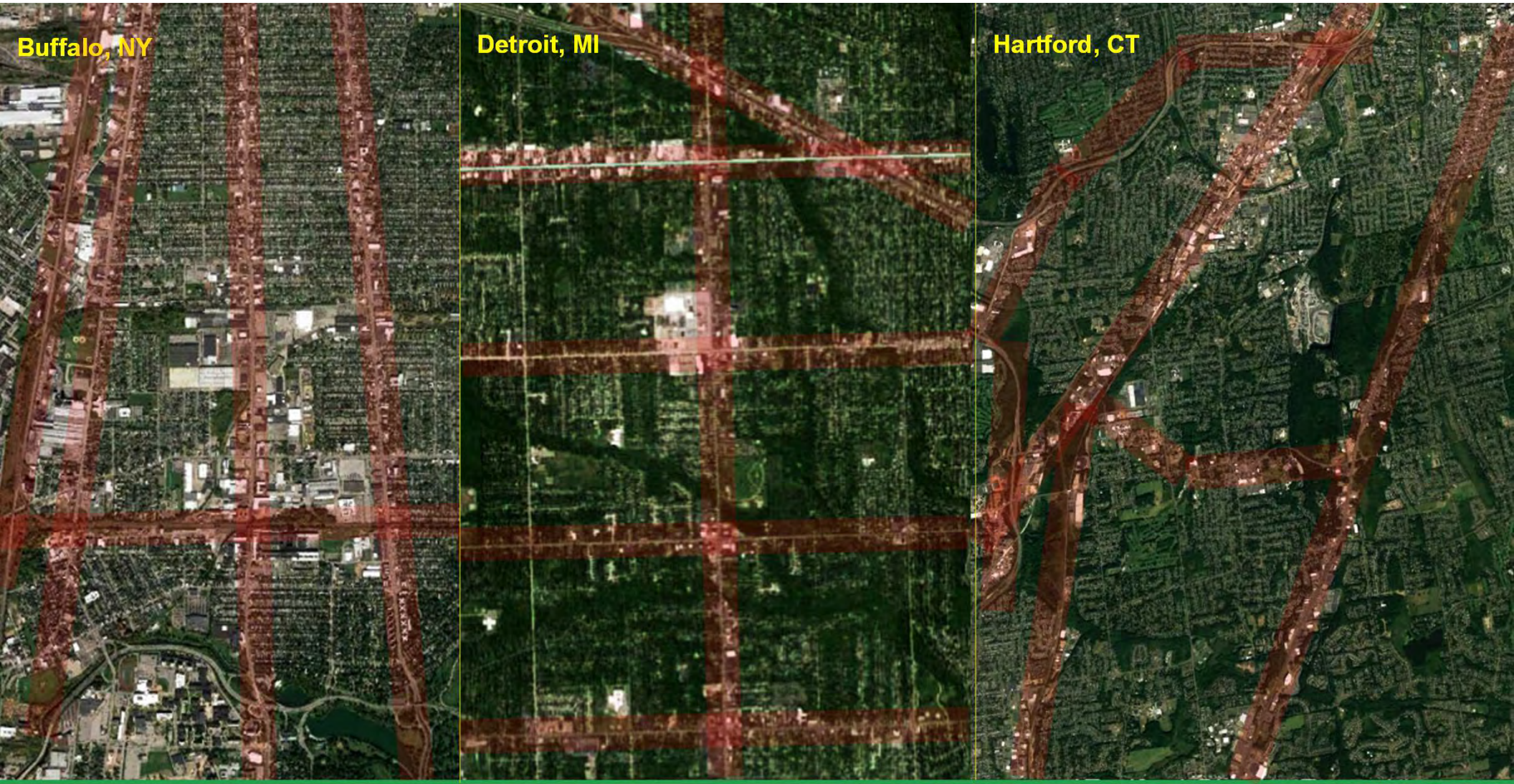
Photo sources: Top - Pittsburgh City Photographer Collection; bottom (L-R) - Pittsburgh Post-Gazette, Dr. Pop, Pennsylvania Aerial Imagery Navigator.

Conventional Concept of the Role of Arterials

- The hierarchy of functional systems consists of principal arterials, minor arterials, collectors, and local roads and streets
- Roads making up the functional system differ for urban and rural areas



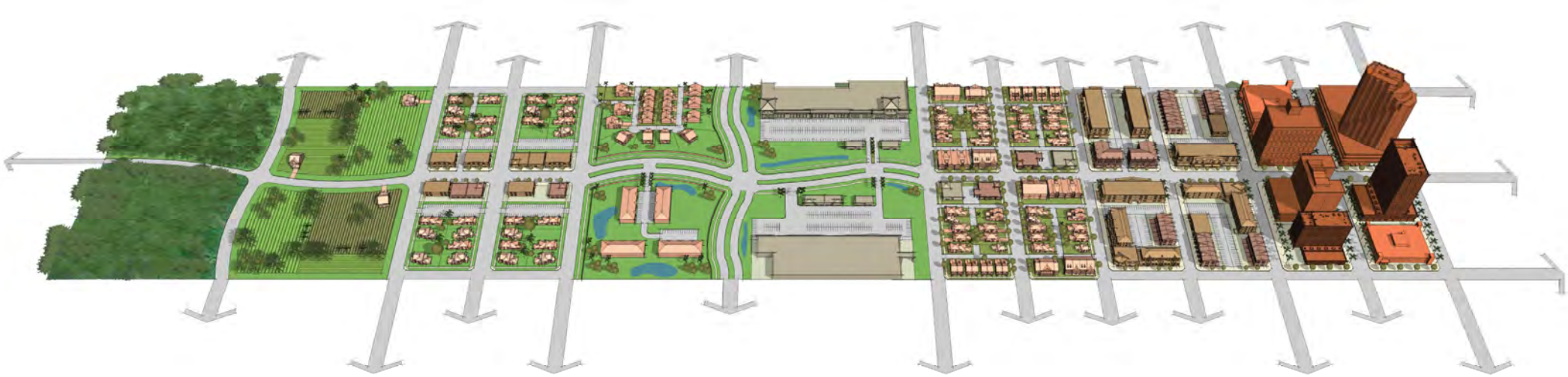
Graphic source: FHWA


Buffalo, NY
Detroit, MI
Hartford, CT

Land Use and Pedestrian Safety

- Land use planning and roadway design are often siloed from each other
- Land use can complicate arterial safety
- Enhanced coordination between transportation and land use decision-making can improve outcomes
- Safer road systems for pedestrians include safe designs in all land use contexts

Context Sensitive Solutions



Rural | **Rural Town** | **Suburban** | **Urban** | **Urban Core**

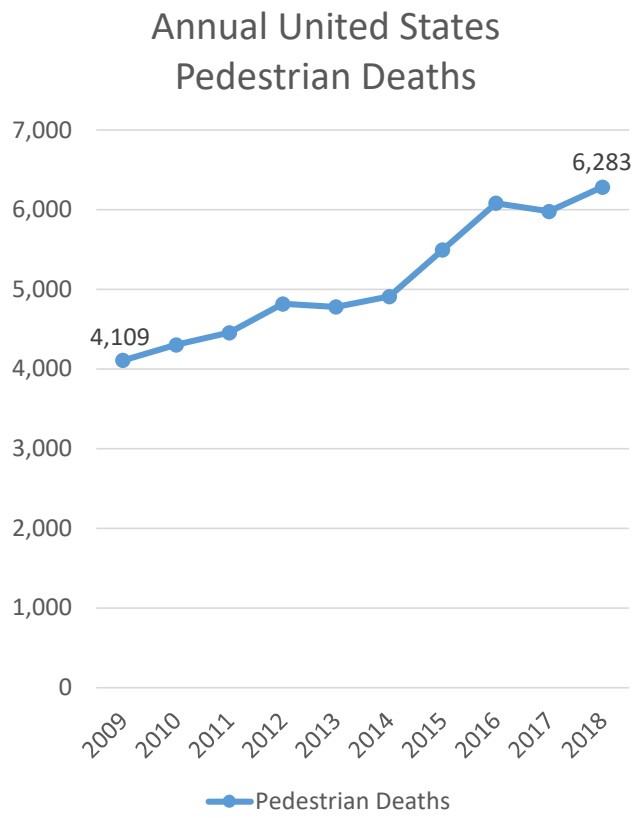
Graphic adapted from FDOT Context Classification Guide

3. Pedestrian Safety and Arterial Roadways



Photo source: Toole Design Group

Pedestrian Safety is an Urgent Problem in the US



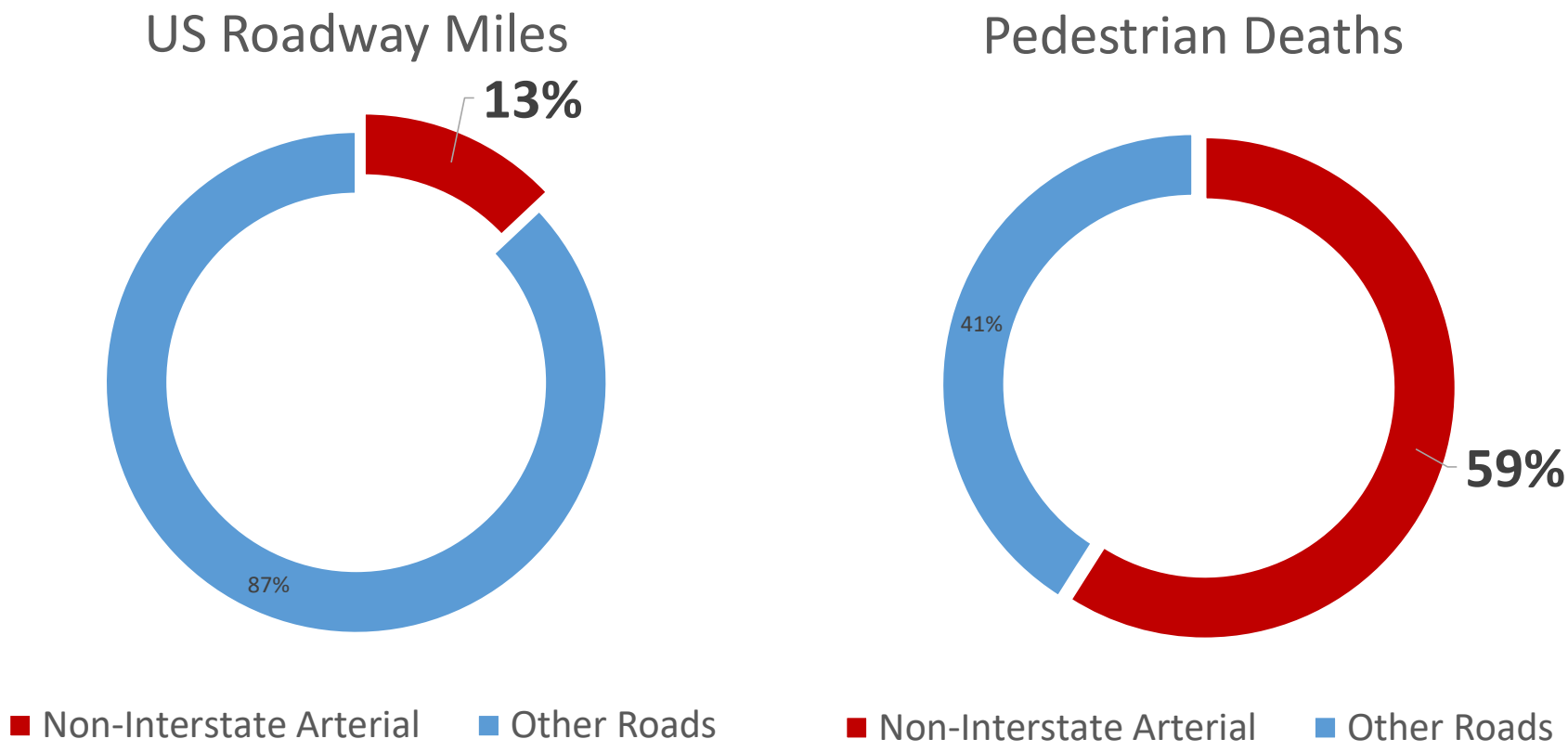
US pedestrian deaths have **increased by 53%** in the past decade

From 2009 to 2018, pedestrian fatalities increased

- 70 percent on principal arterials
- 76 percent on minor arterials

Source: National Highway Traffic Safety Administration, 2019

Arterials are Disproportionately Dangerous for Pedestrians



Source: Bureau of Transportation Statistics, 2019

Source: Governor's Highway Safety Administration, 2019

Highway Functional Classifications

Functional Classification	Distance Served (and Length of Route)	Access Points	Speed Limit	Distance between Routes	Usage (AADT and DVMT)	Significance	Number of Travel Lanes
Arterial	Longest	Few	Highest	Longest	Highest	Statewide	More
Collector	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Local	Shortest	Many	Lowest	Shortest	Lowest	Local	Fewer

- Assumption is moving many cars quickly
- Creates pedestrian safety problems, especially in areas with many destinations and jobs

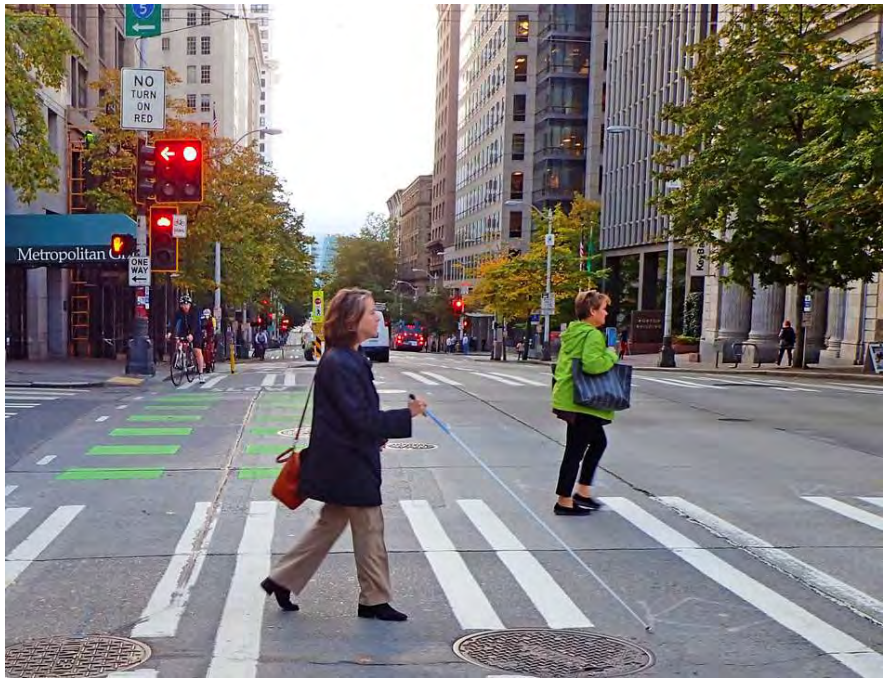
Research Shows Arterial Safety Issues for Pedestrians

In a recent study of the top 34 pedestrian fatality hot spot corridors in the US:

- **Almost all** (97%) are **multilane roadways**
- **70%** require pedestrians to cross **five or more lanes**
- Over **three quarters** have speed limits of **30 mph or higher**
- **62%** have traffic volumes over **25,000 vehicles per day**
- **Nearly all** had adjacent **commercial land uses**
- **Three quarters** were bordered by **low-income neighborhoods**

Source: Schneider, R.J., R.L. Sanders, F.R. Proulx, and H. Moayyed. "United States Fatal Pedestrian Crash Hot Spot Locations and Characteristics," Journal of Transport and Land Use, Volume 14, Number 1, pp. 1-23. DOI: https://doi.org/10.5198/jtlu.2021.1825, 2021.

Pedestrian Experience on Arterials: Urban Context





Photos source: Toole Design Group

Pedestrian Experience on Arterials: Suburban Context



Photo source: Toole Design Group

Common Unsafe Conditions on Arterials

- Lack of sidewalks
- Lack of pedestrian signals and marked crossings
- Intersections with fewer than all crosswalks marked
- Bus stops without sidewalks or marked crossings
- Schools on high-speed arterials

No marked crossing opportunity



No sidewalk near bus stop



No crosswalk near bus stop

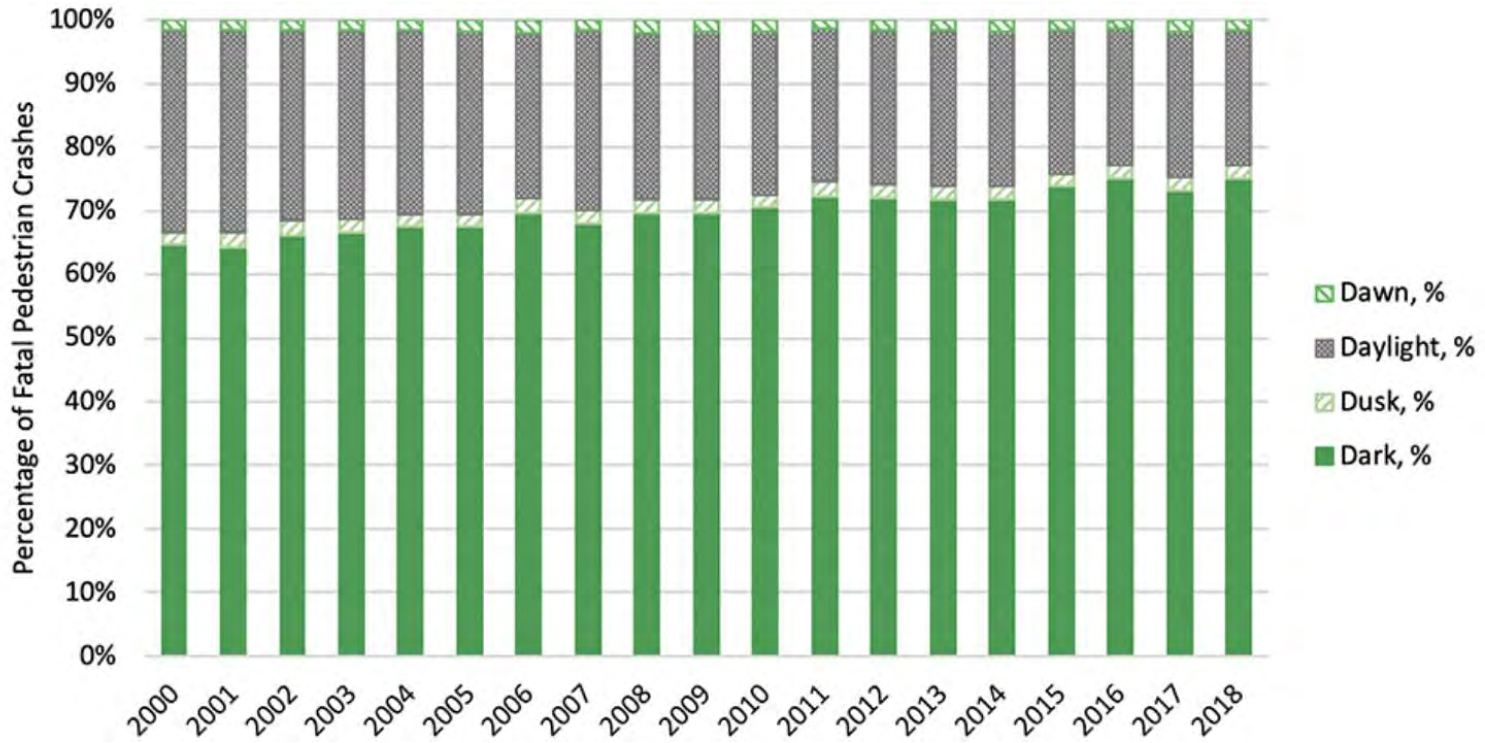


No pedestrian facilities near school



Photos source : Toole Design Group

Lighting and Pedestrian Safety on Arterials



Source: PBIC Toward a Shared Understanding of Pedestrian Safety, 2020

Centering Equity



Photo source: Toole Design Group

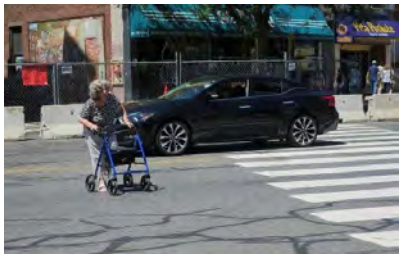
Pedestrian Safety Inequities

- Greater reliance on walking and public transit:
  - People with lower-incomes
  - Older people
  - Youth
  - People with disabilities

- Essential services often located on arterials lacking pedestrian safety infrastructure:
  - Grocery stores
  - Pharmacies
  - Daycares
  - Multifamily housing
  - Senior centers
  - Bus stops







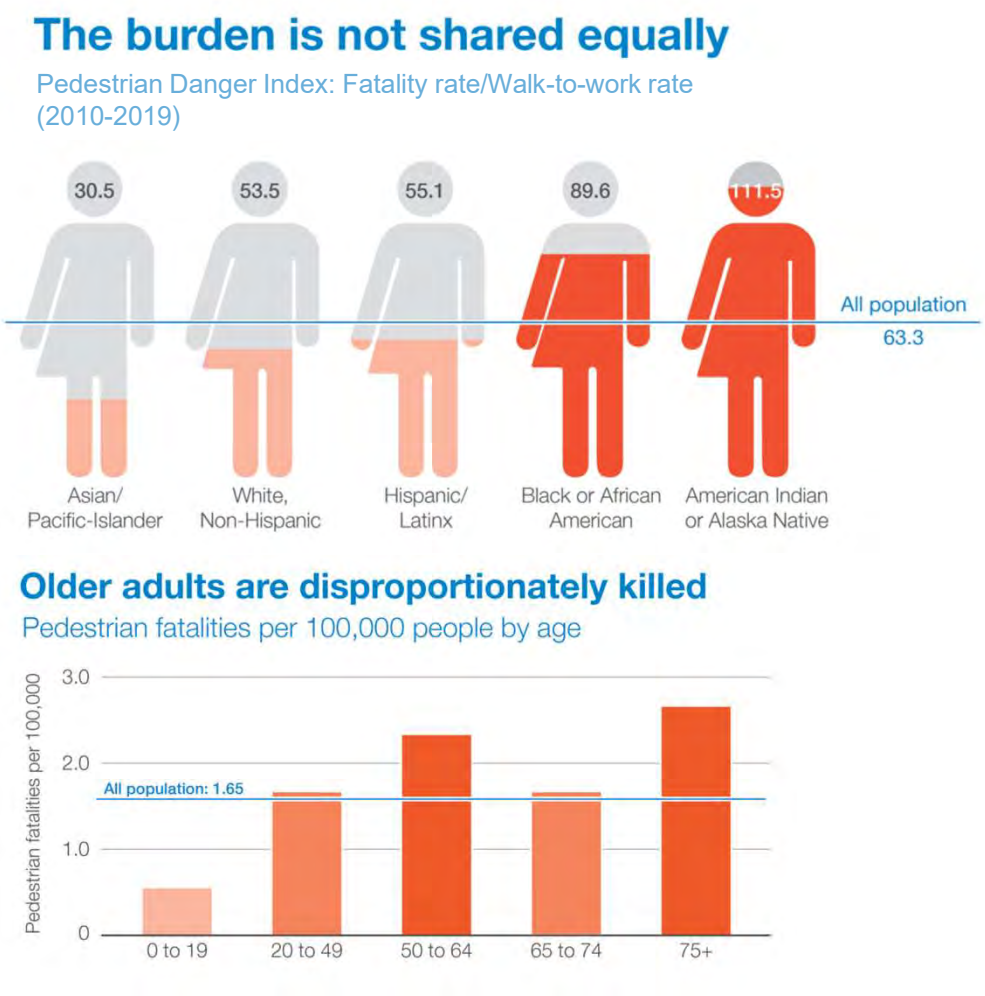




Photos source: Toole Design Group

Pedestrian Safety Inequities

- Black and Indigenous people have higher pedestrian death rates, even when controlled by walking rates
- Lower-income neighborhoods have higher pedestrian death rates
- Older pedestrians have higher death rates



Source: National Complete Streets Coalition, Dangerous by Design 2021

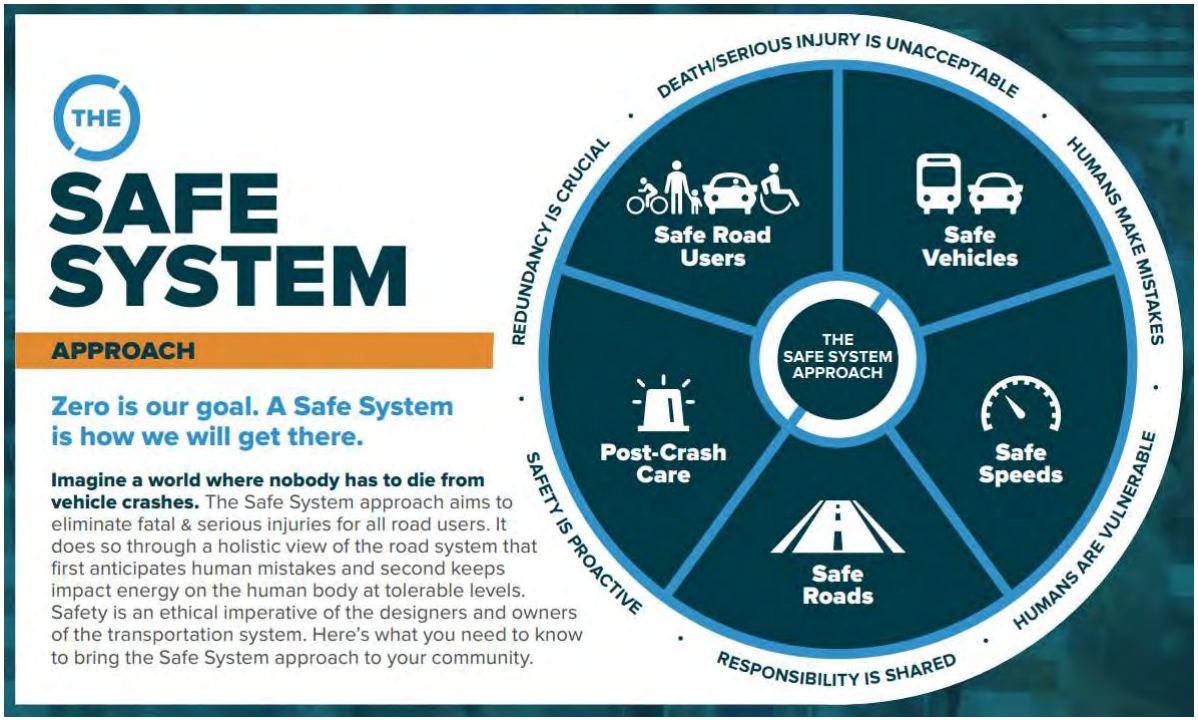
4. Systemic Safety, Vison Zero, and Complete Streets



Photo source: Toole Design Group

The Safe System

- People make mistakes
- Bodies are vulnerable
- Deaths or serious injuries not acceptable
- Redundant safety measures create layers of safety
- Infrastructure is key
  - Influences user behavior
  - Alters crash dynamics



Graphic source: FHWA, 2020

Systemic Pedestrian Safety Infrastructure

A systemic approach to pedestrian safety infrastructure implementation identifies many locations for rapid application of safety measures designed to avert severe and fatal crashes—throughout the roadway system.

According to the Federal Highway Administration

"The systemic approach to safety involves **widely implemented improvements** based on high-risk roadway features correlated with specific severe crash types. The approach provides a more comprehensive method for safety planning and implementation that supplements and complements traditional site analysis. The approach also helps agencies broaden their traffic safety efforts and consider risk as well as crash history when identifying where to make low-cost safety improvements."

Source: FHWA Systemic Safety Project Selection Tool, 2013



Photo source: Toole Design Group

Vision Zero





Graphics source: Vision Zero Network

Complete Streets and Equity on Arterials

- Equity Imperatives:
  - Streets should not pose disproportionate safety burdens
  - Pedestrians should be able to reach their destination safely and comfortable
  - Income or racial distribution should not influence how likely a person is to die while walking along or crossing a road



Photo source: Toole Design Group

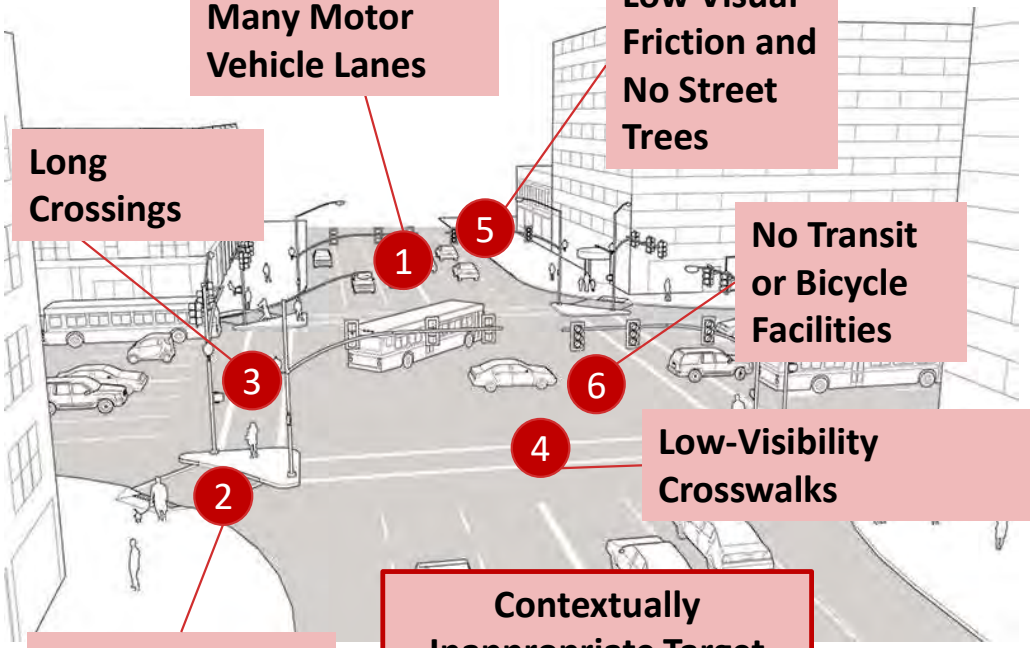
5. Safety Treatments



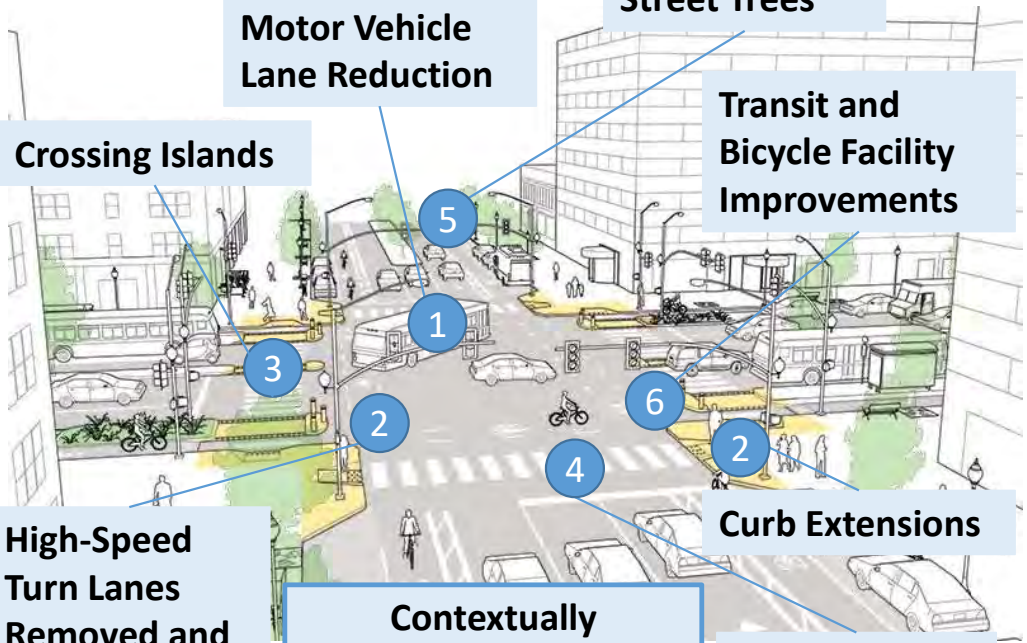
Photo source: Toole Design Group

Identify the Pedestrian Safety Problems and Solutions

Before



After



Graphic source: National Association of City Transportation Officials
Urban Street Design Guide – Major Intersections

Planning and Design Considerations

- Motor vehicle volumes, speeds, and turning movements
- Roadway crossing width
- Driveway and intersection frequencies
- Transit considerations
- Pedestrian generators and desire lines
- Vulnerable populations
- Pedestrian network characteristics and connectivity gaps



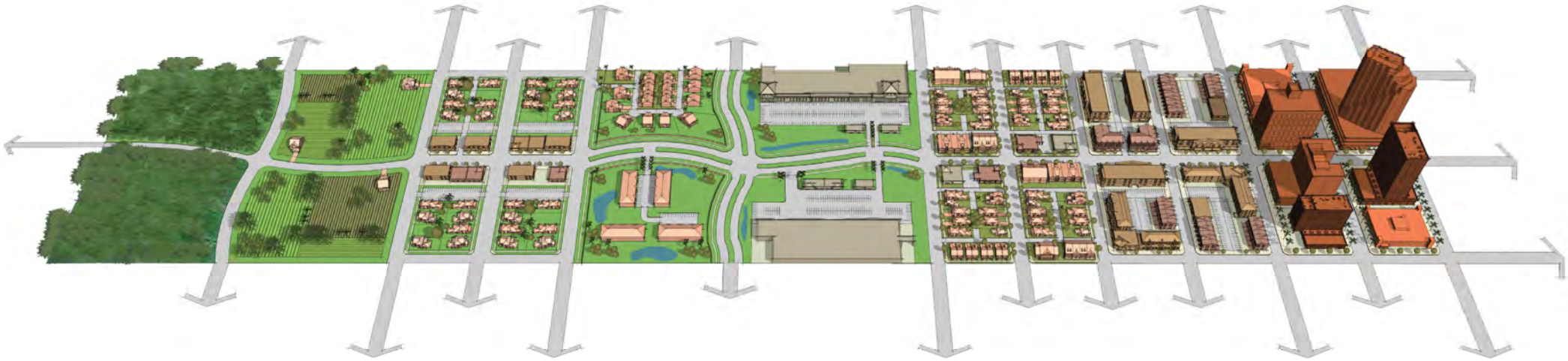


Photo source: Toole Design Group

Safety Treatment Application Considerations

Based on:

- Existing and Future Land Use and Transportation Context
- Project Roadway Type
- Geometric/Physical Constraints
- Policy and Financial Context
- Identification of Priority Users



Rural | **Rural Town** | **Suburban** | **Urban** | **Urban Core**

Graphic adapted from FDOT Context Classification Guide

Which Treatments are Effective?

- Research supports evidence of crash reduction by implementing roadway safety treatments
- Crash reduction estimates do not exist for all treatments, but other research and prior use can indicate safety benefits
- Multiple treatments at the same location often have complementary benefits



Photo source: Toole Design Group

Implementation Options

	Low-Cost Rapid Treatments	Corridor (Re)construction	Network (Re)design
Cost	Low	Medium	High
Implementation Timeline	Fast	Medium	Slow
Implementation Effort	Low	Medium	High
Safety Benefits	Low to Moderate	Moderate to High	High
Livability Benefits	Low	Moderate	High

Implementation Challenges

- Arterials are complex environments
  - High traffic volumes
  - Multiple lanes
  - Commercial driveways
  - Bus routes and stops
  - Traffic signals and intersections
- Corridor or network redesigns are required to meet agencies' pedestrian safety goals
- Transformative safety improvements are high-cost and have long-term implementation timelines

Implementation Solutions

- Interim safety improvements through rapid-implementation projects
  - Quick and less costly
  - Designed to save lives
  - Often help refine capital projects based on real-world use
- Coordination among safety, engineering, asset management, capital program, and other staff to deliver accessible, quality facilities
- Systemic safety analysis – improvements throughout the road network at locations most likely to result in a fatality or serious injury
- Agency leadership that prioritizes safety and accessibility

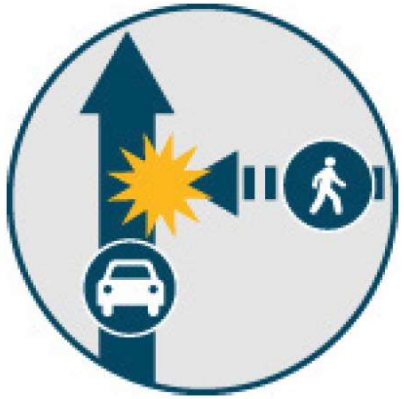
Common Pedestrian Crash Types



Left Turn



Right Turn



Going Straight

Graphics source: NCHRP Research Report 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections, 2020

Examples of Left-Turn Pedestrian Safety Treatments



Photo source: Quartz

Left-Turn Wedge



Photo source: IIHS

Hardened Centerline



Examples of Right-Turn Pedestrian Safety Treatments



Photo source: Toole Design Group

Leading Pedestrian Interval



Photo source: NYC DOT

Corner Radius Reduction



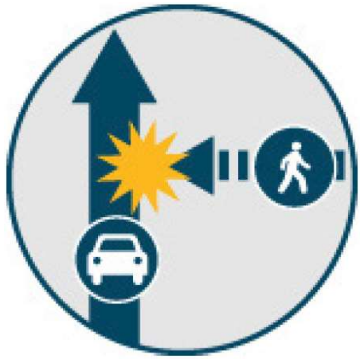
Going Straight Pedestrian Safety Treatments



Rectangular Rapid Flashing Beacon (RRFB)



Pedestrian Hybrid Beacon (PHB)





Photos source: Toole Design Group

Crossing Island

Key Additional Pedestrian Safety Treatments

- Pedestrian Pathways (e.g., Sidewalks and Shared-Use Paths)
- Curb Extensions
- High-Visibility Crosswalks
- Lighting
- Pedestrian Signals and Signal Timing (e.g., Protected Phases)
- Pedestrian Hybrid Beacons (PHB)
- Posted Speed Limit (e.g., School Speed Zones)
- Roundabouts

Safety Benefits of Common Safety Treatments

Treatment	Reduce Speeds	Safer Crossings	Increase Visibility	Reduce Conflicts	Mode Separation	Rural Road Safety
Chicanes / Roadway Curvature	•	•				
Corner Radius Reduction	•	•	•	•	•	
Crossing Islands	•	•	•	•	•	•
Curb Extensions / Bulb Outs	•	•	•	•	•	•
Gateway Treatments			•	•		
Hardened Centerlines and Turn Wedges		•	•	•	•	
High-Visibility Crosswalks			•	•		
Leading Pedestrian Intervals			•	•	•	
Lighting			•	•		
Parking Restrictions at Crossing Locations / Daylighting		•	•	•		
Pedestrian Hybrid Beacons (PHB)		•	•	•	•	•
Pedestrian Pathways (Sidewalks and Shared-Use Paths)			•	•	•	•
Pedestrian Signals and Signal Timing (e.g. Protected Phases)	•	•		•	•	
Posted Speed Limit (Target Speeds and School Speed Zones)	•	•				•
Protected Crossing Spacing for Managing Conflicts	•	•	•	•	•	•
Protected Phases		•		•	•	•
Raised Crossings / Raised Intersections	•	•	•	•		
Rectangular Rapid Flashing Beacons (RRFB)		•	•	•		
Road Diets and Lane Width Reductions	•	•	•	•		•
Roundabouts	•	•	•	•	•	•

Table source: Adapted from the City of Philadelphia *Pedestrian Safety Action Plan* (May 2021)

STEP Studio: Pedestrian Safety Treatment Selection and Application

Includes guidance on:

- Data collection
- Analysis
- Countermeasure selection
- Design and installation considerations
- Implementation
- Monitoring outcomes



Source: FHWA, 2020.

Featured Transformative Treatment: Road Diets

- Road diets reduce the number or width of travel lanes
- Create space for pedestrian facilities:
  - Crossing islands
  - Curb extensions
  - Sidewalks - with physical buffers
- Multiple pedestrian safety benefits:
  - Shorter crossing distances
  - Speed management



Photo source: Toole Design Group

Case Study: Protected Intersections

- Protected intersections use floating curb islands to improve safety for all road users
- Multiple pedestrian safety benefits:
  - Slow through and turn speeds
  - Channelize turns
  - Shorten crossing distance
  - Can be used with crossing islands



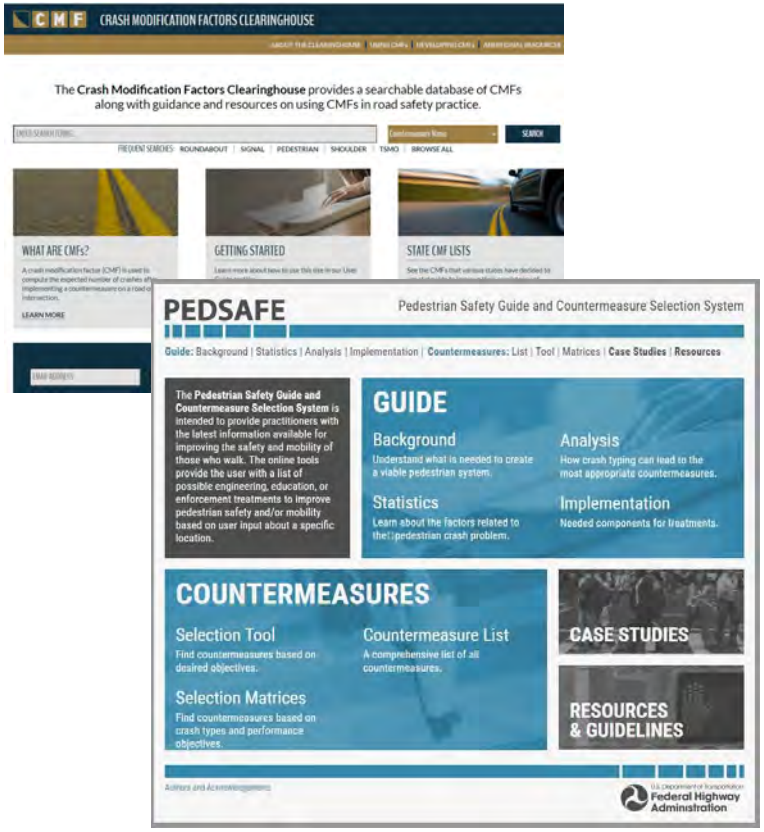
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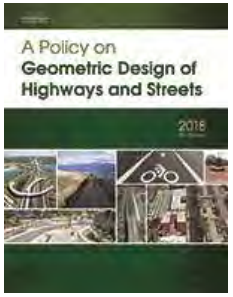
7. Resources

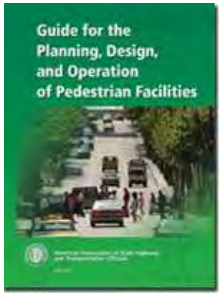


Photo source: Toole Design Group

Resources


CMF
CRASH MODIFICATION FACTORS CLEARINGHOUSE
The Crash Modification Factors Clearinghouse provides a searchable database of CMFs along with guidance and resources on using CMFs in road safety practice.
SEARCH
FREQUENT SEARCHES: ROUNDABOUT | SIGNAL | PEDESTRIAN | SHOULDER | TSMO | BROWSE ALL
WHAT ARE CMFs?
GETTING STARTED
STATE CMF LISTS
LEARN MORE
PEDSAFE
Pedestrian Safety Guide and Countermeasure Selection System
Guide: Background | Statistics | Analysis | Implementation | Countermeasures: List | Tool | Matrices | Case Studies | Resources
The Pedestrian Safety Guide and Countermeasure Selection System is intended to provide practitioners with the latest information available for improving the safety and mobility of those who walk. The online tools provide the user with a list of possible engineering, education, or enforcement treatments to improve pedestrian safety and/or mobility based on user input about a specific location.
GUIDE
Background
Understand what is needed to create a viable pedestrian system.
Analysis
How crash typing can lead to the most appropriate countermeasures.
Statistics
Learn about the factors related to the pedestrian crash problem.
Implementation
Needed components for treatments.
COUNTERMEASURES
Selection Tool
Find countermeasures based on desired objectives.
Countermeasure List
A comprehensive list of all countermeasures.
Selection Matrices
Find countermeasures based on crash types and performance objectives.
CASE STUDIES
RESOURCES & GUIDELINES
Federal Highway Administration


A Policy on
Geometric Design of
Highways and Streets
2018

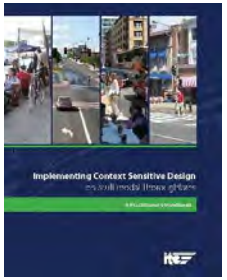

Guide for the
Planning, Design,
and Operation
of Pedestrian Facilities


Manual on Uniform
Traffic Control Devices
EXPRESS
LANE
ENTRANCE

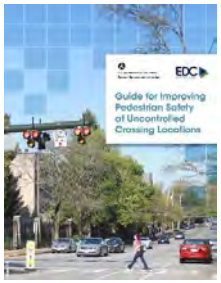

TRAFFIC CONTROL DEVICES HANDBOOK


Urban
Street
Design
Guide


ACHIEVING MULTIMODAL NETWORKS
APPLYING DESIGN FLEXIBILITY & REDUCING CONFLICTS


Implementing Context Sensitive Design




EDC
Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations


STEP STUDIO
EDC


Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes


NCHRP
RESEARCH REPORT 926
Guidance to Improve Pedestrian and Bicyclist Safety at Intersections

Key Resources

- USDOT Equity Information and Resources
- FHWA Zero Deaths and Safe Systems Resources
- FHWA Office of Safety: Pedestrian and Bicycle Safety
- FHWA Safe Transportation for Every Pedestrian (STEP)
- NCHRP Research Report 926: Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- FHWA Toolbox of Pedestrian Safety Countermeasures and Their Potential Effectiveness
- FHWA Complete Streets



Photo source: Toole Design Group

8. Conclusion

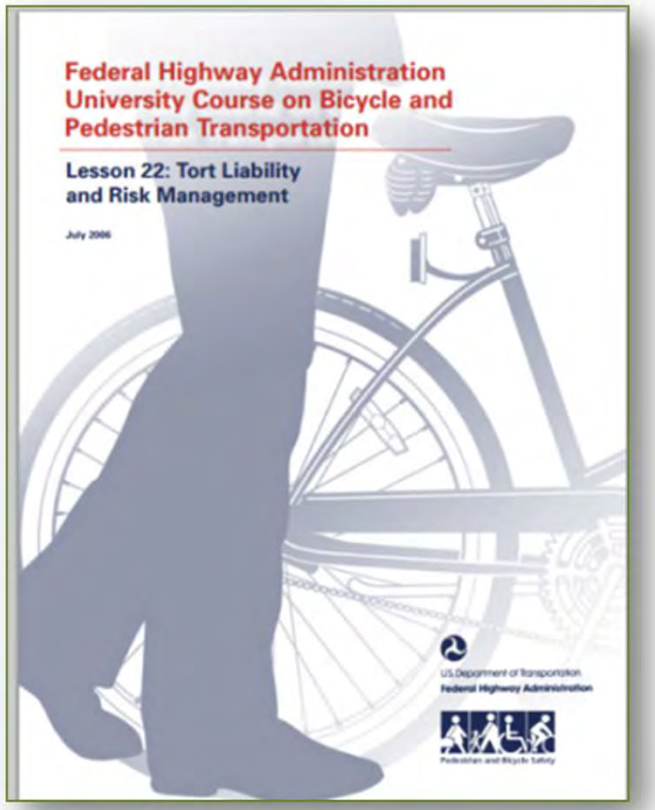


Photo source: Toole Design Group

Conclusion

"**It is no longer acceptable to plan, design, or build roadways that do not fully accommodate use by bicyclists and pedestrians...** With every passing year, the courts become less and less sympathetic to agencies that have not understood the message: bicyclists and pedestrians are intended users of the roadway."

www.fhwa.dot.gov/publications/research/safety/pedbike/05085/pdf/lesson22lo.pdf



Conclusion

- Arterial roadways are uniquely challenging from a pedestrian safety standpoint, because of:
  - Motor vehicle volume
  - Motor vehicle speed
  - Land use characteristics
- Tools and resources are available to improve pedestrian safety
- Now is the time the deploy these measures in a systemic way, to reduce and eventually eliminate pedestrian fatalities and serious injuries



Photo source: Toole Design Group

Contact Information

Name

E-Mail

Title

Organization

Website



Photo source: Toole Design Group



DESIGN GUIDELINES for DRIVE-THROUGH FACILITIES

October 2019

LONGBEACH DEVELOPMENT SERVICES

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Acknowledgments

Mayor and City Council

Honorable Mayor Dr. Robert Garcia, Ed. D
Dee Andrews, Vice Mayor, 6th District
Mary Zendejas, Councilmember, 1st District
Jeannine Pearce, Councilmember, 2nd District
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Daryl Supernaw, Councilmember, 4th District
Stacy Mungo, Councilmember, 5th District
Roberto Uranga, Councilmember, 7th District
Al Austin, Councilmember, 8th District
Rex Richardson, Councilmember, 9th District

Office of the City Manager

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Patrick H. West, City Manager (Ret.)
Rebecca Guzman, Acting Assistant City Manager
Kevin Jackson, Deputy City Manager
Theresa Chandler, Interim Deputy City Manager

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Mark Christoffels, Vice Chair
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Cynthia de la Torre, Planner

Adopted by the Long Beach Planning Commission on 10/03/2019

Processed by Long Beach Development Services

Assisted by RRM Design Group.


Raising Cane I
Our Namesake

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STARBUC



1 Introduction

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Purpose and Applicability of Design Guidelines

Drive-through facilities lack sufficient design standards or guidelines in Long Beach to minimize the impacts on pedestrians, safety, traffic and queuing, noise, lighting, air pollution, and aesthetics associated with their use. To address concerns in the community, the City Council adopted new findings related to drive-through uses. Today, all drive-through facilities require a Conditional Use Permit (CUP), which can only be approved if the required findings laid out in the Long Beach Municipal Code (LBMC) §21.45.130 can be made and the goals and guidelines established within this document are met.

Purpose

The purpose of these guidelines is to provide guidance to applicants, business owners, City staff, neighborhood groups, community members, decision makers, and design professionals to achieve drive-through facilities designed to address development impacts, operational elements, site and built design elements, and safety.

The design guidelines shall be utilized to encourage the highest level of design quality, while at the same time providing the flexibility necessary to encourage creativity on the part of the project designers. In the event that a guideline does not apply to a particular circumstance, the applicant is encouraged to articulate his/her reasons or objectives in not meeting the guidelines contained herein.

Applicability

These guidelines are to be applied to all new drive-through facilities or expansions of existing drive-through facilities in the City of Long Beach.

goals

- Ensure the health, safety and welfare of residents and visitors by promoting designs that can be beneficial to everyone, not just automobile users.
- Reduce negative impacts associated with drive-through facilities, including:
  - Air Quality
  - Traffic Circulation
  - Noise Pollution
  - Light Pollution
  - Parking
  - "Food Swamps"
- Promote compatible development within the site and with surrounding existing uses
- Align uses on major corridors and in transit areas with the City's broader housing and economic development goals
- Direct drive-through uses to more suitable locations such as shopping centers and freeway-adjacent lots
- Provide visible, clearly defined, safe and accessible routes for pedestrians and bicyclists
- Enhance outdoor dining areas with pedestrian-scale amenities, furnishings, and landscaping
- Locate drive-through facilities away from schools
- Encourage equitable distribution of healthy foods

Opportunity Cost of Drive-through Facilities

General Plan policies and required findings relate to consideration of the potential negative impacts associated with drive-throughs, including design, suitability of the location, buffering from sensitive uses, compatibility of a proposed drive-through facility with surrounding existing land uses, as well as over-concentration in an area. The Findings also aim to evaluate the opportunity cost or "trade-offs" of allowing a drive-through use instead of housing or other commercial uses that further the City's housing and economic development goals.

The Floor Area Ratio (FAR) describes the relationship of how much building is on a given site compared to the total lot area.

The FAR on a typical drive-through facility development is 0.10:1. In locations where more intensive development is allowed, mixed-use or office development would occur at an FAR of 2:1 or greater, resulting in substantially greater investment, employment and tax revenues for the City.



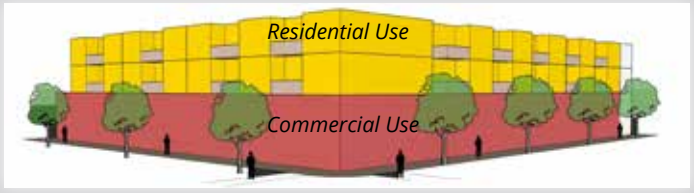
Aerial of site



Aerial of site



Example of an existing drive-through site with a project that has a low FAR. Much of the existing land is devoted to parking and the drive-through lane. (street view)



Example of a reuse of a drive-through site with a project that has a higher FAR, representing more efficient use of land by providing housing and wider array of commercial uses. (street view)

important considerations

To ensure that the use and project design is appropriate to both the site and surroundings, the Planning Commission will grant a Conditional Use Permit (CUP) for establishment of a drive-through facility only if the Findings outlined in LBMC §21.45.130 can be met.

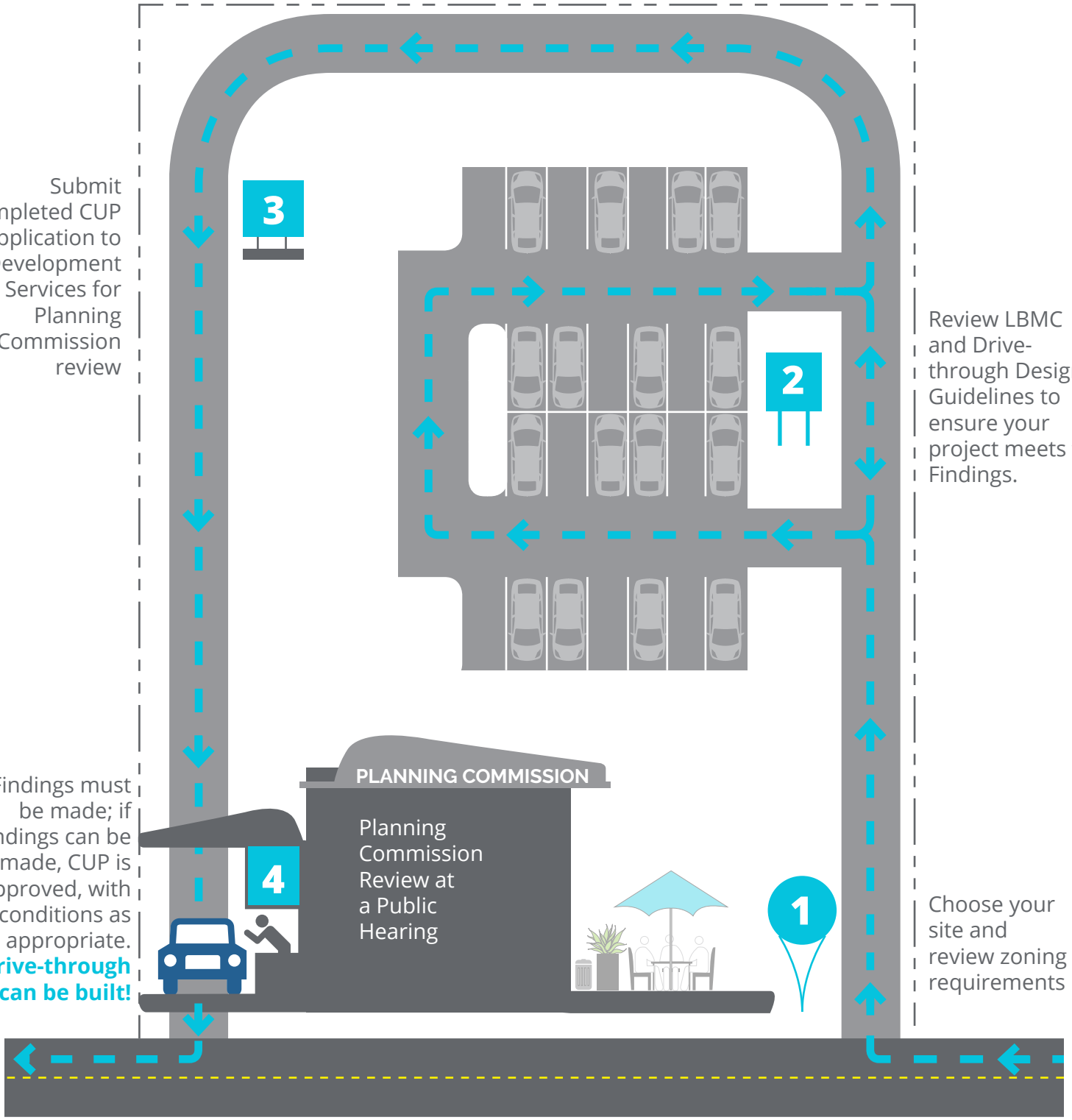
Conditional Use Permit Process

Submit completed CUP application to Development Services for Planning Commission review

Review LBMC and Drive-through Design Guidelines to ensure your project meets the Findings.

Findings must be made; if findings can be made, CUP is approved, with conditions as appropriate. **Drive-through can be built!**

Choose your site and review zoning requirements

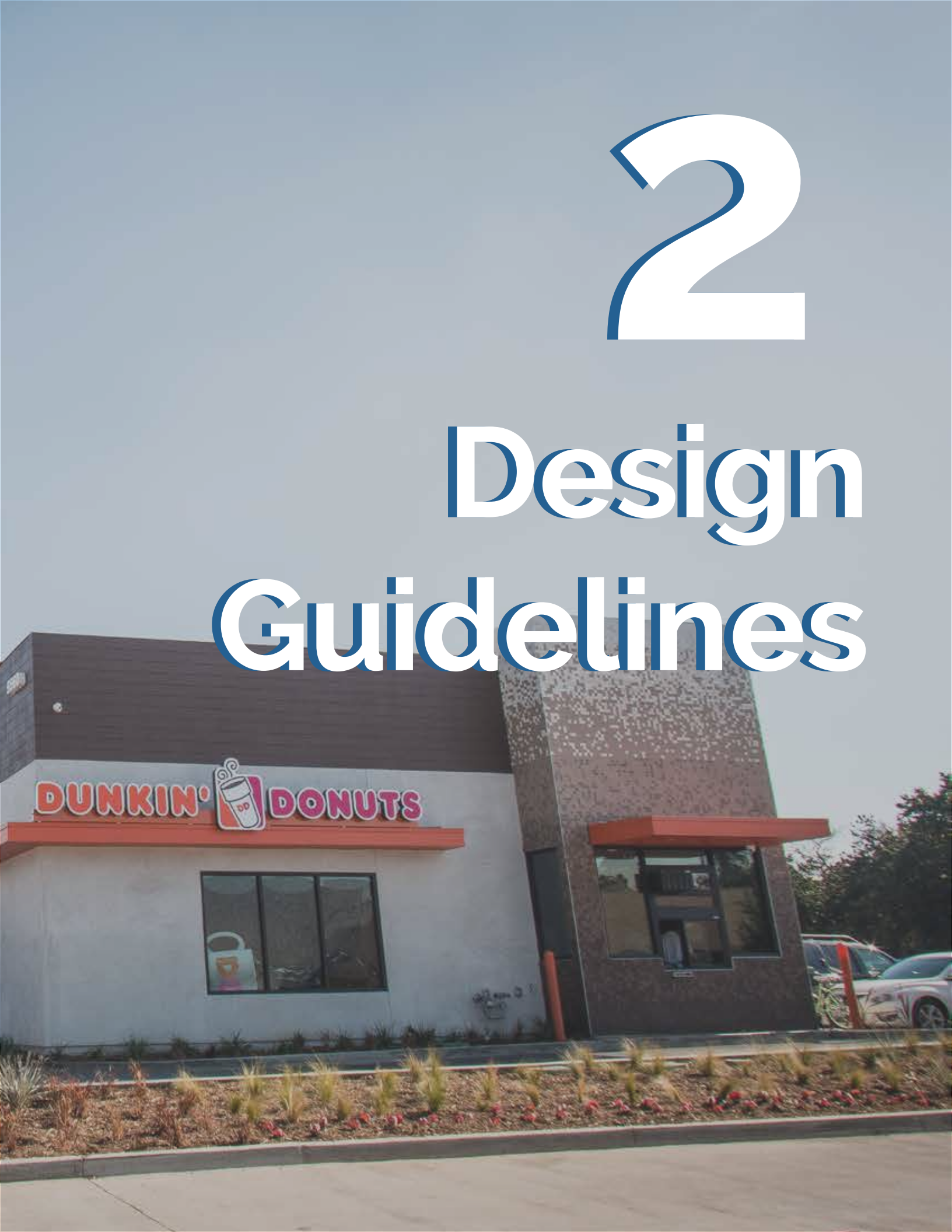


If findings can't be made, Conditional Use Permit is not approved.


DUNKIN'
DONUTS
DRIVE THRU
LONG BEACH RUNS
ON DUNKIN'
Vitamin Shoppe

2

Design Guidelines



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Introduction: Design Guidelines

The City encourages applicants to research and identify locations for drive-through establishments that are appropriate, such as in shopping centers and freeway-adjacent lots, and avoid locations in transit-oriented and other areas where more intense development is permitted, thus better serving Long Beach with additional housing and employment uses. Best-practices for drive-through design should be incorporated to ensure projects address quality of life issues, sustainability, site design, and avoid negatively affecting pedestrians, safety, and the welfare of the community. New drive-throughs and expansions of existing drive-through facilities should be designed to ensure compatibility with adjacent uses, enhance the streetscape frontage, provide adequate buffers, ensure safe pedestrian accessibility, and include outdoor amenities to service patrons.



The City encourages applicants to research and identify locations for drive-through establishments that are appropriate, such as shopping centers and freeway-adjacent lots.

A. Site Planning

Site planning relates to the arrangement of buildings, parking areas, and pedestrian spaces. Appropriate placement, sizing, and design of these areas can enhance or degrade an individual's experience and desire to frequent a business. Site design addresses the scale and size of outdoor spaces, spaces between buildings and parking areas, and the relationship of site elements that create a comfortable pedestrian environment. Site design should extend beyond the needs of vehicles and consider the needs of pedestrians and cyclists. Appropriate design allows for the comfortable, predictable circulation of pedestrians and cyclists.



Building is oriented to the street with access from the sidewalk.

Building Placement

1. Buildings should be placed close to and oriented toward the street.

Building Orientation

2. Outdoor dining and seating areas should be located near the main pedestrian entrance.
3. Service or loading areas should not face the public right-of-way.
4. Structures should be clustered to create a plaza or outdoor dining area between buildings.
5. Windows and indoor dining areas should face onto pedestrian spaces and the public right-of-way.
6. The ordering board speaker for the drive-through should be oriented and directed away from adjacent residential uses.
7. Locate loading and service areas to minimize potential noise incompatibility with surrounding properties.
8. Where walls are used for screening, both sides should be architecturally treated to complement the adjacent buildings.

Landscaping and Buffers

9. Landscaping, fencing, consistent with Zoning Code requirements, and trees should be provided to buffer adjacent uses.

important considerations

Noise levels from speakers shall comply with the City's noise ordinance outlined in Chapter 8.80 of the LBMC.

A. Site Planning (continued)



Well-signed and marked pedestrian crossings.



Walk-up window.

Pedestrian and Bicycle Circulation and Access

10. Buildings and landscape design should work together to create a comfortable pedestrian experience.
11. Pedestrian and bicyclist links should be provided among the public right-of-way, parking area, public open space, and building.
12. Pedestrian and bicycle routes through the site should be separated from vehicular parking, driveways, and stacking lanes. Pedestrian circulation should be accentuated by raised pedestrian crossings, textured and colored paving, accent planting and trees, and other elements such as fencing, trellises, and lighting.
13. Walk-up windows should be located near outdoor dining areas or other pedestrian areas, to encourage accessibility and limit vehicle and pedestrian conflicts.
14. Decorative paving should be used at project entries and in pedestrian areas to enhance the pedestrian environment.
15. Parking lots should be heavily landscaped and connected to buildings with a number of well-designed pedestrian paths, trellises paseos, and walkways.

A. Site Planning (continued)



Accessible entry from public right-of-way.

Pedestrian Circulation

16 Pedestrian routes should not cross driveways or stacking lanes to get to the building's entrance.

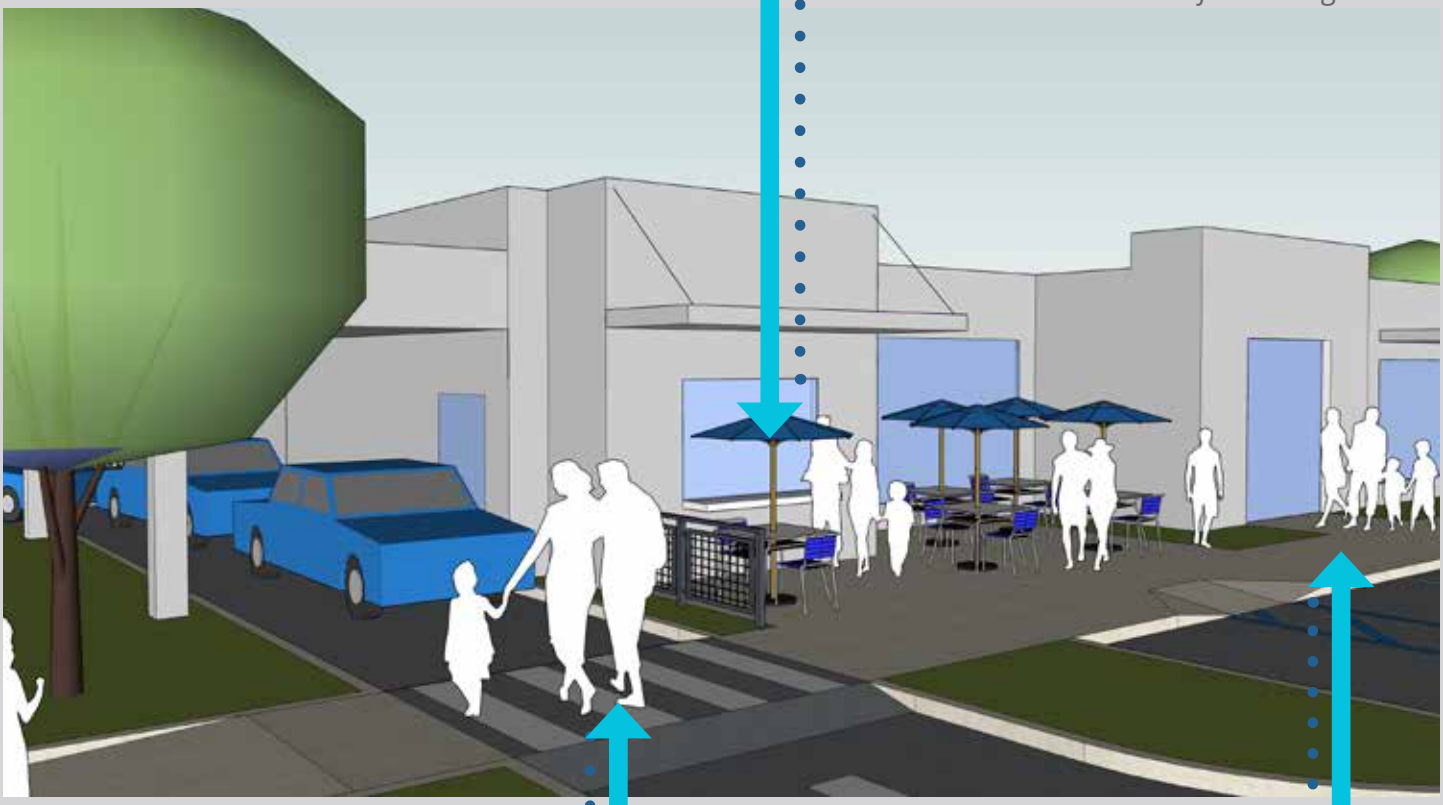
17 Parking lots should be illuminated with lights directed and shielded to prevent light and glare from intruding onto adjacent sites. All lights should be illuminated to the applicable standards of the Illuminating Engineering Society (IES).

18 Where the project site is located near or adjacent to an existing or planned bus stop, the applicant is encouraged to collaborate with Long Beach Transit and the City's Public Works Department. Look for opportunities to provide pedestrian access and coordinated site furnishings to enhance bus stops.

A. Site Planning (continued)

Pedestrian and Bicycle Circulation and Access

Walk-up window located near accessible path, outdoor dining area, with shade and roof overhang.



Raised pedestrian crossing accentuates pedestrian routes.

Accessible route is clearly defined by sidewalk connectivity and building and walk-up window entries.



Bicycle racks are located in convenient and accessible location near building entry. The City provides bike racks and installation free of charge for bike racks located on the public right-of-way! For more info, visit: Longbeach.gov/goactivelb/programs/bike-rack-request



Pedestrian links through the parking lot contribute to the comfortable connectivity through and within the site.

A. Site Planning (continued)

Site Plan Concepts

The following site plan examples illustrate desirable site plan layouts and design features for three different conditions including a pad building located within a multi-tenant building development, a pad building located in a large commercial center or mall, and one in the middle of a block.

Multi-Tenant Building Site Plan Diagram



- **a** Raised pedestrian crossing
- **b** Low screening of parking
- **c** Landscape buffer to screen stacking lane
- **d** Continuous landscaped perimeter with landscape screening
- **e** Pedestrian access and connection
- **f** Low landscaping to maintain site lines to pedestrian crossing
- **g** Exterior dining patio activating street frontage
- **h** Walk-up window
- **i** Street trees provided along public right-of-way
- **j** Menu board

A. Site Planning (continued)

Site Plan Concepts

Building pad located at the front of a large commercial center or mall site plan diagram



- a Raised pedestrian crossing
- b Low screening of parking
- c Landscape buffer and fence to screen stacking lane
- d Continuous landscaped perimeter with landscape screening
- e Pedestrian access and connection
- f Low landscaping to maintain site lines to pedestrian crossing
- g Exterior dining patio activating street frontage
- h Walk-up window
- i Street trees provided along public right-of-way
- j Building entry
- k Walk-up window access from sidewalk

Property Line

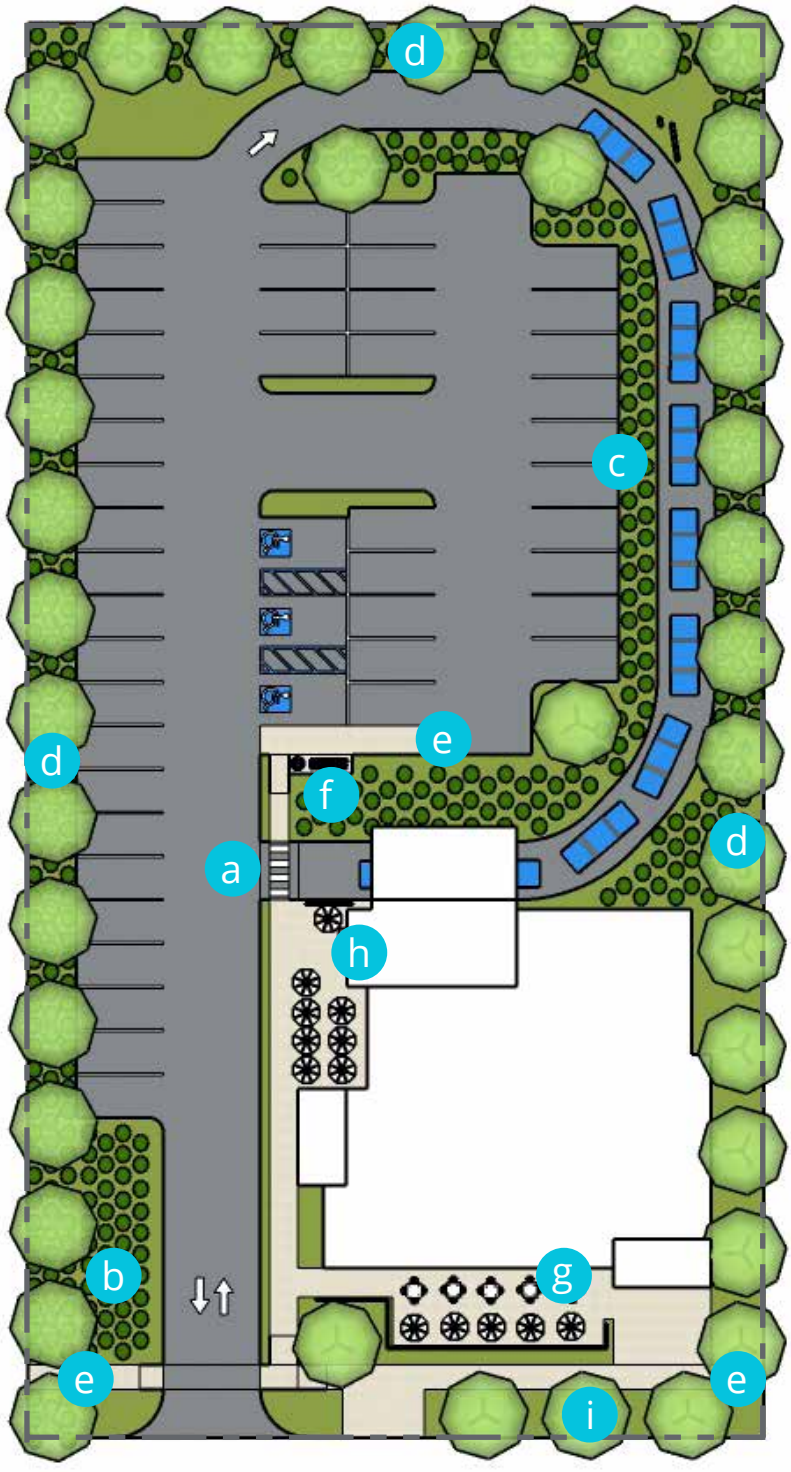
important considerations

Walls and Fencing shall be subject to LBMC Chapter 21.43 Fences and Garden Walls

A. Site Planning (continued)

Site Plan Concepts

Mid-block site plan diagram



a Raised pedestrian crossing

b Low screening of parking

c Landscape buffer to screen stacking lane

d Continuous landscaped perimeter with landscape screening

e Pedestrian access and connection

f Low landscaping to maintain site lines to pedestrian crossing

g Exterior dining patio activating street frontage

h Walk-up window

i Street trees provided along public right-of-way

Property Line

B. Building Design

Buildings located at the street edge with main entrances accessible from the public sidewalk encourage walkability and better contribute to a lively public realm. Building forms and facades foster cohesiveness and comfort, generate pedestrian activity, increase a sense of safety, and are aesthetically pleasing.



Project entry is defined by architectural features and is oriented toward the street frontage.



Use of vertical trellis to break up a blank wall.

Building Entry

1. Building entries should be located toward the street and accessed directly off the public sidewalk to define the street frontage and denote pedestrian areas.
2. Prominent architectural features should be located near corners and intersections to promote and enhance building entry.
3. Other entry features should reflect the overall architectural identity or character of development.

Building Articulation

4. Exterior wall planes should be varied in depth and/or direction. Wall planes should not run in one continuous direction without a significant offset.
5. Well-designed facades, including windows, doors, wall composition, colors, and materials should be used along all street frontages and to create a sense of entry and pedestrian scale.
6. Landscaping should be used to screen and soften the appearance of a buildings' bulk and mass. Utilize trellises or green screens with evergreen vines and/or dense shrubs on blank walls.

important considerations

Exterior remodels to a building frontage consisting of 50' or more in the CNA commercial zone requires Site Plan Review (LBMC 21.25.502.2.C)

B. Building Design (continued)



Trellis and columns add interest and variety along the drive-through lane.



Wall planes in varied directions and use of varied colors and materials.

important considerations

Window signs shall conform to Long Beach Municipal Code Sections 21.44.500, Table 44-4, and 24.44.062.

Building Articulation (continued)

7. All elevations of the building should include articulation consistent with the architectural design. Avoid blank walls by:
   - a. Varying the planes of the exterior walls in depth and/or direction.
   - b. Adding window openings and/or entrances and other relief.
   - c. Adding vertical pilasters which may reflect internal building structure.
   - d. Adding vertical trellis, green screens or other landscape features.
   - e. Changing color and texture along the wall surface.
   - f. Adding trims, projections, and reveals along different wall surfaces.
   - g. Articulating the building façade by varying juxtaposition of building elements.

Building Treatments

8. Exterior security bars and roll-up doors applied to windows and pedestrian building entrances are discouraged.
9. When selecting materials and colors, emphasis should be placed on compatibility with the character and the surrounding context and use of high-quality materials.
10. Avoid prototypical, corporate architecture and color schemes. Fluorescent paints and bright colors are strongly discouraged.
11. Storefront windows should be kept clear and visible to the public right-of-way, free of any frosting, or window treatments that obstruct visibility into the business.

B. Building Design (continued)



Non-corporate style architecture.

Building Treatments (continued)

12. Corporate tenants should design their buildings to fit the scale and character of Long Beach.
13. Corporate signage should not dominate the building façade.
14. Roof forms help to establish the architectural style of the building. Mansard roofs are discouraged; however, if these types of roofs are used, the roof should wrap around the entire perimeter of the structure. Piecemeal mansard roofs that are placed only on portions of the building should not be utilized.



Covered walkway adjacent to building utilizes complementary materials of the building.

Pedestrian Features

15. Awnings or signage should be used to help clearly demarcate building entries and help orient pedestrians.
16. Covered walkways are encouraged at building street frontages, between buildings, from buildings to parking lots, and within a parking lot. Covered walkways associated with the building should utilize the same materials of that building.
17. Walk-up windows should be emphasized by architectural detail and provide awning, roof overhang, or other protection from the elements.

important considerations

All signage must comply with the LBMC. A sign program is required for new commercial buildings, and/or for five or more signs on a site. (LBMC 21.44.035.C)

B. Building Design (continued)

Building design and massing creates pedestrian scale entry.



Varying elevations, materials, window, and awnings help to articulate and enhance the building design.

Trellis, pilasters, and materials complement the building design, scale, and massing.



C. Outdoor Dining Areas

Outdoor dining activates the streetscape by using a portion of the sidewalk space for socializing and dining and, ultimately, serves as an amenity to promote pedestrian use.



Outdoor dining located near building entry.



Outdoor dining incorporates wall and pilasters complementary to the building architecture and activates the street frontage.

1. Outdoor dining areas should be provided and designed as an integral part of the project and not simply left-over areas of a site. Outdoor dining areas should be oriented for maximum benefit of sunlight and views.
2. Outdoor dining areas can take the form of plazas, arcades, colonades, courtyards, and/or usable landscaped areas. Outdoor dining areas and other publicly accessible outdoor spaces should include elements such as seating, trash cans, bicycle racks, weather protection, and pedestrian amenities.
3. Outdoor dining areas should be at least 250 square feet.

important considerations

Refer to the City's Sidewalk Dining and Parklets Handbook for outdoor dining design guidelines.

Noise levels from patio areas shall comply with the City's noise ordinance outlined in Chapter 8.80 of the LBMC.

D. Parking and Circulation

Well-designed parking and circulation allows vehicles to park and drive through a site with ease and does not visually dominate the site.



Drive aisle indicates direction of traffic flow to drive-through entry.



Stacking lane and drive-through are oriented away from the right-of-way and screened by the building.

Parking

1. Parking lots and stacking lanes should be located away from and out of sight of the public right-of-way.
2. Parking access points, whether located in front, side, or rear, should be located as far as possible from street intersections to allow adequate stacking room.

Circulation

3. Structures and on-site circulation systems should be located to minimize pedestrian and vehicle conflicts.
4. Reciprocal access between adjacent parking areas should be provided where feasible so that vehicles are not required to enter the street in order to move from one area to another on the same or adjacent sites.
5. Drive-through ordering menu should be located to allow a minimum of four cars to queue behind the ordering vehicle to prevent vehicles from stacking in the drive-aisle of the parking lot.
6. Curb-cuts should be minimized to reduce pedestrian conflicts along the street and encourage walkability and accessibility.
7. Driveways or site access should be provided on non-residential side streets or less major streets where possible to improve pedestrian safety and reduce pedestrian and vehicle conflicts or vehicle stacking on major streets.

Drive Aisles

8. Double stacked drive aisles are discouraged.
9. Drive-through aisles should provide clear pavement markings for the entrance and direction of traffic flow.

D. Parking and Circulation (continued)

Drive-through menu board provides queuing space for a minimum of four cars behind the ordering vehicle.



Drive-through aisles should provide clear pavement markings for the entrance and direction of traffic flow.

E. On-Site Landscaping and Buffers

Well-designed landscaping provides visual relief, screens parking and other uses, provides shade, and protects the natural environment through the use of drought-tolerant materials and low-impact planting design.



Landscape buffer helps screen drive-through stacking lanes.



Decorative wall and landscaping provides buffer and screens stacking lanes.

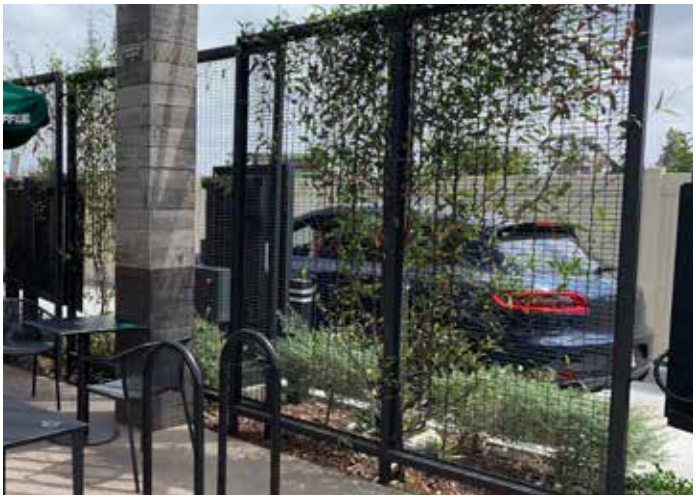
Landscaping

1. Required front, side, and rear setbacks should accommodate tree planting, accent planting, or appropriate screening.
2. Stacking lanes should be defined by a continuous planter or landscaped area no less than five-feet in width.
3. Landscape areas should be designed to accommodate vegetated storm water management systems with appropriate plant species to filter out runoff from roads and parking lots.
4. Accent landscaping should be used to enhance building and site entries.
5. Landscaped areas should be planted primarily with drought tolerant materials.
6. Landscape areas should be provided with water-conserving automatic irrigation systems designed to provide complete and adequate coverage to sustain and promote healthy plant life. The irrigation system should not cause water to spray or flow across a public sidewalk.
7. Parking lots should provide trees to provide heat-reducing shade. Select appropriate tree species compatible with urban environments.

important considerations

Walls and Fencing shall be subject to LBMC Chapter 21.43 Fences and Garden Walls

E. On-Site Landscaping and Buffers (continued)



Trellis and vines screen stacking lanes and provide a buffer between patio and driveway.



Storm water runoff is collected in planters.

Landscaping (continued)

8. Trees and shrubs should be located and adequately spaced to allow for mature and long-term growth. Trees and shrubs that create minimal root problems should be selected.
9. Nuisance trees that drop flowers and fruit should be avoided near pedestrian walkways to maintain clear paths of travel.

Buffering

10. Parking should be screened with landscape buffers, berms, decorative walls, decorative fencing, or a combination thereof.
11. Fast growing evergreen shrubs should be used to effectively screen views of all above-ground equipment.
12. Storm water and non-storm water runoff from the site to the street or neighboring properties should be minimized through the use of permeable materials, vegetated areas, and minimizing paved areas to the satisfaction of the Director of Development Services and Department of Public Works.

important considerations

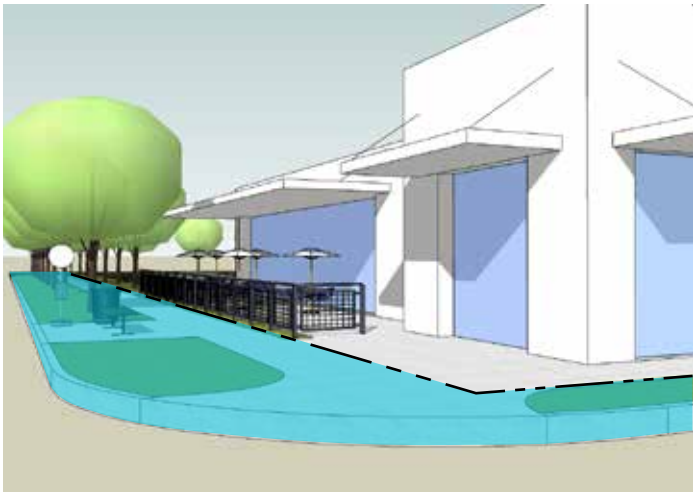
All landscaping shall be subject to LBMC Chapter 21.42 Landscaping Standards.

F. Off-site Improvements

The provision of landscaping, pedestrian connections, and buffers adjacent to the project site integrates the site within the neighborhood and provides visual appeal.



Off-site landscaping and buffers provided.



Coordinate off-site furnishings, bus stops, landscaping, and ADA compliance with Public Works.

1. Street trees should be provided along the public right-of-way. Refer to the Approved Tree List provided by Public Works.
2. The applicant should coordinate with Public Works on all off-site improvements needed to provide full ADA accessibility compliance within the adjacent public right-of-way.

important considerations

All landscaping within the the Public right-of-way shall be subject to LBMC Section 21.42.050 - Landscaping standards—Public right-of-way (Parkway).

All landscaping shall be subject to LBMC Section 21.42.035 – Special Requirements for Water Efficient Landscaping.

G. Mechanical Equipment, Servicing, and Utilities

The screening of service and operational aspects of the site are an important design consideration.



Roof equipment screened in an architecturally compatible manner.



Trellis and vines screen trash enclosure.

Utility (Mechanical Equipment)

1. All utility mechanical equipment such as electric and gas meters, electrical panels, cable boxes, and junction boxes should be located in a utility room within the building.
2. Roof access should be provided from the interior of the building. Exterior roof access ladders are not appropriate.
3. Any outdoor mechanical equipment, whether on a roof, side of a structure, or on the ground should be appropriately screened from view and should not be placed adjacent to the public right-of-way or pedestrian walkways. The method of screening should be architecturally integrated with the adjacent structure in terms of materials, color, shape, and size.

Trash and Recycling Enclosures

4. Trash and recycling enclosures should be designed to be consistent with the project and building architecture and should be carefully sited and screened to minimize the visual impact. Similar or the same materials should be used on the enclosure as the buildings. A solid roof structure should be designed to be architecturally compatible.
5. Every property should provide trash enclosures that can handle the refuse generated by that site.
6. A pedestrian entrance should be provided within trash and recycling enclosures so that large access gates are infrequently used.
7. Trash enclosures should be separated from adjacent parking stalls by a minimum of three-foot wide planters with low-growing plant materials to ensure that adequate space is available for passengers to access a vehicle in an adjacent parking space.

H. Lighting

Lighting should be designed and selected to promote the feeling of a safe environment and minimize light pollution while adding articulation to buildings.



Utilize high quality lighting complementary to the building architecture.



Pedestrian lighting and pendant lighting on building complement building architecture.

1. Architecturally compatible lighting should be provided between buildings and along pedestrian walkways to ensure security.
2. Spotlighting or glare from any site lighting should be shielded from adjacent properties and directed at a specific object or target area.
3. Exposed bulbs should not be used. Cut-off lighting is preferred.
4. Uplighting of building elements and trees should use the lowest wattage possible to minimize impacts to the night sky. Light sources for wall washing and tree lighting should be hidden.
5. The height of a light pole should be appropriate in scale for the building and the surrounding area.

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For an electronic version of this document, visit our website at longbeach.gov/lbds.

Agenda Item No. 21

File Code No. 530.05

CITY OF SANTA BARBARA

COUNCIL AGENDA REPORT

AGENDA DATE: June 7, 2022

TO: Mayor and Councilmembers

FROM: Daniel S. Hentschke, Assistant City Attorney
Clifford M. Maurer, Public Works Director

SUBJECT: Continued Public Hearing To Consider Declaration Of A Public Nuisance Resulting From The Operation Of A Drive-Through Facility Located At 3707 State Street

RECOMMENDATION: That Council:

A. Adopt, by reading of title only, A Resolution of the Council of the City of Santa Barbara Approving a Traffic Circulation Agreement to Remedy Nuisance Related Issues Arising from the Operation of a Drive-Through Facility Located at 3707 State Street.

B. Rescind direction to the City Attorney to prepare an ordinance declaring the existence and ordering the abatement of a public nuisance resulting from the operation of a drive-through facility located at 3707 State Street.

ALTERNATIVE ACTION That Council:

Introduce and subsequently adopt, by reading of title only, an Ordinance of the Council of the City of Santa Barbara Declaring the Existence and Ordering the Abatement of a Public Nuisance Resulting from the Manner of Operation of a Drive-Through Facility Located at 3707 State Street as attached to the Council Agenda Report submitted by the City Attorney.

DISCUSSION:

At the Council's March 1, 2022 public hearing, Council directed four specific actions:

1. Continue the public hearing to June 7, 2022 following supplemental notice to the property owners.

2. Direct the City Attorney to prepare a draft ordinance with nuisance findings based upon Council's comments and the evidence presented, and return with the ordinance on June 7th.

3. Staff are to work with Chick-fil-A and the property owners to develop potential remedies and return with remedial recommendations on June 7th.

4. On or before March 11, Chick-fil-A is to send a letter with proposed interim traffic control actions and report monthly on traffic monitoring information.

On March 11, 2022, Counsel for Chick-fil-A provided the letter outlining its interim traffic control actions. Chick-fil-A has also provided monthly traffic reports and other traffic monitoring information. On March 15, 2022, the City Attorney provided written notice as required by law to the property owners who claimed they did not receive formal notice previously.

Chick-fil-A has implemented the interim traffic control actions outlined in the March 11 letter. Based on the traffic monitoring reports and staff's observations, the measures have been successful in eliminating the chronic nuisance activity that staff described during the March 1, 2022 public hearing. Also, staff and Chick-fil-A have worked diligently to process a Site Improvement Application for improvements to onsite traffic circulation, including widening the driveway to accommodate customers who wish to by-pass the drive through lanes. The City Attorney's Office has previously determined that the proposed site improvements, including the drive-through configuration and site plan are consistent with and not an expansion of the existing nonconforming use.

Staff and Chick-fil-A have negotiated a Traffic Circulation Agreement which they believe is the most effective and least burdensome approach to improving traffic conditions at 3707 State Street and to abate any alleged traffic nuisance arising from the operation of the drive-through facility at that location. A copy of the Traffic Circulation Agreement is attached to this report. All Chick-fil-A related parties and the owners of 3707 State Street have approved the agreement, subject to approval by the City Council.

The Traffic Circulation Agreement has three primary purposes:

- Stay the nuisance proceedings. The Agreement provides that the nuisance proceedings commenced pursuant to City Council Resolution No. 22-008 and continued to this meeting would be stayed indefinitely to allow for implementation of the Agreement. Nuisance proceedings could be recommenced if there is a material breach of the Agreement upon notice as provided in the Agreement.

- Establish operational requirements. The Agreement incorporates the March 11, 2022 interim traffic control action. The Agreement requires both parties to act reasonably and in good faith to obtain final approval of site modifications to improve traffic circulation. However, the Agreement does not waive or limit any

discretionary authority or CEQA requirements. The interim traffic control measures will remain in effect until Final Approval of the Site Improvement Application as described in the Agreement. After Final Approval, there are permanent traffic control actions as set forth in Section II. B. 3. of the Agreement. The traffic control measures identified in the Agreement are legally enforceable contractual obligations.

- Terminate the nuisance proceedings upon successful implementation of the proposed site improvements. If Chick-fil-A meets its obligations under the Agreement as determined by the Public Works Director, then the nuisance proceedings that were initially commenced under Resolution No. 22-088 will be deemed terminated 6 months after implementation of the proposed site improvements. After the nuisance proceedings are deemed terminated, the Agreement is enforceable by legal action or by the initiation of new nuisance abatement proceedings.

Staff believes that the Traffic Circulation Agreement is in the best interest of the City because it will: (1) implement Council's direction of March 1, 2022; (2) facilitate the implementation of site improvements to improve traffic circulation at 3707 State Street; (3) provide enforceable traffic control measures to be implemented by Chick-fil-A on an interim and permanent basis; (4) abate any alleged traffic nuisance arising from the operation of the drive-through facility at 3707 State Street; (5) avoid the time, expense, and uncertainty of ongoing nuisance abatement proceedings.

Therefore, staff is recommending adoption of the proposed resolution approving the Agreement and authorizing its execution by the City Administrator. The proposed resolution also rescinds the prior Council direction for the City Attorney to prepare an ordinance. In the alternative, as directed, the City Attorney has prepared a nuisance abatement ordinance for Council's consideration. The ordinance accompanies the separate agenda report submitted by the City Attorney for this item. If Council approves the Traffic Circulation Agreement and proposed resolution as recommended by staff, it is unnecessary to consider the draft ordinance.

ATTACHMENT: Traffic Circulation Agreement

PREPARED BY: Daniel S. Hentschke, City Attorney

SUBMITTED BY: Clifford M. Maurer, Public Works Director
Daniel S. Hentschke, Assistant City Attorney

APPROVED BY: City Administrator's Office

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TRAFFIC CIRCULATION AGREEMENT

THIS TRAFFIC CIRCULATION AGREEMENT ("Agreement") is made and entered into as of this 7th day of June, 2022 (the "Effective Date") by and between the City of Santa Barbara, a California municipal corporation ("City") and Chick-fil-A, Inc. ("CFA, Inc."), McColm 3707 State, LLC and Thompson 3707 State, LLC (property owner of 3707 State Street, Santa Barbara, California 93105) ("Property Owner"), and Collins Hospitality Company, LLC (the "Operator"). Together, CFA, Inc., Property Owner, and Operator are referred to as "the CFA-Related Parties." Together the City and the CFA-Related Parties are referred to as "Parties."

I. RECITALS

A. WHEREAS, Property Owner owns certain real property at 3707 State Street, Santa Barbara, California ("the Property") which is approximately 1.1 acres and hosts an approximately 3,410 square-foot restaurant with a legal non-conforming drive-through.

B. WHEREAS, CFA, Inc. is the tenant of the Property. Exhibit A provides a legal description of the Property burdened by this Agreement.

C. WHEREAS, Collins Hospitality Company, LLC, the Operator, is the franchisee and independently owns and operates the Chick-fil-A restaurant business on the Property.

D. WHEREAS, on February 11, 2021, CFA, Inc. and the Property Owner applied to the City for approvals to modify the parking lot and construct exterior improvements on the Property to improve on-site traffic circulation, designated as PLN2021-00093 ("Site Improvement Application"). The City has been processing the application since that time. To that end, the City held an Architectural Board of Review ("ABR") hearing on the Site Improvement Application on May 2, 2022, and another on May 31, 2022. City staff have expressed general support for the site plan submitted as Exhibit B of the Site Improvement Application ("Site Plan") and determined that the proposed drive-through configuration and Site Plan are consistent with and not an expansion of the existing nonconforming drive-through use. Following ABR action, application for and issuance of building permits will be required for implementation of the site improvements.

E. WHEREAS, on February 1, 2022, the City initiated public nuisance proceedings against CFA, Inc. and Property Owner through City Council Resolution No. 22-008. On March 1, 2022, the City held a public nuisance hearing, and after the City and the CFA-Related Parties presented evidence, the Council voted to continue the hearing until June 7, 2022 ("Nuisance Proceedings") and directed City Staff to work with the CFA-Related Parties to address the issues raised during the hearing, among other things.

F. WHEREAS, while the CFA-Related Parties deny the existence of an alleged nuisance, the CFA-Related Parties are committed to promote the safe and efficient movement of vehicles onsite to avoid queuing of motor vehicles on State Street, including implementation of the improvements contemplated by their Site Improvement Application to improve traffic circulation on and around the site.

G. WHEREAS, in furtherance of their desire to enhance and improve traffic flow onto and

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over the Property, CFA, Inc. and the Operator have implemented certain Interim Traffic Management Measures described in correspondence dated March 11, 2022 from counsel for CFA, Inc. (the "Interim Traffic Management Measures"), which have substantially mitigated the traffic issues upon which the Nuisance Proceedings were predicated.

H. WHEREAS, the City Staff and CFA-Related Parties mutually desire to stay the Nuisance Proceedings (1) in furtherance of their continued efforts implement the City Council's direction of March 1, 2022 to work cooperatively to amicably and efficiently to address traffic circulation issues at the Property and (2) to avoid the time, inconvenience, expenses, and uncertainty of further Nuisance Proceedings at this time.

I. WHEREAS, the Parties acknowledge and agree that the obligations imposed by this Agreement on CFA, Inc. and the Operator shall only apply for so long as CFA, Inc. remains a tenant at the Property, and shall not bind Property Owner or any subsequent tenant thereafter.

J. WHEREAS, CFA, Inc. and the Operator acknowledge and agree that this Agreement constitutes the least burdensome approach for improving traffic conditions at the Property

NOW, THEREFORE, in consideration of the mutual covenants and agreements described below, and for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree to the following.

II. TERMS

The foregoing WHEREAS clauses are incorporated by reference as if fully restated herein.

A. Stay of Nuisance Proceedings.

1. The Nuisance Proceedings commenced pursuant to City Council Resolution No. 22-008 are stayed indefinitely to allow implementation of this Agreement.

2. Before Final Approvals, as defined in Section II. D. 8. B., below, the Nuisance Proceedings may be recommenced upon 30 days' notice following a determination by the Public Works Director that there has been a material breach of this Agreement by CFA, Inc. or the Operator, which has not been cured following applicable notice and opportunity to cure periods, as set forth in Section II. C. 3., below.

3. Provided CFA, Inc. and the Operator have satisfied their obligations under this Agreement as determined by the Public Works Director, then as of the date that is 6 months following the completion of construction and final inspection of the improvements identified in the Final Approvals, the Nuisance Proceedings will be deemed terminated. After the Nuisance Proceedings are deemed terminated, this Agreement may be enforced by commencement of legal action or by initiation of nuisance abatement proceedings through any lawful process.

B. Obligations of CFA, Inc. and the Operator.

1. CFA, Inc. and the Operator shall continue to implement the Interim Traffic

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Management Measures set forth in the March 11, 2022 correspondence from counsel for CFA, Inc., a copy of which is attached to this Agreement, while the City considers the Site Improvement Application.

2. After the Final Approvals, as defined below, CFA, Inc. and Operator will coordinate with their contractor and the City regarding construction timing and potential phasing to minimize construction-related impacts to off-site traffic circulation.

3. After the Final Approvals, as defined below, and the completion of construction and final inspection of the improvements identified in the Final Approvals, CFA, Inc. and the Operator shall implement the following measures so long as Chick-fil-A remains a tenant on the Property:

a. Operator shall provide an attendant to monitor the drive-through lane. The attendant will be responsible for monitoring traffic and implementing traffic control measures when vehicles are stacked beyond the end of the "Team Member Zones" (as shown on the site plan submitted with the Site Improvement Application at Exhibit B ("Site Plan"), which represents approximately 22* cars in the drive-through stack to facilitate the safe and efficient movement of traffic within the parking lot area. (*This number is based on the Site Plan. If the approved Site Plan contains a drive-through stack with a different number, then this provision will need to be adjusted accordingly.)

b. The Operator will provide sufficient team members to conduct remote ordering and direct additional vehicles to the on-site parking area, during peak hours or whenever required under subdivision "a" to ensure that queues do not interfere with on-site circulation or spill onto the public sidewalk or street.

c. CFA, Inc. shall provide monthly traffic monitoring reports prepared by a professional traffic engineer to the City's Public Works Director for a period of 12 months following the completion of construction of the improvements contemplated by the Site Improvement Application.

d. Twice a year, the Operator shall have the restaurant operations and drive-through assessed by CFA, Inc. corporate team in an effort to further streamline operations. The Operator shall take all reasonable measures to implement any recommendations of the CFA, Inc. drive-through team to further enhance traffic flow at the Property.

e. CFA, Inc. and the Operator shall work together to seek additional off-site parking to be provided at no charge for the Operator's team members.

f. CFA, Inc. and the Operator shall take all reasonable measures to

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prevent truck deliveries at the restaurant during peak hours of operation, including, for example, communicating with vendors and delivery services to avoid deliveries during peak hours of operation.

g. CFA, Inc. and the Operator shall take all reasonable measures to prevent trucks or armored cars visiting the Property from parking on State Street, including, for example, posting signage as required by the Public Works Director to notify such trucks or armored cars that parking on State Street shall not be allowed and including such provisions in service contracts with vendors where feasible.

h. The Operator shall install and maintain permanent onsite signage to discourage Chick-fil-A customers from offsite parking. If the Operator or CFA, Inc. secures offsite parking for customers, this signage may be removed. Such off-site parking arrangement will require a recorded agreement approved by the Community Development Director in accordance with Santa Barbara Municipal Code Chapter 30.260.

These measures shall not apply to another tenant and therefore are not intended to apply should the Property be leased to a different tenant.

C. <u>Obligations of the City.</u>

1. The City shall continue diligently and expeditiously processing the Site Improvement Application.

2. The Site Improvement Application will be evaluated by the City as required by Chapter 22.100 of the Santa Barbara Municipal Code and the California Environmental Quality Act ("CEQA"). At the time of this Agreement, preliminary determination has been made that the site modifications contemplated by the Site Improvement Application are categorically exempt from CEQA pursuant to Sections 15301 (existing facilities) and 15303 (construction, installation, or conversion of small structures, equipment, or facilities).

3. If the City determines that the CFA-Related Parties are in material breach of this Agreement, or upon a determination that the traffic reflected in the traffic monitoring reports required by Section II.B.3.c., above, warrants recommencement of the Nuisance Proceedings as contemplated by Section II.A.2, above, then the City shall give notice to the CFA-Related parties in accordance with the Notice provision in Section II.D.10, below, with sufficient detail for the CFA-Related Parties to understand the basis for the alleged breach. Upon receipt of the notice, the CFA-Related Parties shall have 30 days to cure such material breach or traffic queuing problem, before the City shall be permitted to take any action. The City shall only be required to provide such notice and opportunity to cure one time in any 12

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month period and action on subsequent violations may be taken without additional notice and opportunity to cure.

D. General Provisions.

1. Representations and Warranties.

a. The Parties hereby represent and warrant to each other as of the Effective Date, as follows:

1) The Parties have received all corporate and other approvals necessary to enter into this Agreement. The persons signing this Agreement on their behalf are fully authorized to commit and bind Parties as applicable to each and all of the commitments, terms and conditions hereof, and to release the claims described herein. All documents and instruments relating to this Agreement are, or, upon execution and delivery will be, valid and binding obligations, enforceable against them in accordance with their respective terms.

2) The Parties have freely entered into this Agreement and are not entering into this Agreement because of any duress, fear, or undue influence; this Agreement is being entered into in good faith.

3) The Parties have made such investigation of the facts pertaining to this Agreement as it deems necessary.

4) The Parties have, prior to the execution of this Agreement, obtained the advice of independent legal counsel of its own selection regarding the substance of this Agreement, and the claims released herein.

5) In executing this Agreement, the Parties acknowledge, represent, and warrant that they have not relied upon any statement or representation of any officer, agent, employee, representative, or attorney of another Party regarding any facts not expressly set forth within this Agreement. Except for knowingly false or intentionally misleading statements, the Parties, by entering into this Agreement, assume the risk of any misrepresentations, concealment or mistake, whether or not it should subsequently discover or assert for any reason that any fact relied upon by them in entering into this Agreement was untrue, or that any fact was concealed from them, or that their understanding of the facts or of the law was incorrect or incomplete.

b. The representations and warranties of each of the Parties set forth in

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this Section and elsewhere in this Agreement shall survive the execution and delivery of this Agreement and are a material part of the consideration to the City in entering into this Agreement.

2. Interpretation.

a. All Parties have cooperated in the drafting and preparation of this Agreement and in any construction or interpretation to be made of this Agreement, the same shall not be construed against any such Party. This Agreement is the product of bargained for and arms' length negotiations between the Parties and their counsel. This Agreement is the joint work-product of the Parties.

b. This Agreement is an integrated contract and sets forth the entire agreement between the Parties hereto with respect to the subject matter contained herein. All agreements, covenants, representations and warranties, express or implied, oral or written, of the Parties hereto with regard to such subject matter are contained in this Agreement. No other agreements, covenants, representations or warranties, express or implied, oral or written, have been made or relied on by any Party hereto.

c. This Agreement may not be changed, modified or amended except by written instrument specifying that it amends this Agreement and signed by the Party against whom the enforcement of any waiver, change, modification, extension or discharge is sought. No waiver of any provision of this Agreement shall be deemed or shall constitute a waiver of any other provision whether or not similar, nor shall any waiver be deemed a continuing waiver; and no waiver shall be implied from delay or be binding unless executed in writing by the party making the waiver.

d. All of the covenants, releases and other provisions herein contained in favor of the persons and entities released are made for the express benefit of each and all of the said persons and entities, each of which has the right to enforce such provisions. Except as expressly provided in this Agreement, the obligations and covenants created hereby shall burden the properties and be appurtenant to and benefit the Property pursuant to the provisions of California Civil Code section 1468 *et. seq*. The restrictions and provisions herein shall run with the Property and shall be binding upon and inure to the benefit of the successors in title to the Property. The covenants may be amended only by a written instrument signed by the Parties. This Agreement shall be recorded in the Official Records of the County of Santa Barbara.

e. This Agreement shall be binding upon and inure to the benefit of each of the Parties, and their respective representatives, officers, employees, agents, heirs, devisees, successors and assigns.

3. Further Cooperation.

Each Party shall perform any further acts and to execute and deliver any further documents that may be reasonably necessary or appropriate to carry out the provisions and intent of this Agreement. Except as expressly stated otherwise in this Agreement, actions required of the Parties or any of them will not be unreasonably withheld or delayed. Time will be of the essence of actions required of any of the Parties.

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4. No Third Party Beneficiaries.

Nothing in this Agreement is intended to benefit any third party or create a third party beneficiary. This Agreement will not be enforceable by any person not a Party to this Agreement, or their respective representatives, heirs, devisees, successors and assigns.

5. Governing Law; Venue.

This Agreement shall be governed by, and construed in accordance with, the laws of the State of California, without regard to any otherwise applicable principles of conflicts of laws. Any action arising out of this Agreement must be commenced in the state courts of the State of California, County of Santa Barbara and each party hereby consents to the jurisdiction of the above courts in any such action and to the laying of venue in the State of California, County of Santa Barbara, and agrees that such courts have personal jurisdiction over each of them.

6. Counterparts.

This Agreement may be executed in any number of counterparts, delivered via facsimile or electronic mail, each of which when so executed shall be deemed to be an original, but such counterparts together shall constitute one and the same instrument.

7. Effective Date.

This Agreement shall become effective as of the Effective Date upon execution by all parties.

8. Conditions and Limitations.

a. The CFA-Related Parties recognize and acknowledge that the City is under no obligation to approve the Site Improvement Application, and that the City reserves all of its discretion and the full measure of its police power to evaluate the applications on their merits in accordance with applicable procedures, standards and requirements. If CEQA applies, the City must comply fully with CEQA when evaluating and acting on the Site Improvement Application. It is understood and agreed that this Agreement shall not be construed in any fashion as an approval of the Site Improvement Application or an advance determination and does not provide the CFA-Related Parties with any expectation as to the outcome of the discretionary review process. The City neither expressly nor by implication conveys any position with regard to whether the Site Improvement Application may or may not be approved or with regards to any conditions that may be imposed on such applications.

b. The Parties acknowledge, understand, and agree that issuance of Final Approvals and acceptance by the Property Owner of any conditions of approval, which shall not be unreasonably withheld, are express conditions precedent to the consummation of this Agreement and the covenants, conditions and agreements contained herein. "Final Approvals" is defined as City approval of the Site Improvement Application by the ABR, approval of the driveway apron expansion application by the City Administrator, and issuance of a building permit or ministerial permit for construction of improvements, where there has also been no litigation

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filed within 90 days of the City's final action or, if litigation or some other challenge is brought, after a favorable and final resolution of such litigation or challenge.

c. If the Site Improvement Application is not approved, or if the CFA-Related Parties do not accept the conditions of approval, which shall not be unreasonably withheld, then all obligations in this Agreement shall be null and void and shall have no further force and effect. In such event, neither this Agreement, nor any of its terms or provisions, shall be admissible in any action or proceeding for any purpose. The City may recommence the Nuisance Proceedings stayed by this Agreement upon 30 days' notice to the CFA-Related Parties and the public if the traffic issues upon which the Nuisance Proceedings were predicated are no longer substantially mitigated.

9. Limitation of Remedies.

a. The Parties acknowledge that neither Party would have entered into this Agreement if doing so would subject it to the risk of incurring liability in money damages, either for breach of this Agreement, anticipatory breach, repudiation of the Agreement, or for any actions with respect to its implementation or application. The Parties intend by the provisions of this Section 9(a) that neither of the Parties shall have any liability for money damages arising out of a breach or repudiation of this Agreement, and no liability in money damages for any claims arising out of the application process, negotiation, execution and adoption, or the implementation or application of this Agreement. Each of the Parties to this Agreement may pursue any remedy at law or equity available for the breach of any provision of this Agreement, including but not limited to specific performance, temporary or permanent injunctive relief, declaratory relief, or restraining orders, except that the Parties shall have no liability in money damages for any acts which are alleged to have arisen out of or relate to this Agreement. The Parties acknowledge and agree that the limitation in Section 9(a) shall not apply to any new nuisance proceeding commenced by the City against any of the CFA-Related Parties following the dismissal of the Nuisance Proceedings.

b. The parties further acknowledge that money damages and remedies at law generally are inadequate, and specific performance or other equitable relief is the most appropriate remedy for the enforcement of this Agreement.

c. Except for claims, demands, actions, or suits in which non-monetary relief is the sole remedy sought, including without limitation the remedy of specific performance, temporary or permanent injunctive relief, declaratory relief, or restraining orders, and except for claims, demands, actions or suits arising out of future acts and circumstances, each of the parties, for themselves, their successors and assignees, hereby release one another's officers, trustees, directors, partners, agents and employees from any and all claims, demands, actions, or suits of any kind or nature arising out of any liability, known or unknown, present or future, including, but not limited to, any claim or liability, based or asserted, pursuant to Article I, Section 19 of the California Constitution, the Fifth and Fourteenth Amendments of the United States Constitution, or any other law or ordinance which seeks to impose any money damages, whatsoever, upon the parties because the parties entered into this Agreement, because of the terms of this Agreement, or because of the manner of implementation or performance of this Agreement.

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10. Notice.

Notice required to be given pursuant to this Agreement shall be by certified mail and, where provided below, by e-mail to the following, to be deemed effective upon actual receipt, if by certified mail, or one business day after delivery by e-mail:

For CFA, Inc.:
Leslie Armistead
Chick-fil-A, Inc., Real Estate Legal
5200 Buffington Road
Atlanta, GA 30349
E-mail: leslie.armistead@cfacorp.com

With a copy to:
Beth Collins
Brownstein Hyatt Farber Schreck
1021 Anacapa Street, 2nd Floor
Santa Barbara, CA 93101
E-mail: bcollins@bhfs.com

And:
Brian P. Watt
Troutman Pepper Hamilton Sanders LLP
600 Peachtree Street NE, Suite 3000
Atlanta, Georgia 30308
E-mail: brian.watt@troutman.com

For Operator:
Travis Collins
Collins Hospitality Company, LLC
3707 State Street
Santa Barbara, CA 93105
E-mail: travis.collins@cfafranchisee.com

For Property Owner:
McColm 3707 State, LLC
535 San Onofre Road
Santa Barbara, CA 93105
E-mail: mrmccolm@gmail.com

Thompson 3707 State, LLC
2175 Alisos Drive
Santa Barbara, CA 93108
E-mail: pthompson2175@cox.net

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With a copy to:
Joseph Billings
Allen & Kimbell, LLP
317 E. Carrillo Street
Santa Barbara, CA 93101
E-mail: jbillings@aklaw.net

For City of Santa Barbara:
City Administrator
City of Santa Barbara
P.O. Box 1990
Santa Barbara, CA 93102-1990
rbjork@santabarbaraca.gov

With a copy to:
City Attorney
City of Santa Barbara
P.O. Box 1990
Santa Barbara, CA 93102-1990
acalonne@santabarbaraca.gov
dhentschke@santabarbaraca.gov

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the day and year first above written.

CITY OF SANTA BARBARA

By:_____
Rebecca Bjork, City Administrator
City of Santa Barbara

APPROVED AS TO FORM:
Ariel P. Calonne, City Attorney

By: DocuSigned by: Daniel S. Hentschke 70683A909AB240D...
Daniel S. Hentschke, Assistant

[Signatures continued on next page]

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MCCOLM 3707 STATE, LLC,
a California Limited Liability Company

By: DocuSigned by: Michael McColm
CB9D80782E984B9...
Michael R. McColm, Manager

THOMPSON 3707 STATE, LLC.
a California Limited Liability Company

By: DocuSigned by: Patricia Thompson Perry
C0ACE2008T634CF...
Patricia Thompson Perry, Manager

APPROVED AS TO FORM:

By: DocuSigned by: Joe Billings
183F93A156454C9...
Joseph Billings, Esq.

CHICK-FIL-A, INC.

By: DocuSigned by: Kelly Ludwick
DC31A4FE14EA191...
Kelly Ludwick, Vice President Legal

Collins Hospitality Company, LLC.

By: DocuSigned by:
C7EF6A1B0C0496...
Travis Collins, Operator

APPROVED AS TO FORM:
BROWNSTEIN HYATT FARBER SCHRECK

By: DocuSigned by: Beth Collins
F7F8809C9978455...
Beth A. Collins, Esq.

City of Santa Barbara
Public Works Department

Memorandum

DATE: January 11, 2022

TO: Mayor and Council

FROM: Derrick Bailey, Principal Transportation Engineer

SUBJECT: Traffic Conditions Associated with Chick-fil-A Queuing

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The purpose of this memorandum is to document the traffic conditions associated with queuing for the Chick-fil-A restaurant drive-through at 3707 State Street and provide a professional opinion on the effects the queuing has on traffic safety and operations.

Executive Summary and Professional Opinion:

Queuing from the Chick-fil-A drive-through is routinely observed blocking the sidewalk, bike lane, and number two (outside) traffic lane of eastbound State Street. The location and typical queuing area are illustrated in attachment #1.

I have reviewed traffic data and conditions caused by queuing from the Chick-fil-A drive-though. The queuing increases the risk of collisions and injuries, and decreases mobility for all modes of travel by creating a condition that State Street was not intended to accommodate. Based on observations, the queue blocks the number two traffic lane of State Street an average of 70 minutes per day on weekdays, and 92 minutes per day on Saturdays. Chick-fil-A is closed on Sundays.

The queuing is also routinely blocking access to adjacent businesses, which affects the ability for customers and deliveries to access these businesses. For example, the driveway for Rusty's Pizza Parlor (115-feet west of the Chick-fil-A driveway) is blocked an average of 15 times per day.

As a principal arterial street, State Street is intended to provide the highest level of mobility within the City's street network for all modes of travel. The effects of queuing on each mode of travel and the effect on adjacent businesses is described in more detail below in the Analysis section.

Based on the existing environment, I do not believe that a reasonable solution exists to safely accommodate the queue within the public right of way. Further, I do not believe that on-site improvements can be made that will prevent the queue from blocking State Street.

Discussion - Analysis

Staff set up video recording cameras near the Chick-fil-A drive-through entrance every three months beginning in the spring of 2021. For each video data collection period, two weekdays and Saturdays were recorded (Chick-Fil-A is closed on Sunday). Staff played back the video recordings and noted each time a queue began to form in the street, the time the queue in the street ended, and the maximum length of each queueing event.

Below is an analysis of the following:

- Traffic safety and operations
- Pedestrian safety and mobility
- Cyclist safety and mobility
- Transit safety and operations
- Access to adjacent businesses

Traffic Safety and Operations

Mobility of traffic is negatively affected by queuing onto State Street. Each time a queue forms in the street, the eastbound number two traffic lane is blocked and the capacity of that lane effectively becomes zero, thus traffic has only one lane available. The capacity of the number two lane is zero regardless of the length of the queue. In other words, the effect on roadway capacity is the same when a queue has one vehicle in length compared to a queue of ten or more vehicles. In addition, longer queues affect access to adjacent businesses which is described in more detail below.

Findings for the duration of queues blocking the number two lane are summarized below.

Summary of Observed Duration of Lane Blockage (In Minutes)

	Average Daily Duration of Blockage	Maximum Daily Duration of Blockage
Weekdays	70 minutes	91 minutes
Saturday	92 minutes	155 minutes

The average weekday cumulative duration of queuing onto the street is illustrated in attachment #2. Also shown in attachment #2 is the hourly weekday traffic volumes. The graph in attachment #2 demonstrates the traffic volumes on eastbound State Street are above 1,000 vehicles per hour between 12:00 P.M. and 6:00 P.M. during typical weekdays. The majority of queuing onto State Street coincides with the busiest travel times of typical weekdays.

The average Saturday cumulative duration of queuing onto the street is illustrated in attachment #3. Also shown in attachment #3 is the hourly Saturday traffic volumes. The graph in attachment #3 demonstrates the traffic volumes on eastbound State Street are above 800 vehicles per hour between 11:00 A.M. and 4:00 P.M. on a typical Saturday. The majority of queuing onto State Street coincides with the busiest travel times of typical Saturdays.

In addition to the negative effects on mobility, queuing into the street increases the risk of collisions, particularly rear-end collisions and side-swipe collisions. During the review of video of the queuing, erratic and last second lane changes were observed. Drivers were also observed getting stuck in the queue because they were unable to change lanes. There has been one reported collision to the Santa Barbara Police Department (SBPD) involving a rear end collision with a queued vehicle (11/5/2018).

Pedestrian Safety and Mobility

Attachment #4 illustrates what typically happens during queuing on pedestrian access. Queued vehicles persistently block the sidewalk and pedestrian path of travel, thus pedestrians have to deviate from their normal path of travel and maneuver through tightly spaced queued vehicles. This increases the risk of collisions involving pedestrians and also creates a challenging condition for pedestrians with disabilities and mobility challenges. Photos of the sidewalk blockage are contained in attachment #8.

There have been no collisions reported to SBPD associated with queued vehicles involving pedestrians.

Cyclists Safety

The State Street bike lanes are one of the most important cycling facilities in the City's cycling network. The 2016 Bicycle Master Plan described State Street as the north/south spine of the City's network.

Attachment #5 illustrates what typically happens during queuing on cycling access. One of two scenarios typically happens:

1. Some drivers waiting in the queue will pull to the right, blocking both the bike lane and the number two (outside) traffic lane. This forces cyclists to merge out of the bike lane and into vehicle traffic to bypass the queue. This maneuver puts cyclists at increased risk of collision due to the frequent, erratic and last second lane changing near the queue.
2. Some drivers do not block the bike lane, and instead queue only in the number two traffic lane. Cyclists can ride past the queue in the bike lane up to the Chick-fil-A driveway, but are exposed to right hook collisions at the driveway entrance.

Both scenarios create dangerous conditions for cyclists. Of all the increased risks of collision and injury to the various modes of travel, I believe that risks to cyclists is

highest due to the persistent queues. It is likely that some cyclists have stopped using State Street due to the conditions created by queuing.

There have been no collisions reported to SBPD associated with queued vehicles involving cyclists.

Transit Safety and Operations

Santa Barbara Metropolitan Transit District (Santa Barbara MTD) lines 3, 6, and 11 provide service along this section of State Street. During daytime service hours, there are six scheduled buses that pass Chick-fil-A per hour. Buses generally stop at the Hitchcock bus stop, which is about 260-feet west of the Chick-fil-A driveway.

When there is a queue backing onto State Street, buses must change lanes to bypass the queue. Buses are more difficult to maneuver than passenger vehicles, which increases the risk of collision. The erratic and last second lane changes mentioned above increase the challenges maneuvering transit vehicles through the queueing area. Depending on traffic conditions, the queue can also cause delays to transit vehicles.

Santa Barbara MTD has communicated to City Staff that queuing from the Chick-fil-A parking lot and drive-through creates adverse conditions for transit operations.

Attachment #6 illustrates the location of the Hitchcock bus stop and the proximity to the lane changing zone when queues are present.

Access to Nearby Driveways

The driveway to Rusty's Pizza Parlor is located 115- feet west of the Chick-fil-A driveway. A queue that is approximately five vehicles long blocks access to the Rusty's Pizza Parlor driveway.

The driveway to the Educated Car Wash is located 180-feet west of the Chick-fil-A driveway. A queue that is approximately eight vehicles long blocks access to the Educated Car Wash driveway.

The exit driveway for the Jack In The Box drive-through is located 240-feet west of the Chick-fil-A driveway. A queue that is approximately ten vehicles long blocks access to the exit driveway of the Jack In The Box drive-through.

Attachment #7 illustrates the locations of nearby private driveways, and the length of queue that blocks access to these driveways.

As part of Staff's data collection, the maximum queue lengths were noted for each queueing event. The table below summarizes the average number of queuing events that block access to the neighboring businesses' driveways.

	Average Number of Times Per Day That Queues Block Jack In The Box Driveway	Average Number of Times Per Day Queues Block Educated Car Wash Driveway	Average Number of Times Per Day Queues Block Rusty's Pizza Parlor Driveway
Weekday	4	7	15
Saturday	5	6	16

Conclusion

Queuing for the Chick-fil-A drive-through increases the risk of collisions and injuries, with the highest risk of injury being for cyclists. Mobility is negatively affected for all modes of travel due to decreased roadway capacity and decreased safety.

As a principal arterial street, State Street is intended to provide the highest level of mobility within the City's street network. Persistent queuing onto State Street is a condition that State Street was not intended for, nor a condition that drivers, cyclists, and pedestrians expect to encounter.

The queuing is also routinely blocking access to adjacent businesses, which affects the ability for customers and deliveries to access these businesses.

Based on the existing environment in the vicinity of Chick-fil-A, I do not believe that a solution exists to safely accommodate the queue within the public right of way.

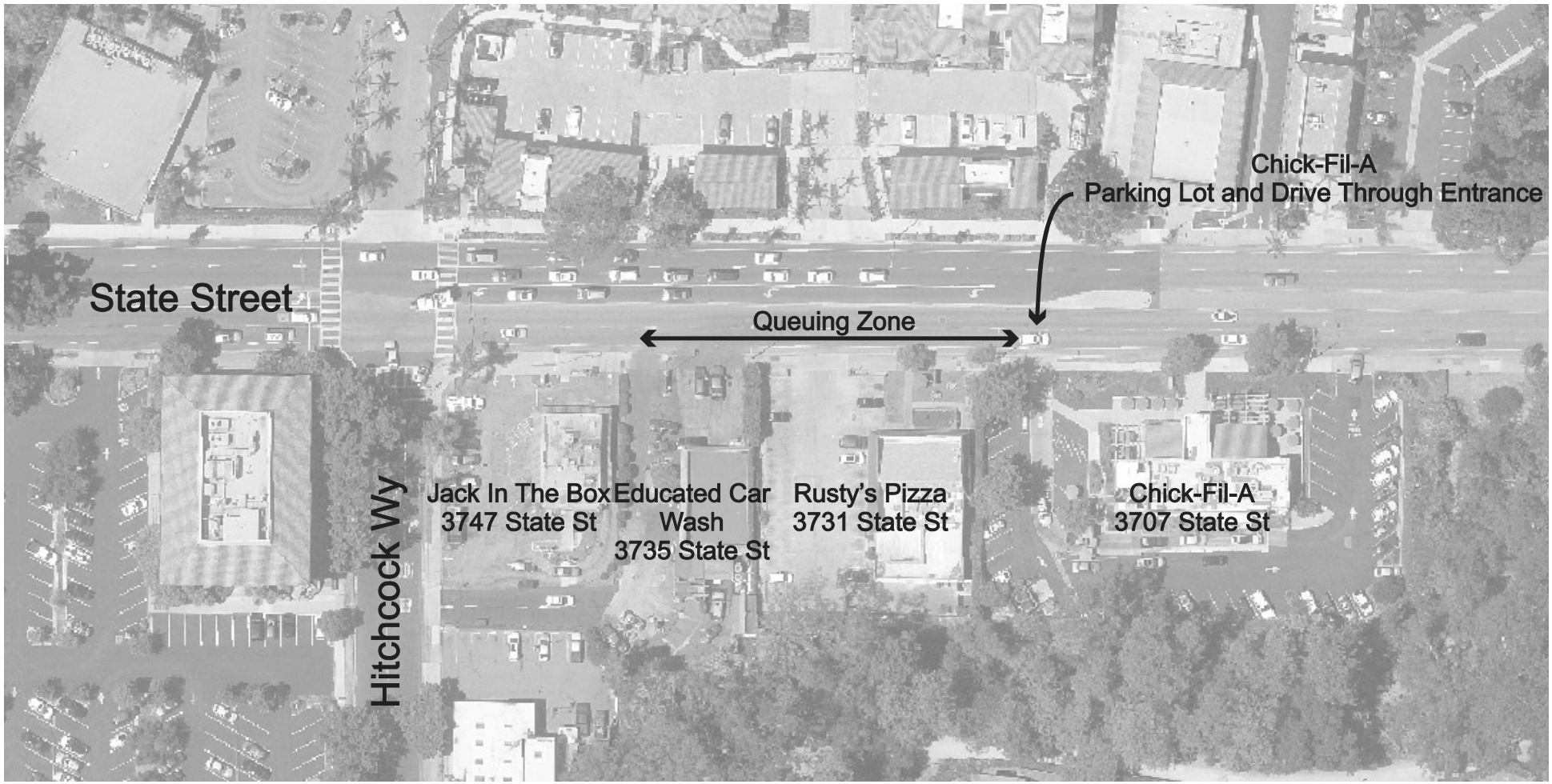
Further, I do not believe that on-site improvements can be made that will prevent the queue from blocking State Street. Chick-fil-A has proposed to physically reconfigure their onsite circulation to create a dual lane drive-through. Chick-fil-A has been operating a make-shift dual lane drive-through throughout most of the pandemic, and while throughput is likely significantly higher, the queues persist. As Chick-fil-A improves onsite capacity, it appears they are attracting more customers, meaning the queue persists.

Attachment #8 are photographs illustrating queuing conditions.

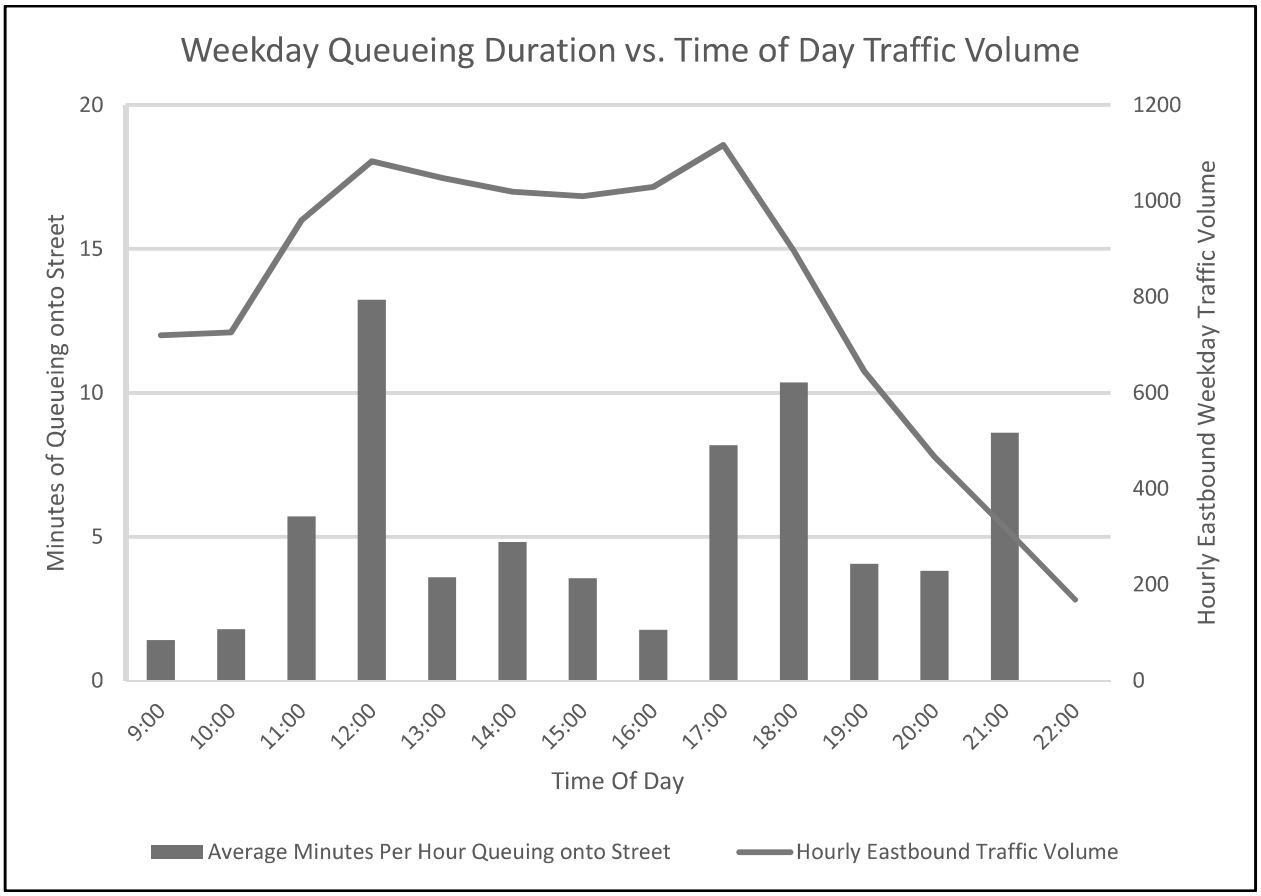
Attachments

1. Site Location and Typical Queue Location
2. Average Weekday Cumulative Queuing Duration
3. Average Saturday Cumulative Queuing Duration
4. Typical Effect of Queuing on Pedestrian Access
5. Typical Effect of Queuing on Cycling Access
6. Bus Stop Location and Typical Bus Weaving Due to Queuing
7. Location of Nearby Private Driveways Affected by Queuing
8. Photographs Illustrating Queuing Conditions

Attachment #1 - Site Location and Typical Queue Location

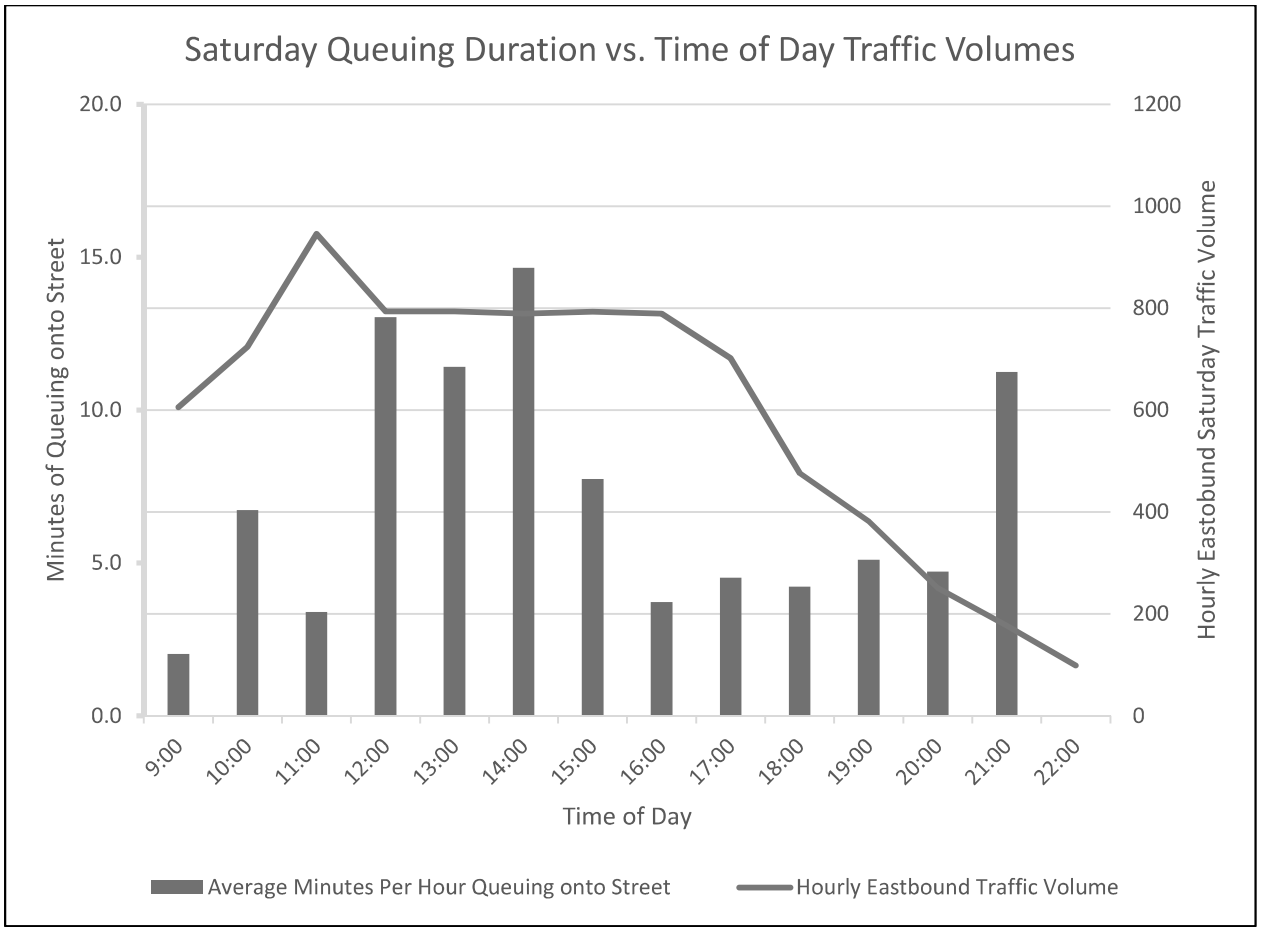


Attachment #2 Average Weekday Cumulative Queuing Duration



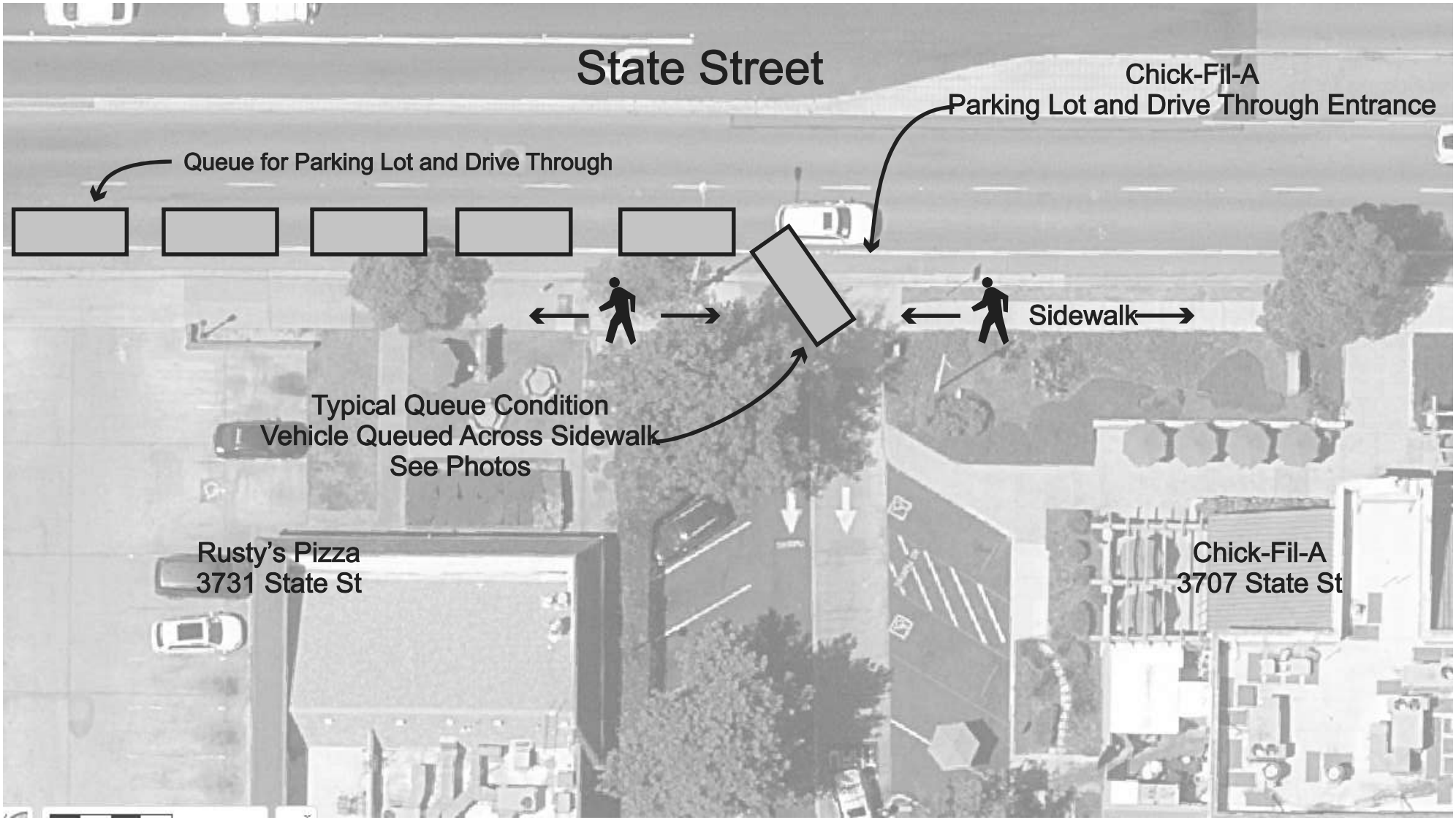
Hour of Day	Minutes of Queue Per Hour (Weekday)		
	Average Observed	Lowest Observed	Highest Observed
9:00	1.4	0.0	8.5
10:00	1.8	0.0	5.5
11:00	5.7	0.6	17.9
12:00	13.2	7.2	17.7
13:00	3.6	0.3	12.1
14:00	4.8	1.5	11.4
15:00	3.6	0.0	8.2
16:00	1.8	0.0	4.0
17:00	8.2	0.0	18.8
18:00	10.4	0.0	32.5
19:00	4.1	0.1	10.6
20:00	3.8	0.0	11.0
21:00	8.6	0.6	18.5
22:00	0.0	0.0	0.0

Attachment #3 Average Saturday Cumulative Queuing Duration

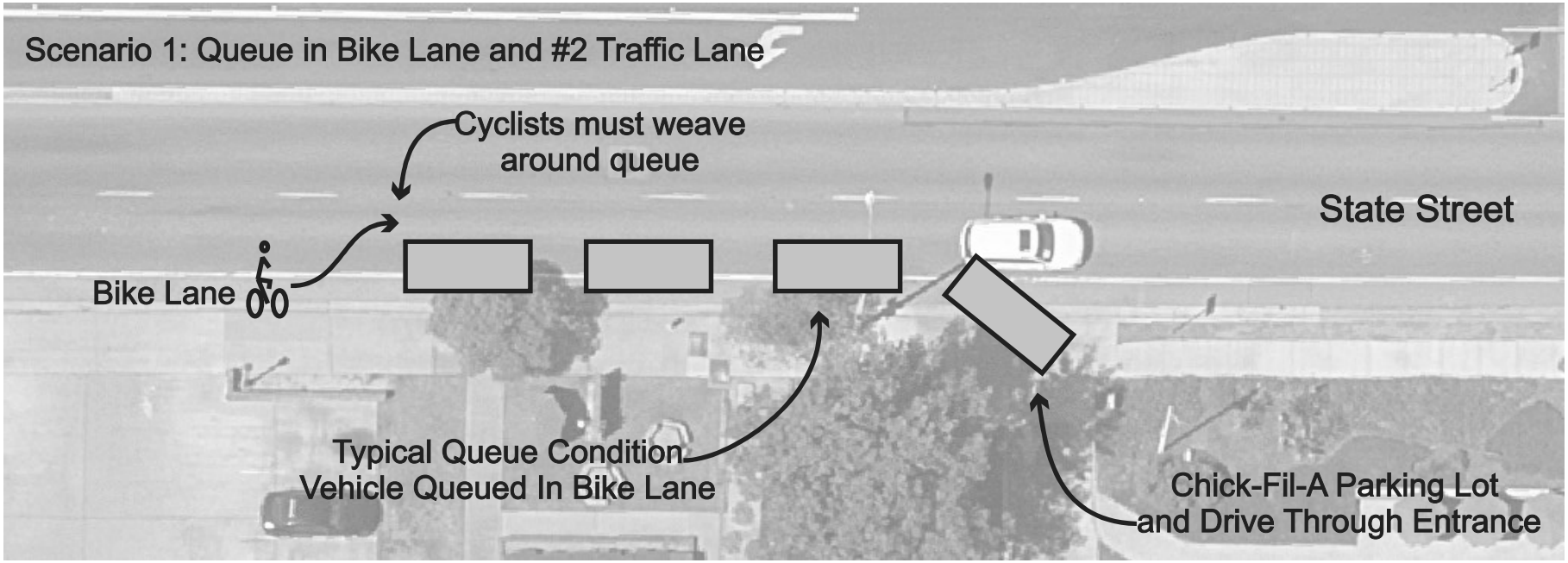


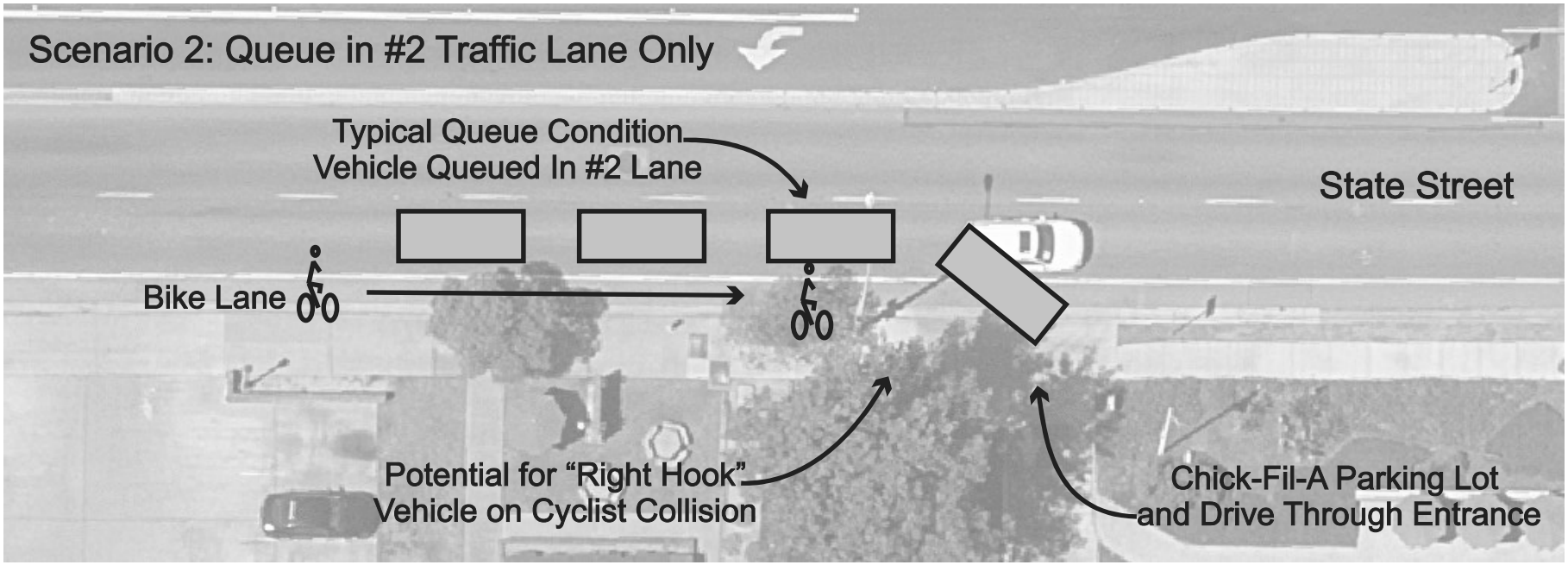
Hour of Day	Minutes of Queue Per Hour (Saturday)		
	Average Observed	Lowest Observed	Highest Observed
9:00	2.0	0.0	6.1
10:00	6.7	0.4	11.4
11:00	3.4	2.6	5.0
12:00	13.0	2.0	25.7
13:00	11.4	3.5	23.8
14:00	14.7	3.5	36.7
15:00	7.7	0.5	22.1
16:00	3.7	0.0	10.5
17:00	4.5	2.1	7.0
18:00	4.2	0.7	10.5
19:00	5.1	0.0	11.4
20:00	4.7	3.0	6.5
21:00	11.2	0.0	31.5
22:00	0.0	0.0	0.0

Attachment #4 - Typical Effect of Queuing on Pedestrian Access

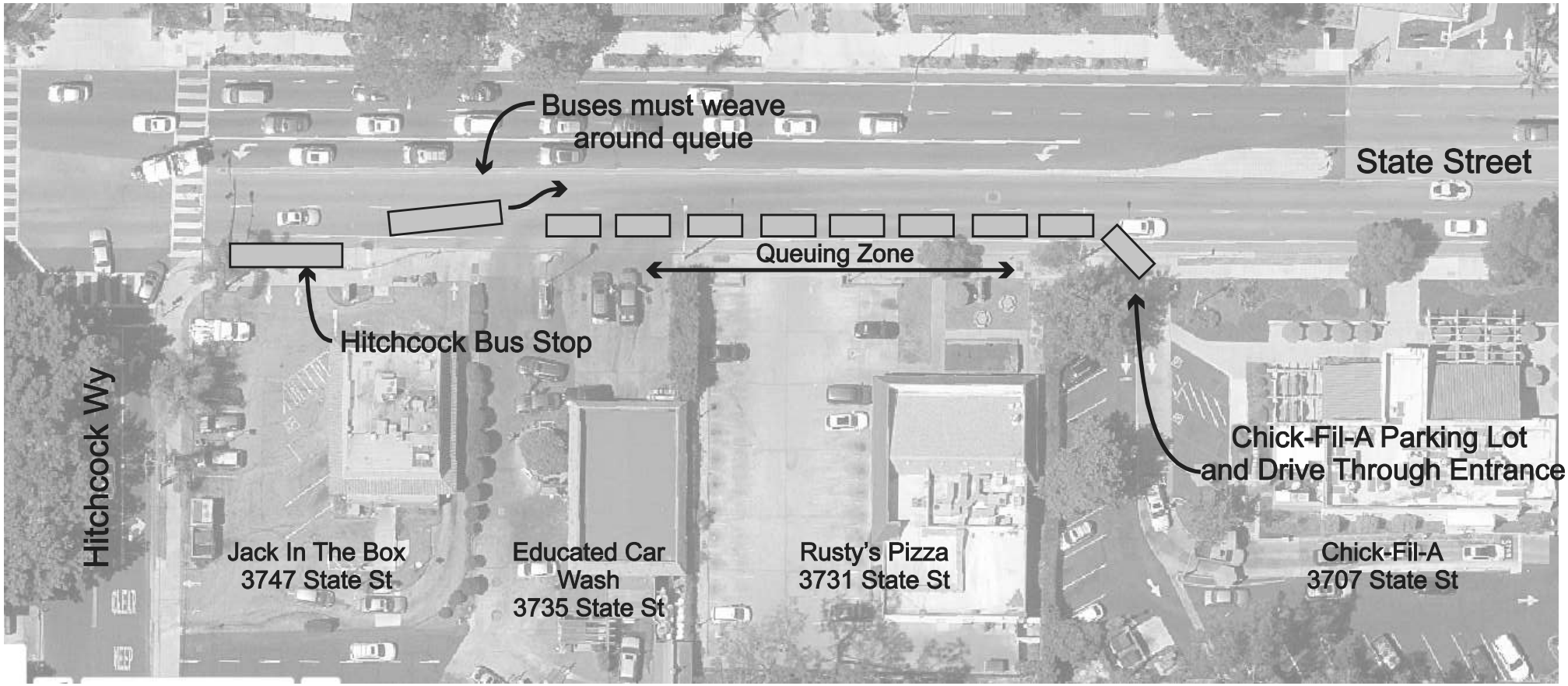


Attachment #5 - Typical Effect of Queuing on Cycling Access

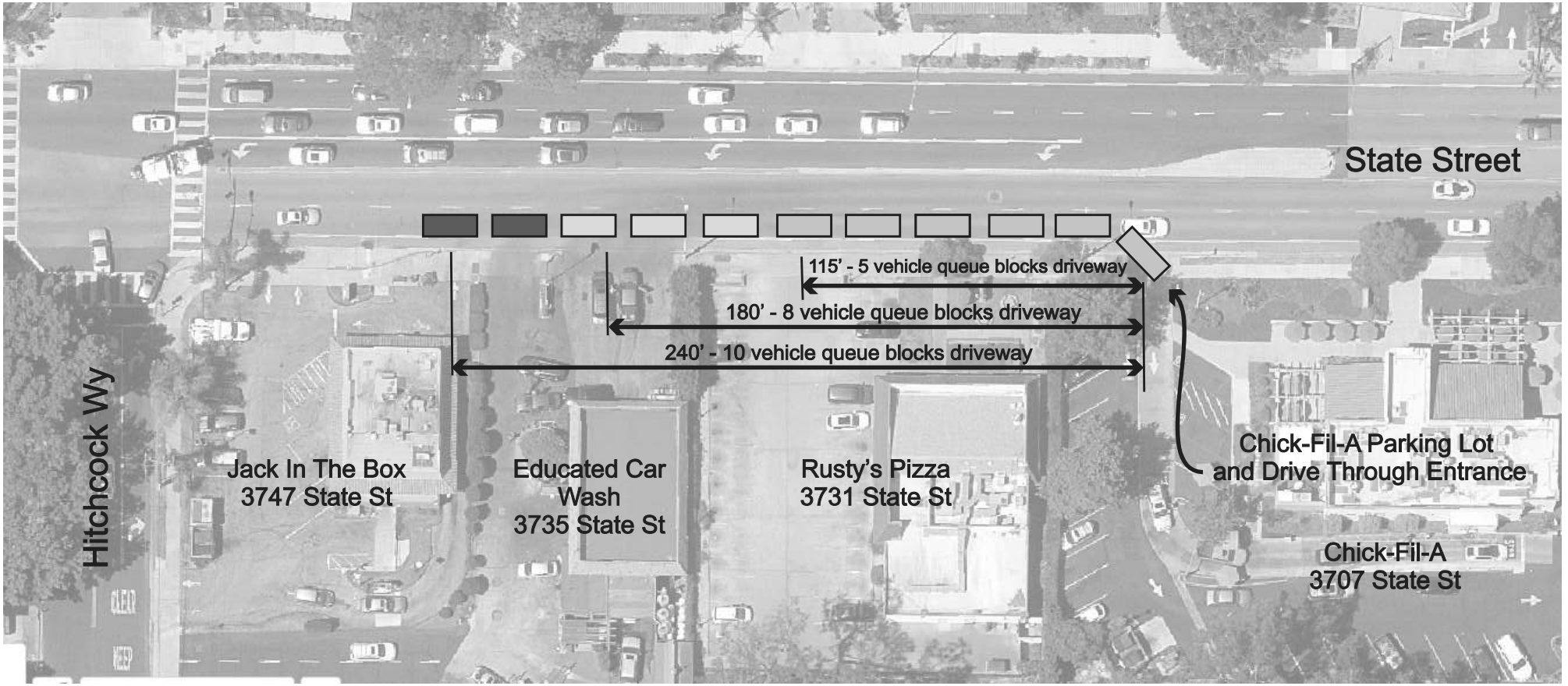




Attachment #6 - Bus Stop Location and Typical Bus Weaving Due to Queuing



Attachment #7 - Location of Nearby Private Driveways Affected by Queuing



	Average Number of Times Per Day That Queues Block Jack In The Box Driveway	Average Number of Times Per Day Queues Block Educated Car Wash Driveway	Average Number of Times Per Day Queues Block Rusty's Pizza Parlor Driveway
Weekday	4	7	15
Saturday	5	6	16

Attachment #8 - Photographs Illustrating Queuing Conditions



Queue Blocking #2 (Outside) Traffic Lane Access to Rusty's Pizza Parlor Blocked (Shown In Foreground)



Queue Blocking Bike Lane and Sidewalk

Attachment #8 - Photographs Illustrating Queuing Conditions



Bus Weaving Around a Single Vehicle in Queue



Bus and Cyclist Weaving Around Queue
Sidewalk is Blocked

THE CONVERSATION

Academic rigor, journalistic flair

Drive-throughs are busier than ever during the pandemic – but they're hotspots for air pollution

Published: October 16, 2020 10.16am EDT

Anitha Chinnaswamy

Assistant Professor of Environment and Computing, Coventry University



In the US, the average time spent waiting in fast food drive-throughs has risen by half a minute during the pandemic. Ministr-84/Shutterstock

Over 90% of EU citizens each year are exposed to levels of outdoor air pollution that are above the World Health Organization's air quality guidelines. In Birmingham, the UK's second largest city, air quality in 2018 breached both national air quality limits for nitrogen dioxide (NO_2) and the WHO guideline for particulate matter. Children who live in Birmingham could have their lives cut short by an average of up to seven months because of poor air quality alone.

Air pollution is a public health crisis, but it's currently overshadowed by coronavirus. As the virus has restricted our access to cafes and restaurants, drive-through services have swollen. They might allow a semblance of normal life to continue, but what might it mean for the air we breathe?

In research conducted at the outset of the pandemic, my colleagues and I discovered that many drive-throughs in the UK are air pollution hotspots. Without measures to limit exposure, these sites could contribute to chronic health problems among drive-through workers and the people they serve.



Air pollution is a leading cause of illness worldwide. Jarhe Photography/Shutterstock

Convenience at a cost

In February 2020, mere weeks before lockdown began in the UK, we published a study on air pollution around the drive-through windows of fast food outlets in 10 major cities throughout the UK. To find out how it might be affecting customers and employees, we used monitors to measure levels of pollution every 15 minutes for two weeks.

At a drive-through in Erith, south-east London, 61% of NO_2 measurements exceeded the UK's safe limit. In Hull, 27% of measurements revealed unsafe levels of NO_2 and in Birmingham, 19% exceeded the limit. NO_2 levels seemed to peak during lunch and in the evening, while concentrations of particulate matter were highest in the morning during the breakfast rush.

In all of these places, drive-through employees were regularly exposed to toxic fumes that can have long-term health effects. Customers in their cars weren't much safer either. Rather than being protected from emissions inside a vehicle, studies show that pollutants can accumulate within your car while you're sat inside, often to higher levels in the confined space than outside it.

Clearing the air

Ours was the first study to investigate pollution levels at drive-throughs. Since then, drive-through coronavirus testing sites have sprung up across the UK and in the US, a "building boom" for restaurant drive-throughs is underway.



Drivers queue for a coronavirus test at a drive-through testing site. EPA-EFE/Daniel Pockett

Traffic pollution contains a number of harmful substances. Nitrogen dioxide (NO_2) is a noxious gas found in exhaust fumes that has been linked to asthma and birth complications. Particulate matter is another form of air pollution that's like a fine dust, shed during combustion in the engine or from the wear and tear of brakes.

These tiny fragments often measure less than 2.5 thousandths of a millimetre, or one-thirtieth the width of a human hair. But when inhaled, they can infiltrate the bloodstream and weaken the lungs or contribute to heart disease.

Although there are permissible standards for these substances that are set by the government, no studies can claim that a harmless level of air pollution exists. People with underlying health problems can be affected even at very low levels of exposure.

Read more: Air pollution: your exposure and health risk could depend on your class, ethnicity or gender

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Employers have a duty to protect drive-through workers from air pollution. Proper precautionary measures to minimise their exposure could also benefit the public. Using a reverse-flow fan system to prevent exhaust from entering the drive-through windows, encouraging stationary drivers to turn off their engines while waiting and preventing pregnant staff from working on the drive-through are just a few small steps that could make a big difference.

Scientists have found that hospital admissions for COVID-19 tend to flare up where air pollution is most severe, as chronic exposure to airbone pollutants can make people more vulnerable. Using drive-through services instead of eating inside cafes and restaurants might limit your contact with coronavirus, but the hidden health consequences of air pollution should not be ignored.

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Research Article Open Access

An Evaluation of the Effects of Drive-Through Configurations on Air Quality at Fast Food Restaurants

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Abstract

Drive-thru users at fast food restaurants stay in their vehicle and have the engine running instead of walking into the restaurant to place an order for food or beverage. Although the drive-thrus are convenient, and they save time for costumers, they may have negative impacts on the air quality. Idling vehicles waiting in lines at drive-thru facilities waste gas, harm air quality, and increase greenhouse gas emissions. This study examined the emission rates at three fast food restaurants in Houston, TX, with different drive-thru configurations. By driving on each drive-thru facility in two different times of the day (peak hours and non-peak hours), instantaneous speed and acceleration of vehicles were collected on a second-by-second basis using Global Positioning System (GPS) devices. Then, for each second-by-second data, Vehicle Specific Power (VSP) value was calculated using instantaneous speed and acceleration. VSP and instantaneous speeds of the vehicles were used to obtain the operating mode distribution bins according to the standard provided by the Motor Vehicle Emission Simulator (MOVES). The vehicle emissions were calculated based on the operating mode binning approach. Emission factors analyzed in this study are Carbon Monoxide (CO), Carbon Dioxide (CO_2), Oxides of Nitrogen (NO_x), and Hydrocarbons (HC). The results of the study showed that the estimated emission is lower at drive-thru facilities with fewer stops and number of lanes.

Keywords: Drive-thru; Emission; Operating mode; Vehicle Specific Power (VSP)

Introduction

With the fast food restaurant business consistently growing, it causes more and more people to use the drive-thru facilities, especially in the big cities where time and convenience are major factors in the daily activities of people. The drive-thru facilities have increasingly become an integral part of not only the fast food restaurants, but also the other businesses such as banks, DVD rentals, ATMs, coffee shops, pharmacies, and dry cleaners. In general, drive-thru windows are very popular convenience for those people who drive. Although drive-thrus are convenient, and they save time for customers; they may have negative impacts on the air quality. In this study, three fast food restaurants in Houston, TX, with different drive-thru configurations will be examined, and the total emissions associated with their drive-thru facilities will be estimated.

Background

Most of the people living in major cities prefer to use the quickest and easiest way when it comes to ordering their food at fast food restaurants. Drive-thru shopping has become a part of their daily routine where their vehicles are kept idling during the service period. No matter whether there are lines inside of the restaurant and how many vehicles are waiting in the drive-thru line, drivers never step out their vehicle to make an order insider of the restaurant. However, such an idling behavior may result in enormous health and environmental consequence. A significant number of byproducts of burning fossil fuel may be produced during idling, which include carbon dioxide (CO_2), carbon monoxide (CO), oxides of nitrogen (NO_x), and Volatile Organic Compounds (VOC). While CO_2 as a greenhouse gas contributes the most to global warning [1], CO, NO_x and VOC are toxic exhaust gases for humans. Further, NOx can react with VOC and still air under sunlight to form toxic smog. Meanwhile, NOx is associated with the formation of acid rain. The concentration of the four byproducts in the exhaust gases is highly subject to many factors, such as vehicle operation [2], pavement types and roughness, engine efficiency, and roadway design [3, 4]. For example, CO concentration in the exhaust gases is the highest during an idling phase with 69, 000 ppm from a gasoline engine [5]. Vehicle emissions could be reduced at traffic conflicting areas, such as work zones [6,7], and signalized intersections in fog [8], where are equipped with Vehicle to Infrastructure (V2I) to improve drivers' driving behaviors [9].

According to a published statistics in 2010, "drive-thru sales account for more than 60% of McDonald's overall revenues. Burger King relies on drive-thrus for 62% of its revenues. For Wendy's, the number is about 60%. Starbucks doesn't break out drive-thru revenues, but the chain operates approximately 2,650 drive-thru locations, representing approximately 35% of company-operated stores in the USA and Canada combined" [10]. This statistics reveals there is a high proportion of population nationwide using the drive-thru facilities daily. It seems that drivers' convenience has been trading off by air quality and public health.

Some local governments have adopted policies in this issue and launched anti-idling campaigns to help educate people about negative impacts of idling on the environment. Furthermore, there are growing debates about the environmental impact of drive-thrus [11-15] and a few governmental agencies have been trying to eliminate and ban drive-thrus. The USA Federal Highway Administration (FHWA) recommends turning off the vehicle engines in drive-thrus to reduce emissions and climate change [16]. However, most people do not know that a vehicle that is idle at a drive-through facility and wait for a long period of time produces a considerable amount of emission. The USA Environmental Protection Agency (EPA) presented tables including idle emission factors for volatile organic compounds (VOC), carbon monoxide (CO), and oxides of nitrogen (NO_x) for both summer and winter conditions [17]. Idle emissions for particulate matter (PM10) were also provided for heavy-duty diesel vehicles only since it was negligible for gasoline-

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fueled vehicles. EPA suggested use of the idle emission factors to obtain first-order approximations of emissions under idle conditions. There are few studies on the estimation of emission at drive-thru facilities. A group of college students in Pennsylvania calculated the vehicle emissions at two fast food restaurants by counting the vehicles and using an equation provided by EPA office of mobile sources [18]. Mittingly et al. developed a methodology for estimating benefits associated with drive-thru restrictions by characterizing a drive-thru as an M/M/1 queuing system, and calculated the reduction in NO_x emissions [19].

As having been noticed, drive-thru facilities at fast food restaurants are built differently in terms of their configurations (number of stops, number of lanes, etc.); however they all serve the same purpose. This study will examine the emission rates at three fast food restaurants in Houston, TX, with different drive-thru configurations.

Materials and Methods

Vehicle Specific Power (VSP) is a well-accepted explanatory variable in microscopic emission modeling. VSP is defined as the instantaneous tractive power per unit vehicle mass [20]. The main advantages of using VSP as an independent variable for studying the stabilized emissions of passenger cars and light-duty trucks are: it can be directly calculated from roadside measurements, it captures most of the dependence of emissions on engine operating parameters, and certification driving cycles are defined as a speed versus time trace and can also be specified in terms of VSP. The commonly used unit of VSP is Kw/Metric Ton. VSP distributions not only represent well the driving characteristics but also are highly correlated with the vehicle emission characteristics [21-23]. VSP is calculated using the following equation [20]:

$$VSP = v \times [1.1\ a + 9.81 \times grade\ (\%) + 0.132] + 0.000302\ v^3 \quad (1)$$

where:

v is the vehicle speed (m/s),

a is the vehicle acceleration (m/s^2), and

grade (%) is the vehicle vertical rise divided by slope length.

Since the data collection area was flat, the grade was zero in Equation (1). Therefore, the equation can be simplified as:

$$VSP = v \times (1.1\ a + 0.132) + 0.000302\ v^3 \quad (2)$$

VSP-based emission modeling approaches have been used to quantify a vehicle's emissions during its regular operations [24-26]. The basic methodology for this modeling approach is binning second-by-second VSP data and computing the average emission rate in each bin. The meaning of each bin is the percentage of corresponding VSP values in the whole distribution. With this partition, the average emission rate of a particular type of pollutant in that bin for a specific vehicle can be calculated. The accuracy of the VSP-based modeling approach relies on how VSP bins are defined. There has been no clear definition about criteria in selecting VSP cutting points. However, since Motor Vehicle Emission Simulator (MOVES) is currently considered the standard tool that the USA Environmental Protection Agency has for estimating greenhouse gas (GHG) emissions from transportation sector, the definition of VSP bins provided by MOVES is used in the binning process in this study. Operating mode bins are a categorization method that describes vehicle behaviors based on the instantaneous speed and VSP characteristics, which serves the primary tool when generating total emissions [27,28]. Table 1 illustrates details of the operating mode binning provided by MOVES. In the table, the Operating Mode ID refers to operating mode bins that represent braking, idling, and varying levels of the vehicle's VSP and speed. The operating mode bins are broken down into 23 bins that range from 0 to 40. As shown in the table, bins 0 and 1 represent braking and idling. Bins 11 to 16 represent

Operating Mode ID	Operating Mode Description	Vehicle Specific Power, VSP_t (kW/tonne)	Vehicle Speed, v_t (mph)	Vehicle Acceleration, a_t (mph/sec)
0	Braking			($a_t \le -2$) or ($a_t \le -1$ and $a_{t-1} \le -1$ and $a_{t-2} \le -1$)
1	Idling		$-1 \le v_t < 1$	
11	Low Speed Coasting	$VSP_t < 0$	$1 \le v_t < 25$	
12	Cruise/Acceleration	$0 \le VSP_t < 3$	$1 \le v_t < 25$	
13	Cruise/Acceleration	$3 \le VSP_t < 6$	$1 \le v_t < 25$	
14	Cruise/Acceleration	$6 \le VSP_t < 9$	$1 \le v_t < 25$	
15	Cruise/Acceleration	$9 \le VSP_t < 12$	$1 \le v_t < 25$	
16	Cruise/Acceleration	$12 \le VSP_t$	$1 \le v_t < 25$	
21	Moderate Speed Coasting	$VSP_t < 0$	$25 \le v_t < 50$	
22	Cruise/Acceleration	$0 \le VSP_t < 3$	$25 \le v_t < 50$	
23	Cruise/Acceleration	$3 \le VSP_t < 6$	$25 \le v_t < 50$	
24	Cruise/Acceleration	$6 \le VSP_t < 9$	$25 \le v_t < 50$	
25	Cruise/Acceleration	$9 \le VSP_t < 12$	$25 \le v_t < 50$	
27	Cruise/Acceleration	$12 \le VSP_t < 18$	$25 \le v_t < 50$	
28	Cruise/Acceleration	$18 \le VSP_t < 24$	$25 \le v_t < 50$	
29	Cruise/Acceleration	$24 \le VSP_t < 30$	$25 \le v_t < 50$	
30	Cruise/Acceleration	$30 \le VSP_t$	$25 \le v_t < 50$	
33	Cruise/Acceleration	$VSP_t < 6$	$50 \le v_t$	
35	Cruise/Acceleration	$6 \le VSP_t < 12$	$50 \le v_t$	
37	Cruise/Acceleration	$12 \le VSP_t < 18$	$50 \le v_t$	
38	Cruise/Acceleration	$18 \le VSP_t < 24$	$50 \le v_t$	
39	Cruise/Acceleration	$24 \le VSP_t < 30$	$50 \le v_t$	
40	Cruise/Acceleration	$30 \le VSP_t$	$50 \le v_t$	

Table 1: Definition of MOVES operating mode characteristics [17].

Operating Mode ID	CO_2 (g/s)	CO (mg/s)	HC (mg/s)	NO_x (mg/s)
0	0.89	1.83	0.85	1.3
1	0.75	0.84	1.04	1.71
11	1.08	3.9	1.49	1.3
12	1.84	8.19	2.77	2.38
13	3.44	22.41	4.24	3.97
14	4.6	22.04	7.04	5.72
15	5.67	23.11	7.51	9.92
16	6.83	32.4	2.72	18.25
21	1.25	2.57	1.38	1.93
22	1.97	3.51	3.94	2.36
23	2.83	6.65	4.72	4.59
24	3.92	9.31	3.51	6.55
25	4.87	9.65	3.39	10.49
27	6.3	12.51	5.31	20.28
28	7.41	11.17	9.26	31.05
29	7.89	11.35	14.09	35.42
30	5.17	13.74	2.35	11.5
33	2.46	4.11	1.64	3.47
35	4.56	9.25	1.92	7.11
37	5.68	10.51	4.24	13.05
38	6.64	9.82	3.98	18.99
39	7.44	18.68	5.66	28.62
40	5.20	9.03	4.74	13.09

Table 2: Emissions rates of operating mode bins collected with PEMS [18].

driving behavior with lower speeds. Bins 21 to 30 represents driving behavior between 25 mph to 50 mph. Bins 33 to 40 represents driving behavior with speed 50 mph and greater.

In this study, VSP values will be calculated using instantaneous speed and acceleration data collected by GPS devices. Once VSP is determined, the data can be categorized using the operating mode binning approach. Then, the vehicle emissions can be calculated based on the operating mode binning approach. Tao and Yu [29] conducted a research study and determined the emission rates in each operating mode bin using the real emission data of a light-duty vehicle collected by a Portable Emission Measurement System (PEMS). Those emission rates are shown in Table 2. Therefore, the total emissions can be calculated by combining the emission rates in Table 2 and the operating mode bins. Emission factors analyzed in this study are Carbon Monoxide (CO), Carbon Dioxide (CO_2), Oxides of Nitrogen (NOx), and Hydrocarbons (HC).

Data Collection

In this study, three fast food restaurants with different locations were selected in Houston, TX for data collection. When choosing the restaurants, the following considerations were taken into account:

- Location of restaurant
- Size of facility
- Number of existing lanes in drive-thru
- Number of stops in drive-thru

The data collection was conducted at each restaurant during the peak hours and non-peak hours. The location of the restaurants was important since the facilities should have been quite busy during the peak hours compared with non-peak hours. The first restaurant (Restaurant A) was located in a residential neighborhood, next to a large shopping center. The second restaurant (Restaurant B) was located in the area close to Texas Medical Center. The third restaurant (Restaurant C) was located close to two university campuses: Texas Southern University and University of Houston.



Figure 1: GPS device used to collect data in the drive-thru facilities.

Before starting the data collection, each location was visited at different times of the day in order to determine the exact time for both peak hour and non-peak hour data collection. Finally, two time periods were selected: 11:00 a.m. to 1:00 p.m. as peak hours, and 2:30 p.m. to 4:30 p.m. as non-peak hours. For each restaurant, one graduate student with more than three years of driving experience was assigned to collect data during both peak hours and non-peak hours by driving his/her light-duty vehicle in the restaurant drive-thru. The fuel type for the vehicles was gasoline. In total, three drivers participated in data collection. The speed and acceleration were collected while driving in the drive-thru facilities using the portable Global Positioning System (GPS) devices (Figure 1). This data collection approach recorded second-by-second real-world driving behaviors. The drivers were advised to turn on the GPS device when they pulled into the driveway of the restaurants. They placed their order and continue driving through the drive-thrus like a regular costumer. The GPS devices were turned off after they pulled out of the drive-thru.

Each location had a different drive-thru configuration. The drive-thru at Restaurant A included two lanes with two stops. The first stop was at ordering station where the menu board was located between the lanes; and the vehicles could stop at this point and order their food. Then those two lanes eventually merge into one single lane where the customers could pay and pick up their order at the same window (Figure 2). Since the drive-thru was not very busy in the afternoon between 2:30 p.m. and 4:30 p.m., the right lane was closed during non-peak hours. Drive-thru configuration at Restaurant B was much more different compared to



Figure 2: Drive-thru at Restaurant A: (a) the menu board (ordering station) located between two lines of vehicles, (b) the vehicles merging into one lane towards the pick-up window.

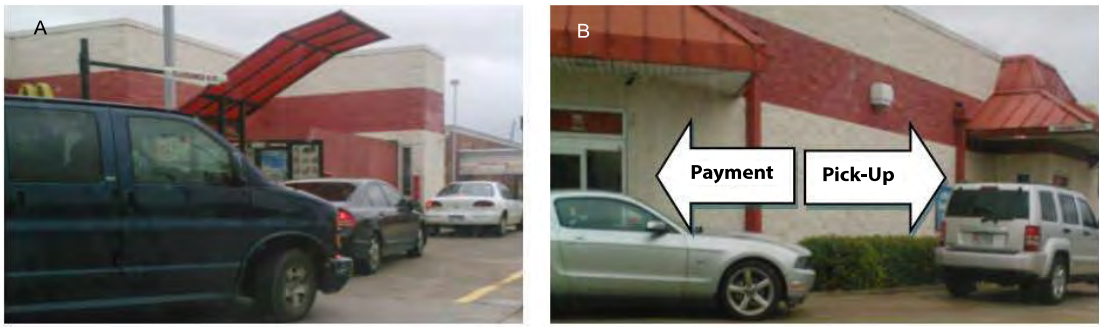


Figure 3: Drive-thru at Restaurant B: (a) the menu board (ordering station) with one lane vehicles, (b) payment and pick-up windows.



Figure 4: Drive-thru at Restaurant C: the menu board (ordering station) with one lane vehicles, and the window for payment and picking up the orders.

Drive-Thru		Peak Hours	Non-Peak Hours
Restaurant A	Left Lane	65 veh	52 veh
	Right Lane	80 veh	
Restaurant B		86 veh	32 veh
Restaurant C		49 veh	31 veh

Table 3: Traffic count at drive-thru facilities during both peak and non-peak hours.

Restaurant A. This facility had one lane with three stops. The first stop was to place the order, second stop was at the payment window where customers paid for their purchase, and the third stop was to pick up their food or beverage at the pick-up window (Figure 3).

The drive-thru facility at Restaurant C was similar to Restaurant A with the only difference in the number of the lanes. The facility had one lane with two stop. The first stop was next to the menu board where the drivers placed the order; and the second stop was at the pick-up window where they could pay and pick up their order (Figure 4). During data collection, there were other students who assisted in counting the traffic at drive-thru facilities at peak hours and non-peak hours. At each of Restaurants B and C locations, two students were assigned to record the data; the first student recorded the information when the vehicles were entering the drive-thru, and the second one recorded the same information when the vehicles were leaving. At Restaurant C location, only one student recorded the information since he had a good view of the entrance and the exit of the drive-thru. The information included the time the vehicles entered the drive thru, the time the vehicles left the drive-thru, the last four digits of the vehicles' license plates, and the vehicle type. Recording the time was necessary in order to calculate the presence time (waiting time) of each vehicle in the drive-thru facilities.

Table 3 shows the traffic count at each location. Traffic count indicates that more vehicles use the drive-thru facilities during peak-hours. As mentioned before, the right lane of the drive-thru facility at Restaurant A was closed at non-peak hours due to the fact that it was not as busy as during peak hours. Second-by-second data were collected using GPS devices (loggers). GPS loggers record the local time and date, longitude and latitude, and speed in kilometers per hour. Data processing followed the data collection phase of this study. The steps of this process are provided as follows:

Step 1: GPS data from the vehicles were used to calculate VSP for each second of data recorded using Equation (2).

Step 2: VSP and instantaneous speeds of the vehicles were used to obtain the operating mode distribution bins according to the standard in MOVES (Table 1).

Step 3: The operating mode bins were combined with the emission rates provided in Table 2, and the total emissions are estimated.

Results

The goal of this study was to analyze the effects of drive-thru facilities at fast food restaurants on emission outputs of light-duty vehicles. Real world GPS data was collected for three restaurants with different drive-thru configurations during peak hours and non-peak hours. The emission factors estimated were carbon dioxide (CO_2), carbon monoxide (CO), oxides of nitrogen (NO_x), and hydrocarbons (HC).

Figure 5 shows the operating mode distributions for the vehicles using the drive-thru facilities during non-peak hours (2:30 p.m. to 4:30 p.m.). As seen in the figure, Restaurant A has higher frequencies

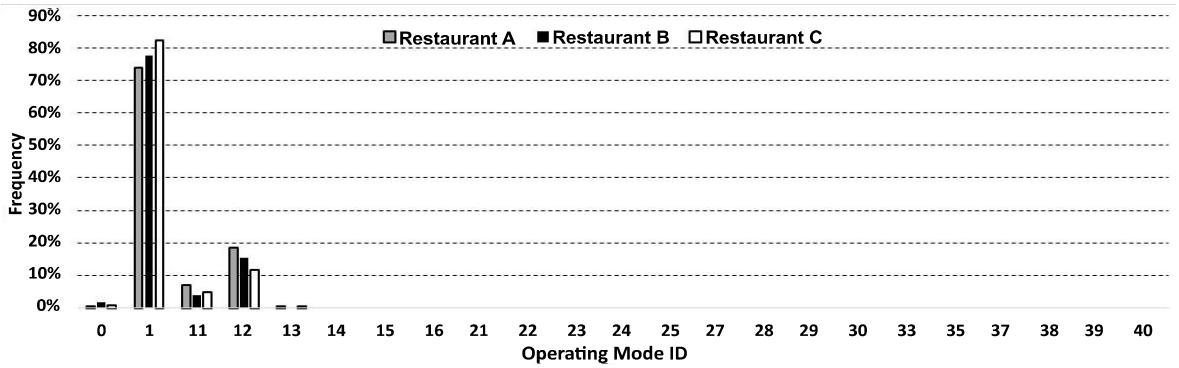
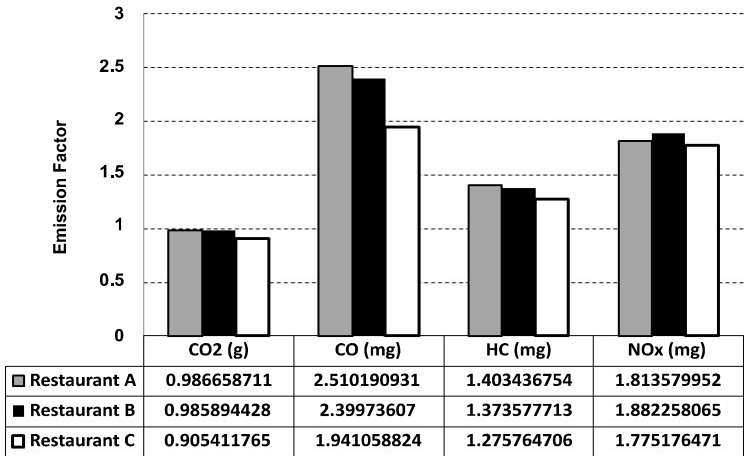


Figure 5: Operating mode distributions during non-peak hours.



	CO2 (g)	CO (mg)	HC (mg)	NOx (mg)
Restaurant A	0.986658711	2.510190931	1.403436754	1.813579952
Restaurant B	0.985894428	2.39973607	1.373577713	1.882258065
Restaurant C	0.905411765	1.941058824	1.275764706	1.775176471

Figure 6: Emissions during non-peak hours.

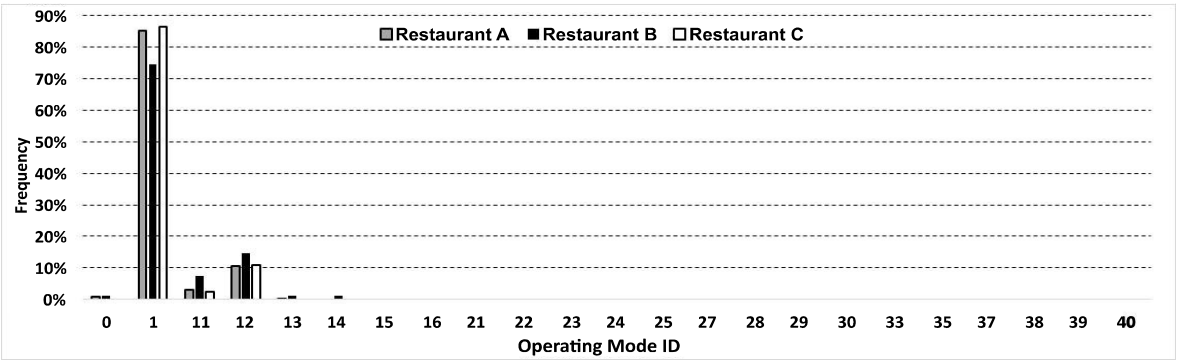
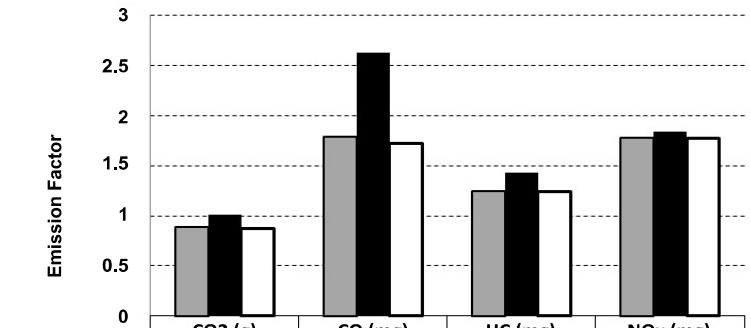


Figure 7: Operating mode distributions during peak hours.

in bins 11 and 12. These bins are described as low speed coasting and cruise/acceleration, respectively. However, it has lower frequency in bin 1 compared to the other two locations, that is idling. Figure 6 shows the emission factors for each light-duty vehicle using the drive-thru facilities during non-peak hours. During this time, Restaurant A had the highest emission factors except for NO_x. As mentioned above, the operating mode bins 11 and 12 of Restaurant A had higher frequencies, which could be the reason that the total emission for Restaurant A is higher than the other two restaurants (the emission rates of the operating mode bins 11 and 12 in Table 2 are higher than bin 1). Restaurant C has the lowest frequency in bin 12 but the highest in 1 indicating there were more idling during non-peak hours. Restaurant B in bin 12 is the second highest and it also the second highest for total emissions (except for NO_x). Figure 7 displays the frequencies of the operating mode bins for the vehicles using the drive-thru facilities during peak hours (11:00 a.m. to 1:00 p.m.). The frequency of the operating mode bin 1 (idling mode) for Restaurant A during peak hours is higher (74%) compared with the frequency of the bin 1 during non-peak hours (85%). That was because both lanes of the drive-thru facility at Restaurant A was open at non-peak hours, and two lanes had to merge into one single lane. In other words, the vehicles had to be idle for longer time. During the peak hours Restaurant B had the lowest idling time (bin 1), but higher



	CO2 (g)	CO (mg)	HC (mg)	NOx (mg)
Restaurant A	0.885793037	1.791005803	1.247021277	1.773017408
Restaurant B	1.007663043	2.62701087	1.426032609	1.840815217
Restaurant C	0.877925072	1.72426513	1.241123919	1.772737752

Figure 8: Emissions during peak hours.

frequencies in bin 11 and 12 compared with the other two locations (Figure 6). Furthermore, the drive-thru at Restaurant B has the highest emissions for all the emission factors. The reason is the drive-thru facility at this location has three stops (Figure 8).

Conclusion

This study examined the emission rates at three fast food restaurants in Houston, TX, with different drive-thru configurations. By driving on each drive-thru facility in two different times of the day (peak hours and non-peak hours), instantaneous speed and acceleration of vehicles were collected on a second-by-second basis using Global Positioning System (GPS) devices. Then, for each second-by-second data, VSP value was calculated using instantaneous speed and acceleration. VSP and instantaneous speeds of the vehicles were used to obtain the operating mode distribution bins according to the standard provided by the MOVES. The vehicle emissions were calculated based on the operating mode binning approach. Also, traffic count was conducted at each location. Traffic count indicated that more vehicles used the drive-thru facilities during peak-hours. Emission factors analyzed in this study are Carbon Monoxide (CO), Carbon Dioxide (CO_2), Oxides of Nitrogen (NO_x), and Hydrocarbons (HC). The results of the estimated emission in this study may seem to be relatively small (since it is related to a single vehicle), but it adds up when it is multiplied by all the vehicles idling at that specific drive-thru restaurant. Furthermore, the results showed that the total emission for a single vehicle using a drive-thru facility is not only related to the idling situation, but the other modes (bins 11 and 12) also have impact on the overall emission.

There are some other factors that must be taken into consideration when estimating the emission for a vehicle running in the facilities with the situation of idling and stop-and-go. One of the factors is number of the vehicles using the facility during that specific time period. This number not only has effect on the total emissions produced by all the vehicles, but it also has effect on the emission produced by that specific single vehicle. The reason is the average waiting time for each vehicle would be longer when there are more vehicles using the facilities. Therefore, it is very important to conduct the traffic count in these types of facilities.

Restaurant A location had the most traffic during peak and non-peak hours. The emissions were higher at this facility during non-peak hours versus peak hours. The reason was one of the lanes in the drive-thru facility was closed during non-peak hours, however the number of the vehicles using the drive-thru between 2:30 p.m. and 4:30 p.m. was still high (Table 3). Due to this fact, the waiting time was increased, and vehicles emitted more pollutions. During the peak hours, Restaurant B had the highest emission rate, since the drive-thru facility had three stops. As stated earlier, vehicle idling produces more emission and with each vehicle stoping at each window it causes more idling time. The result of the study shows that Restaurant C seems to have the best drive-thru configuration (one lane, two stops) since the related emission factors was the lowest during both non-peak hours and peak hours. At Restaurant C drive thru, there were not as many stops and lanes like Restaurants A and B. Therefore, there was less idling time for the vehicles. It seems that designing the restaurant drive-thrus with one lane and two stops may decrease of the vehicle emissions comparing to other design configurations.

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Drive-thrus are ruining cities and helping kill the planet

By Joe Cortright | 7.12.2021

(https://twitter.com/home?status=https://cityobservatory.org/dr
thrus-are-ruining-cities-and-helping-
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kill-the-planet/)
(http://cityobservatory.org/feed)

Your 12 ounce latte comes with a pound of carbon emissions, just from the drive-thru.

How convenience for cars makes cities less livable for everyone, and contributes to climate change.

Last week, twitter user Maris Zivarts (https://twitter.com/mnolangray/status/1463028803496730626?s=20) posted this telling image of 20 car queue wrapping around the block of a Starbucks, all lined up to go through the store's drive-thru. It shows how the store's driveway and parking lot taking up vastly more space than the store itself, and how the backup from the drive-thru window spills out onto adjacent streets, creating congestion and a safety hazard for others.



(https://twitter.com/mnolangray/status/1463028803496730626?s=20)

As Zivarts observes, 20 people showing up at a coffee shop on foot, by bike or transit is no problem. The same 20 headed for the drive-thru window is a disaster. It's clearly a blight on the neighborhood as well.

And more than that, it's bad for the environment. Those cars idling while they wait in line are burning gasoline and creating pollution, including greenhouse gases. How much, you might ask? Well, we've studied queueing and service at coffee shops before (to create our Cappuccino Congestion Index (http://cityobservatory.org/the-cappuccino-congestion-index-2/)), so we have a pretty good handle on this. We would estimate that the average wait would an average of and ten minutes to handle all the cars in a queue like this. (This assumes that the store can produce an order about every 30 seconds).

The US Department of Energy (https://www.energy.gov/eere/vehicles/fact-861-february-23-2015-idle-fuel-consumption-selected-gasoline-and-diesel-vehicles) tells us that a typical large US car burns about a third of a gallon per hour at idle. A gallon of gas produces about 20 pounds of carbon when burned. So that means that in ten minutes of idling would produce about a pound of carbon (10/60 * 20 * .33 = 1.1). So, in addition to their twelve-ounce latte, each customer is producing another 16 ounces or so of carbon to be added to the global total, just from the time spent idling in their car, waiting to be served their coffee. And, of course, this doesn't count any of the emissions from driving to and from the coffee shop to get served, which by the same math works out to about another pound per mile.

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Idling Reduction for Personal Vehicles

Idling your vehicle—running your engine when you're not driving it—truly gets you nowhere. Idling reduces your vehicle's fuel economy, costs you money, and creates pollution. Idling for more than 10 seconds uses more fuel and produces more emissions that contribute to smog and climate change than stopping and restarting your engine does.

Researchers estimate that idling from heavy-duty and light-duty vehicles combined wastes about 6 billion gallons of fuel annually. About half of that is attributable to personal vehicles, which generate around 30 million tons of CO_2 every year just by idling. While the impact of idling may be small on a per-car basis, the impact of the 250 million personal vehicles in the U.S. adds up. For saving fuel and reducing emissions, eliminating the unnecessary idling of personal vehicles would be the same as taking 5 million vehicles off the roads.

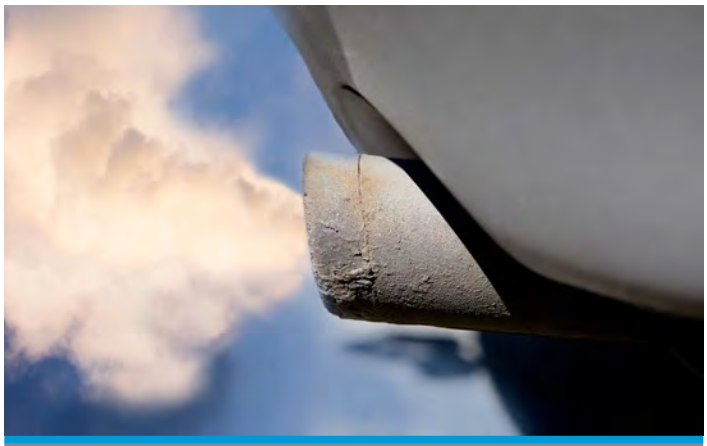
Modern Cars Don't Need To Idle

Advances in vehicle technology have made it easier than ever to avoid idling. Current vehicle owner's manuals, which contain information on how to get the best and most economical performance, often recommend avoiding idling.

In today's vehicles, driving the vehicle helps the engine reach its ideal operating temperature faster than idling it. The catalytic converter, which reduces emissions, operates much sooner if the car is driven. Even on the coldest days, most manufacturers recommend avoiding idling and driving off gently after running the vehicle for about 30 seconds. Not only will the engine warm up faster by being "at work," but the car's interior will warm up more quickly as well. Similarly, today's gasoline and diesel vehicles do not suffer damage by being turned on and off. Starters and batteries are much more durable now than they were in the past.

Consider Your Circumstances

Drive-through lines are a common place for vehicles to idle. If a line at a drive-through restaurant, pharmacy, or bank is long, consider turning off your car while you wait or parking and going inside. Likewise, when waiting for passengers, consider the weather. If the temperature is moderate, turning off your engine makes sense. It's especially important for caregivers waiting to pick up schoolchildren to minimize idling, because vehicle emissions are more concentrated near the ground, where children breathe. Poor air quality can contribute to asthma and other ailments, and children's lungs are more susceptible to damage than adults' lungs are.



Personal-vehicle idling wastes about 3 billion gallons of fuel—generating around 30 million tons of CO_2 annually in the U.S. *Photo from Shutterstock (12004621).*

There are a few circumstances where idling is hard to avoid. When waiting in traffic, you must keep your car running for safety reasons. In winter, you may need to idle to defrost your windows. When bringing your car for vehicle emissions testing, your inspection station may require that you idle to keep your engine at operating temperature.



Drive-through windows are an opportunity to reduce idling. Idling for more than 10 seconds uses more fuel and creates more CO_2 than turning off and restarting your engine. *Photo from Shutterstock (38753656).*

Clean Cities
U.S. Department of Energy

Idling May Even Be Illegal

If money wasted and pollution don't provide enough reasons to avoid idling, some jurisdictions have laws against it. You could be subject to a fine if you idle unnecessarily in:



Clean Cities supports idling reduction through its online toolkit, IdleBox (cleancities.energy.gov/idlebox).

- New York City
- Massachusetts
- Maryland
- New Hampshire
- New Jersey
- Vermont
- Hawaii
- Parts of California, Colorado, New York, Ohio, Utah, and other states

Check Clean Cities' IdleBase for a list (cleancities.energy.gov/idlebase) of local and state regulations to see whether your area has laws that restrict idling.

Solutions To Minimize Idling

For everyday drivers, the best way to reduce idling is to simply turn the key when stopped for 10 seconds or more, except in traffic. Driving a hybrid-electric vehicle makes idle reduction even easier. Hybrids shut off the engine when they are not moving and even enable slow movement with the engine off. "Mild hybrid" or stop-start technology, which is increasingly available in a number of vehicles, also eliminates idling when the car is stopped.

Idling is not a problem restricted to personal vehicles. Reducing idling in a number of community vehicles, such as school buses, taxis, police cruisers, and ambulances, can bring even bigger benefits. While emergency vehicles are usually exempt from idling regulations, these vehicles can be equipped with devices that provide power and comfort in engine-off mode. For example, police cars can use automatic start-stop devices and school buses can be equipped with block heaters to warm the engines in the morning.



Reducing idling at schools is especially helpful for protecting the health of children. *Photo from Shutterstock (157939259).*

Schools Offer Unique Opportunities

As communities are often concerned about the effects of poor air quality on children, many anti-idling campaigns have targeted diesel-powered school buses. To protect public health, school districts nationwide have enacted policies and trained drivers on idle-reduction techniques. There are several sources of information on designing a campaign that works for your school, many of which teachers can use as environmental education teaching tools. The U.S. Environmental Protection Agency's Clean School Bus USA (epa.gov/cleandiesel/sector-programs/csb-overview.htm) program can help parents and school districts reduce idling. In addition to improving air quality, minimizing idling can save school districts money by reducing the vehicles' fuel cost and engine wear.

Everyone Can Contribute

Contact your local Clean Cities coalition (cleancities.energy.gov). These coalitions work to reduce petroleum use in transportation with the support of the U.S. Department of Energy.

- Talk to the principal of your child's school to ask that anti-idling signs be posted where school buses and parents' vehicles wait.
- Work with your school board on a district-wide anti-idling campaign.
- Talk to managers of local drive-through businesses about idling's air-quality impacts and suggest that signs be posted to remind patrons not to idle.

There are a number of ways drivers can reduce their own idling and encourage others to do the same.

U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy

For more information, visit: cleancities.energy.gov

Prepared by Argonne National Laboratory,
a U.S. Department of Energy laboratory managed by UChicago Argonne, LLC.

DOE/CHO-AC-06CH11357-1502 • May 2015

The Environment and Drive-Thrus: Not an Idle Concern Anymore

As the drive-thru surges again, so does the need to consider climate ramifications.

DRIVE THRU | SEPTEMBER 15, 2021 | DANNY KLEIN



ADOBE STOCK

The U.S. Department of Energy estimated that eliminating idling would be the same as taking 5 million

vehicles off the roads.

Customers are waiting longer in the drive-thru these days, and that's OK by them it seems. In QSR magazine's 2021 Drive-Thru Study, guests showed a willingness to spend slightly more time going through the line than last year, with Gen Z and millennial consumers offering even more flexibility.

Overall, guests said they were OK sitting a maximum of 13 minutes (Gen Z and millennials were at 17 minutes). Last year, it was 12 minutes.

Customers also said they spent, on average, about 11 minutes in the drive-thru this past year versus 9 the year before. Ideally, they'd like to get in and out in 9 minutes—a number, again, up a bit from the previous calendar, when it was 7 minutes.

Why this is happening likely owes to a couple of factors. Smart phones, for one, which is a point supported by the younger consumer figures. Also, the straightforward reality people pull into more crowded drive-thrus of late, given the safety concerns of a COVID-19 climate.

But a less-talked about fallout from more cars in the drive-thru and longer wait times is what role it's playing in the conversation surrounding environmental responsibility and climate change. The health of the planet is an ever-present topic following the United Nations' landmark report released in August. Authored by nearly 200 climate scientists, it revealed



The Future of Fast-Food Drive-Thru Arrives Early

The Environment and Drive-Thrus: Not an Idle Concern Anymore

THE CHARTS:

Speed of Service

Order Accuracy

Customer Service

Vehicles in Line

Digital Menuboard

With Digital Menuboard

Without Digital Menuboard

Pre-sell Menuboard

With Pre-sell Menuboard

Without Pre-sell Menuboard

Suggestive Sell Offered

Order Confirmation Boards

carbon dioxide in the atmosphere had reached the highest level in at least the past 2 million years, which is resulting in quickly warming temperatures. Since 1970, global temperatures increased faster than in any other 50-year period in the last 2,000 years.

Read Last Year's Report

Drive-thrus have been under this microscope before. Minneapolis in 2019 passed an ordinance to ban the building of drive-thrus. Towns in California, Missouri, and New Jersey have taken similar measures.

Idling engines contribute to emissions and increased fuel consumption, with government officials suggesting idling for more than 10 seconds uses more fuel and produces more emissions than restarting your car's engine. The U.S. Department of Energy estimated that eliminating idling would be the same as taking 5 million vehicles off the roads.

As visible as this issue is, however, it's not a simple one to address for quick-service chains, says Michael Oshman, the CEO of the Green Restaurant Association. But it needs to start somewhere. And with that, you can look to electric vehicles and how officials and markets have incentivized adoption to date.

"You had people who literally didn't care too much about the environment who were buying electric cars because it could save them 50 percent on their commute," he says. "So that really changed behavior. Now, obviously going through the drive-thru is not as much of an incentive. But if you think about a society that shifts in the way that incentivizes right behavior, then enough of them together starts hastening the pace."

How can this mix into the drive-thru landscape, though?

Oshman says restaurants should consider offering an incentive for electric vehicles just like government officials do. "It will be one piece in a much larger pie that helps us move in the right direction as a society," he says. It could mean different things. Perhaps restaurants dangle a

discount. Down the line, if electric vehicles gain prevalence nationwide, when multiple lanes are factored into restaurant designs of the future, chains can create an "express" lane for "x, y, or z," customer, Oshman says. That could include loyalty members cashing in on a rewards perk. Or maybe it's someone helping the climate cause in an electric car.

Oshman admits these options fall into the large, macro conversation. "But they're helpful in the long-term," he says, "because if the [quick-service restaurant industry] does that, and the high-occupancy lane … all of sudden, for somebody in an electric vehicle there's a great incentive in terms of time and money."

Think this sounds fanciful? McDonald's, according to Design Boom, became Sweden's largest restaurant chain for electric car charging in 2019, with upward of 55 stations. The chain started installing posts as early as 2009. It also created unique parking signs to lead electric cars to the stations. These displays showed the current price of charging plus that of a Big Mac and Happy Meal.



FREEWIRE TECHNOLOGIES

Restaurants can own and operate chargers on site, which offers an additional revenue stream at minimal cost.

Arcady Sosinov, CEO of FreeWire Technologies, a company that enables brands to offer charging without relying heavily on the utility grid (it created what it claims is the only

battery-integrated fast-charging solution in the U.S.], says a big barrier for electric vehicles remains the concern of places to plug in. "Despite this challenge, EV adoption is accelerating, and there is a massive opportunity for [quick-service restaurants] to adopt and integrate EV charging into their business model," he says. "This benefits both the restaurant from a brand awareness and revenue driving standpoint while promoting sustainability initiatives and retaining customer loyalty in this changing mobility landscape."

Sosinov believes quick-serves are positioned to capitalize, if they think ahead. On average, people spend 25–30 minutes charging their car, he says. That's far longer than the typical gas-station stop of 7 minutes, and, thus, a good chance for people to wrap the experience around lunch or dinner windows.

Restaurants can own and operate chargers on site, he adds, which offers an additional revenue stream at minimal cost. They'll have the option to offer free charging to increase store visits, or collect additional revenue on the charging device itself.

To the McDonald's example, it's a chance to boost awareness with branded stations, and restaurants can encourage return visits with loyalty programs on both car charging and menu items. Imagine, while drivers are charging, screens on chargers that showcase special food promotions available inside.

Domestically, in a lot of respects, the drive-thru dilemma remains at the mercy of the automobile industry, consumer education, and even the further development of "stop-start" systems that shut off engines when the vehicle is at rest, which cuts fuel use and eliminates idle emissions.

Oshman says brands could promote order-ahead capabilities at the drive-thru or pickup window (think Chipotle) as ways to help the current environmental concern. Generally speaking, it's a far quicker experience and, thus, produces less idling moments. Oshman says restaurants might pass along some of those savings gained

via digital ordering or pickup windows (less labor, real estate in the restaurant) to guests in an active way.

"They can also make the argument we're incentivizing people to do this because a, it makes business sense and b, we can reduce idling by 90 percent because to come and pick something up, how long does that take?" he says.

Fifty-seven percent of consumers in QSR magazine's Drive-Thru Study said they were "very likely" to tap app/mobile ordering in the drive-thru over the next 12 months. That figure was 50 percent last year.

"I would say that's kind of a low-tech way, probably the best thing [restaurants] can do right now," Oshman adds. "I think the other idea of incentivizing electric vehicles and rewarding them is great, but again, that's a longer-term play. Whereas this one can be a few-months play of really giving great incentives. And in this day and age, almost everybody has smart phones and it's accessible."

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From: Diane Stites <dianestites@sbcglobal.net>
Sent: Tuesday, March 7, 2023 3:59 PM
To: Tori Ballif Gibbons
Subject: Fw: Parcel sizes in Gaslight Square ?

FYI

Diane

----- Forwarded Message -----
From: Madrigal-Gonzalez, Cecilia <ceciliamg@ci.brea.ca.us>
To: 'Diane Stites' <dianestites@sbcglobal.net>
Sent: Wednesday, February 1, 2023, 05:36:09 PM CST
Subject: RE: Parcel sizes in Gaslight Square ?

Hi Diane,

I've provided the information below corresponding to each Assessor's Parcel Number. I also provided a graphic to help with visualizing the parcels.

- 319-292-31 – 10,054 sq. ft.
- 319-292-36 – 27,185 sq. ft.
- 319-292-35 – 35,457 sq. ft.
- 319-292-33 – 9,442 sq. ft.
- **Total:** 82,138 sq. ft. or 1.88 acres.



Thank you,

CECILIA MADRIGAL-GONZALEZ

Associate Planner
Community Development Department | Planning Division

P: 714.990.7674 | **E:** ceciliamg@cityofbrea.net | **W:** www.cityofbrea.net
City of Brea | 1 Civic Center Circle | Brea, California 92821

From: Diane Stites <dianestites@sbcglobal.net>
Sent: Wednesday, February 1, 2023 2:26 PM
To: Madrigal-Gonzalez, Cecilia <ceciliamg@ci.brea.ca.us>
Subject: Parcel sizes in Gaslight Square ?

Hi Cecilia,

I hope you are having a fine day.

I thought I had this info but can't seem to find it. Could you pls help?

Could you please tell me what are the individual parcels that make up Gaslight Square and what are their individual sizes?

Thanks,

Diane

RESOLUTION NO. P.C. 88-56

A RESOLUTION OF THE PLANNING COMMISSION OF THE CITY OF BREA APPROVING CONDITIONAL USE PERMIT APPLICATION NO. C.U.P. 88-39, ZONE VARIANCE APPLICATIONS NOS. Z.V. 88-20 AND Z.V. 88-21, AND NEGATIVE DECLARATION NO. N.D. 88-12, SUBJECT TO CONDITIONS AS SET FORTH HEREIN.

A. Recitals.

(i) The Planning Commission of the City of Brea has heretofore held a duly noticed public hearing, as required by law, on Conditional Use Permit Application No. C.U.P. 88-39 and Zone Variance Applications Nos. Z.V. 88-20 and Z.V. 88-21, a request to construct four buildings totalling 16,859 square feet of retail and office with a Conditional Use Permit to have retail and commercial in excess of 25% in a CP Zone within the Brea Towne Plaza Specific Plan area and Zone Variances to reduce the required 50 foot driveway throat to 23 feet off of Orange Avenue and 34 feet off of Flower Avenue in accordance with Section 405(B) of the Brea Towne Plaza Specific Plan and Sections 304.030(2)(c)(2), 504 and 505 of the Brea Zoning Ordinance.

(ii) The property is located on the north side of Imperial Highway between Orange Avenue and Flower Avenue, legally described as a portion of Map Book 319, page 292, parcels 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 and 18, as shown in the latest rolls of the Orange County Tax Assessor.

(iii) The property is designated Specific Plan on the General Plan and is zoned BTPSP-CP, Brea Towne Plaza Specific Plan - Commercial, Administrative and Professional Office Zone.

(iv) All legal prerequisites to the adoption of this Resolution have occurred.

B. RESOLUTION. NOW, THEREFORE, BE IT FOUND, DETERMINED AND RESOLVED by the Planning Commission of the City of Brea, as follows:

1. In all respects as set forth in the recitals, Part A, of this Resolution.

2. The Planning Commission hereby finds that Negative Declaration No. N.D. 88-6 has been prepared in compliance with the California Environmental Quality Act of 1970, as amended, and the guidelines promulgated thereunder, and further, this Commission has reviewed and considered the information contained in said Negative Declaration No. N.D. 88-12, with respect to the project identified in this Resolution.

3. The Planning Commission hereby specifically finds and determines that, based upon the findings set forth below, and changes and alterations which have been incorporated into and conditioned upon the proposed project, no significant adverse environmental effects will occur.

4. The Planning Commission finds that facts supporting the above-specified findings are contained in the Negative Declaration, the staff report and exhibits, and the information provided to this Commission during the public hearing conducted with respect to the project and the Negative Declaration. Mitigation measures will be made a condition of approval of said project and are intended to mitigate and/or avoid environmental effects identified in the Negative Declaration.

5. It is hereby found that the use applied for at the location set forth in the application is authorized by Ordinance 808 and 805, the Brea Towne Plaza Specific Plan, as amended, as set forth in Section 405 (B).

6. It is further found that said use with conditions as imposed is desirable for the development of the community, is in harmony with the various elements and objectives of the General Plan and is not detrimental to existing uses or to uses specifically permitted in the zone in which the proposed uses are to be located.

7. It is found that the proposed site relates to streets and highways which are properly designed and shall be or are now improved to carry the type and volume of traffic generated by the proposed project.

8. It is found that with conditions stated herein, the uses will not adversely effect the public healty, safety or general welfare.

9. It is found that the site is adequate in size and shape to accommodate the proposed development and all of the yard setbacks, walls, fences and landscaping and other features required to bring the site into conformity with other elements of the neighborhood.

10. It is hereby found that there are exceptional and extraordinary circumstances applicable to the property involved which do not generally apply to other properties in the same vicinity and zone and that the granting of these variances will not constitute a privilege which is inconsistent with the limitations of other properties in the vicinity; to wit, the 50 foot driveway throat at the entry way at Flower AVenue and Orange Avenue required per Section 304 of the Zoning Ordinance would prohibit the reasonable development of the property. The strict application of the aforementioned requirements would create an undue hardship on the property owners.

11. It is found that the requests are necessary in that the strict and literal interpretation of the Zoning Ordinance with regard to the requirement that a 50 foot driveway throat be provided at each entrance would create an undue hardship inconsistent with the purpose and intent of the ordinance requirements. The intent of the ordinance rquirement is to provide adequate queing for vehicles exiting the site and to prevent conflicts with vehicles entering the site with vehicles backing up from parking stalls adjacent to the entrances. The intent of these requirements is met in that the traffic study performed indicates that a driveway throat depth of approximately 34 feet at the Flower Avenue entrance and a driveway throat depth of approximately 23 feet at the Orange Avenue entrance is adequate to prevent adverse vehicular ingress/egress movements.

12. The granting of this variance would not adversely effect the General Plan and would not be detrimental to the environment, public health or public welfare and would not be injurious to improvement of property in the same vicinity and zoning in which said property is located.

13. The property herein referred to and described is found to be suitable for the request, to wit, to relieve the applicant of the required 50 foot driveway throat at the Flower Avenue and Orange Avenue entrances.

14. Conditional Use Permit Application No. C.U.P. 88-39 and Zone Variance Applications Nos. Z.V. 88-20 and Z.V. 88-21 are hereby approved, subject to the listed conditions:

A. The development of the site shall occur in substantial conformance with plans submitted to the Planning Commission dated November 18, 1988, stamped Exhibit "A".

B. A final exterior lighting plan shall be submitted and shall be subject to the review and approval of the Planning Division and shall include the following:

1. Cut-off luminaires shall be installed which will provide true ninety degree cut-off and prevent projections of light above the horizontal from the lowest point of the lamp or light emitting refractor or device.

2. All fixtures shall use a flat clear lens energy efficient light source.

3. All project lighting shall be confined to the project site.

C. All ground-mounted utility and mechanical equipment shall be screened and sound buffered, subject to the review and approval of the Planning Division.

D. A final landscape and full-coverage automatic irrigation system shall be provided for review and approval by the Planning Division, prior to the issuance of building permits and installed prior to building occupancy. Tree staking, soil preparation and planting details shall be shown on the final landscape plan. Water conservation design and maintenance and drought tolerant landscape planning shall be incorporated wherever feasible into the final design of the landscape and irrigation plans for the site.

E. A minimum of six percent (6%) of the total off-street parking area, not including required setbacks, shall be landscaped with at leaset one (1) fifteen (15) gallon tree per three (3) parking stalls (which may be clustered or grouped) and appropriate ground cover. The parking lot trees shall be a species which will provide a canopy-style effect.

F. Trees shall be planted in areas of public view adjacentto and along side and rear building lines, at an equivalent of one (1) fifteen (15) gallon tree per twenty-five (25) linear feet of building which has public exposure.

G. The use of or a combination of berming, landscaping materials and walls not more than forty-two (42) inches in height shall be used to screen parking areas from public streets. All walls to be used for screening purposes shall be of solid masonry construction and ornamental in texture, pattern or shadow relief and shall be used in conjunction with foreground landscaping.

H. A solid wall not less than six (6) feet nor more than seven (7) feet in height shall be erected along the north property line, to within fifteen (15) feet of any street property line, subject to the review and approval of the Planning Division. The required wall shall be constructed of masonry material.

I. Loading areas visible from abutting streets shall be screened by a masonry wall not less than six (6) feet in height.

J. On-site directional signage shall be provided subject to the review and approval of the Development Services Director prior to building occupancy.

K. All roof-mounted equipment shall be screened by building parapet walls subject to the review and approval of the City Planner.

L. A sign program shall be required and subject to a separate Conditional Use Permit. The sign program shall be designed to comply with the design guidelines as established in the Brea Towne Plaza Specific Plan.

M. The trash enclosure design shall include a separtae pedestrian access and overhead trellis work.

N. Special landscape treatment, such as specimen size shade trees, freestanding potted plants, low level lighting, seating benches, etc. shall be provided to the plaza areas west of Building F and between Buildings D & E, subject to the review and approval of the Planning Division.

O. Dense landscaping shall be provided along the north property boundary to provide a buffer for the residents.

P. Special landscape treatment, such as increased number of trees, shrub massing, rockscape, etc. shall be provided along Flower Avenue, Orange Avenue and Imperial Highway.

Q. The following retail uses shall be prohibited:

1. Convenience stores
2. Video game facilities
3. Fast food and sit-down restaurants

R. The following retail/commercial uses may be allowed:

1. Convenience sales and services, including but not limited to pharmacy, florist, beauty supplies, cards & gifts, book or stationery stores.
2. Food and non-alcoholic beverages sales, including but not limited to candy, ice cream, yogurt, confectionary stores.
3. Personal services, including but not limited to photo studios, reducing salons, barber & beauty shops, tailors, dry cleaning.
4. Repair services, including but not limited to apparel, small instrument such as watches and clocks, jewely.
5. General retail.

S. The applicant shall provide an Art Monument in accordance with the City's Art in Public Places Program.

T. The applicant shall sign a notarized affidavit within ten (10) days after adoption of this resolution indicating an acceptance of all conditions of approval.

15. The Secretary to this Commission shall certify to the adoption of this Resolution.

ADOPTED AND APPROVED this 22nd day of November, 1988.

Chairman, Planning Commission

I, Roger Friesen, Secretary to the Planning Commission of the City of Brea, hereby certify that the foregoing resolution was introduced at a regular meeting of the Planning Commission of the City of Brea, held on the 22nd day of November, 1988, and was finally passed at a regular meeting of the Planning Commission of the City of Brea, held on the 22nd day of November, 1988, by the following votes:

AYES: COMMISSIONERS: CLAUSEN, DAUCHER, BEHOTEGUY, WOLFERT AND WETTLIN

NOES: COMMISSIONERS: NONE

ABSENT: COMMISSIONERS: NONE

ABSTAIN: COMMISSIONERS: NONE

ATTEST: Roger Friesen
Secretary, Planning Commission

nc15.42

Technical Appendix B2, Localized Significance Thresholds (LST) Model Results

14783-Brea Gaslight (Operational LSTs) Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	14783-Brea Gaslight (Operational LSTs)
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	1.80
Precipitation (days)	21.2
Location	33.91618627251319, -117.89859599419326
County	Orange
City	Brea
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5752
EDFZ	7
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
High Turnover (Sit Down Restaurant)	2.40	1000sqft	0.06	2,400	9,929	—	—	—
Fast Food Restaurant with Drive Thru	2.00	1000sqft	0.05	2,000	0.00	—	—	—

Strip Mall	3.60	1000sqft	0.08	3,600	0.00	—	—	—
Parking Lot	112	Space	0.44	0.00	0.00	—	—	—
Other Asphalt Surfaces	14.4	1000sqft	0.33	0.00	0.00	—	—	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

No measures selected

2. Emissions Summary

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	5.00	5.04	1.42	11.3	< 0.005	0.02	0.04	0.06	0.02	0.01	0.03	32.9	796	829	3.60	0.14	7.35	967
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.88	4.92	1.52	12.9	< 0.005	0.02	0.04	0.06	0.02	0.01	0.03	32.9	794	827	3.63	0.14	6.90	967
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	4.21	4.26	1.31	11.1	< 0.005	0.02	0.04	0.05	0.02	0.01	0.02	32.9	743	776	3.58	0.12	7.07	909
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.77	0.78	0.24	2.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	5.45	123	128	0.59	0.02	1.17	151

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.92	4.79	1.28	10.9	< 0.005	0.01	0.04	0.05	0.01	0.01	0.01	—	419	419	0.26	0.13	0.46	464
Area	0.06	0.24	< 0.005	0.35	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.43	1.43	< 0.005	< 0.005	—	1.44
Energy	0.02	0.01	0.14	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	365	365	0.03	< 0.005	—	366
Water	—	—	—	—	—	—	—	—	—	—	—	3.07	11.1	14.1	0.32	0.01	—	24.3
Waste	—	—	—	—	—	—	—	—	—	—	—	29.8	0.00	29.8	2.98	0.00	—	104
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.89	6.89
Total	5.00	5.04	1.42	11.3	< 0.005	0.02	0.04	0.06	0.02	0.01	0.03	32.9	796	829	3.60	0.14	7.35	967
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.87	4.72	1.38	12.8	< 0.005	0.01	0.04	0.05	0.01	0.01	0.01	—	418	418	0.29	0.13	0.01	466
Area	—	0.19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.02	0.01	0.14	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	365	365	0.03	< 0.005	—	366
Water	—	—	—	—	—	—	—	—	—	—	—	3.07	11.1	14.1	0.32	0.01	—	24.3
Waste	—	—	—	—	—	—	—	—	—	—	—	29.8	0.00	29.8	2.98	0.00	—	104
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.89	6.89
Total	4.88	4.92	1.52	12.9	< 0.005	0.02	0.04	0.06	0.02	0.01	0.03	32.9	794	827	3.63	0.14	6.90	967
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	4.15	4.03	1.17	10.7	< 0.005	0.01	0.04	0.04	0.01	0.01	0.01	—	366	366	0.25	0.11	0.18	406
Area	0.04	0.23	< 0.005	0.24	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.98	0.98	< 0.005	< 0.005	—	0.98
Energy	0.02	0.01	0.14	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	365	365	0.03	< 0.005	—	366
Water	—	—	—	—	—	—	—	—	—	—	—	3.07	11.1	14.1	0.32	0.01	—	24.3
Waste	—	—	—	—	—	—	—	—	—	—	—	29.8	0.00	29.8	2.98	0.00	—	104

Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.89	6.89
Total	4.21	4.26	1.31	11.1	< 0.005	0.02	0.04	0.05	0.02	0.01	0.02	32.9	743	776	3.58	0.12	7.07	909
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.76	0.73	0.21	1.95	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	60.6	60.6	0.04	0.02	0.03	67.3
Area	0.01	0.04	< 0.005	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.16	0.16	< 0.005	< 0.005	—	0.16
Energy	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	60.4	60.4	0.01	< 0.005	—	60.6
Water	—	—	—	—	—	—	—	—	—	—	—	0.51	1.83	2.34	0.05	< 0.005	—	4.02
Waste	—	—	—	—	—	—	—	—	—	—	—	4.94	0.00	4.94	0.49	0.00	—	17.3
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.14	1.14
Total	0.77	0.78	0.24	2.02	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	5.45	123	128	0.59	0.02	1.17	151

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	0.95	0.93	0.25	2.10	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	80.9	80.9	0.05	0.02	0.09	89.5
Fast Food Restaurant with Drive Thru	3.43	3.34	0.89	7.56	< 0.005	0.01	0.03	0.03	0.01	< 0.005	0.01	—	291	291	0.18	0.09	0.32	322

Strip Mall	0.54	0.53	0.14	1.21	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	47.1	47.1	0.03	0.01	0.05	52.0
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.92	4.79	1.28	10.9	< 0.005	0.01	0.04	0.05	0.01	0.01	0.01	—	419	419	0.26	0.13	0.46	464
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	0.94	0.91	0.27	2.47	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	80.8	80.8	0.06	0.03	< 0.005	89.9
Fast Food Restaurant with Drive Thru	3.39	3.29	0.96	8.88	< 0.005	0.01	0.03	0.03	0.01	< 0.005	0.01	—	291	291	0.21	0.09	0.01	324
Strip Mall	0.54	0.52	0.15	1.41	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	47.0	47.0	0.03	0.01	< 0.005	52.2
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	4.87	4.72	1.38	12.8	< 0.005	0.01	0.04	0.05	0.01	0.01	0.01	—	418	418	0.29	0.13	0.01	466
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	0.14	0.13	0.04	0.35	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	10.9	10.9	0.01	< 0.005	0.01	12.1
Fast Food Restaurant with Drive Thru	0.53	0.52	0.15	1.38	< 0.005	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	42.9	42.9	0.03	0.01	0.02	47.6

Strip Mall	0.09	0.08	0.02	0.22	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	6.84	6.84	< 0.005	< 0.005	< 0.005	7.59
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.76	0.73	0.21	1.95	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	—	60.6	60.6	0.04	0.02	0.03	67.3

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	—	79.4	79.4	0.01	< 0.005	—	79.8
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	—	66.2	66.2	0.01	< 0.005	—	66.5
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	33.8	33.8	< 0.005	< 0.005	—	34.0
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	195	195	0.02	< 0.005	—	196

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	—	79.4	79.4	0.01	< 0.005	—	79.8
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	—	66.2	66.2	0.01	< 0.005	—	66.5
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	33.8	33.8	< 0.005	< 0.005	—	34.0
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	16.0	16.0	< 0.005	< 0.005	—	16.1
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	195	195	0.02	< 0.005	—	196
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	—	13.1	13.1	< 0.005	< 0.005	—	13.2
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	—	11.0	11.0	< 0.005	< 0.005	—	11.0
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	5.59	5.59	< 0.005	< 0.005	—	5.62
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	—	2.66	2.66	< 0.005	< 0.005	—	2.67
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	32.3	32.3	< 0.005	< 0.005	—	32.5

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	0.01	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	88.6	88.6	0.01	< 0.005	—	88.8
Fast Food Restaurant with Drive Thru	0.01	< 0.005	0.06	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	73.8	73.8	0.01	< 0.005	—	74.0
Strip Mall	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.91	6.91	< 0.005	< 0.005	—	6.93
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.02	0.01	0.14	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	169	169	0.01	< 0.005	—	170
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	0.01	< 0.005	0.07	0.06	< 0.005	0.01	—	0.01	0.01	—	0.01	—	88.6	88.6	0.01	< 0.005	—	88.8
Fast Food Restaurant with Drive Thru	0.01	< 0.005	0.06	0.05	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	73.8	73.8	0.01	< 0.005	—	74.0

Strip Mall	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	6.91	6.91	< 0.005	< 0.005	—	6.93
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.02	0.01	0.14	0.12	< 0.005	0.01	—	0.01	0.01	—	0.01	—	169	169	0.01	< 0.005	—	170
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	14.7	14.7	< 0.005	< 0.005	—	14.7
Fast Food Restaurant with Drive Thru	< 0.005	< 0.005	0.01	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	12.2	12.2	< 0.005	< 0.005	—	12.3
Strip Mall	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.14	1.14	< 0.005	< 0.005	—	1.15
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	< 0.005	< 0.005	0.03	0.02	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	28.0	28.0	< 0.005	< 0.005	—	28.1

4.3. Area Emissions by Source

4.3.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Consum Products	—	0.17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.06	0.06	< 0.005	0.35	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.43	1.43	< 0.005	< 0.005	—	1.44
Total	0.06	0.24	< 0.005	0.35	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	1.43	1.43	< 0.005	< 0.005	—	1.44
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	0.19	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.03	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	< 0.005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.01	0.01	< 0.005	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.16	0.16	< 0.005	< 0.005	—	0.16
Total	0.01	0.04	< 0.005	0.04	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	—	0.16	0.16	< 0.005	< 0.005	—	0.16

4.4. Water Emissions by Land Use

4.4.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	1.40	5.39	6.78	0.14	< 0.005	—	11.4
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	1.16	3.95	5.11	0.12	< 0.005	—	8.96
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	0.51	1.73	2.24	0.05	< 0.005	—	3.94
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	3.07	11.1	14.1	0.32	0.01	—	24.3
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	1.40	5.39	6.78	0.14	< 0.005	—	11.4
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	1.16	3.95	5.11	0.12	< 0.005	—	8.96

Strip Mall	—	—	—	—	—	—	—	—	—	—	—	0.51	1.73	2.24	0.05	< 0.005	—	3.94
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	3.07	11.1	14.1	0.32	0.01	—	24.3
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	0.23	0.89	1.12	0.02	< 0.005	—	1.89
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	0.19	0.65	0.85	0.02	< 0.005	—	1.48
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	0.08	0.29	0.37	0.01	< 0.005	—	0.65
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	0.51	1.83	2.34	0.05	< 0.005	—	4.02

4.5. Waste Emissions by Land Use

4.5.2. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	15.4	0.00	15.4	1.54	0.00	—	53.9
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	12.4	0.00	12.4	1.24	0.00	—	43.4
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	2.04	0.00	2.04	0.20	0.00	—	7.13
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	29.8	0.00	29.8	2.98	0.00	—	104
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	15.4	0.00	15.4	1.54	0.00	—	53.9
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	12.4	0.00	12.4	1.24	0.00	—	43.4
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	2.04	0.00	2.04	0.20	0.00	—	7.13
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00

Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	29.8	0.00	29.8	2.98	0.00	—	104
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	2.55	0.00	2.55	0.25	0.00	—	8.92
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	2.06	0.00	2.06	0.21	0.00	—	7.19
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	0.34	0.00	0.34	0.03	0.00	—	1.18
Parking Lot	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Other Asphalt Surfaces	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	4.94	0.00	4.94	0.49	0.00	—	17.3

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.75	3.75
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.12	3.12
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.89	6.89
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.75	3.75
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3.12	3.12
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.02	0.02
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.89	6.89
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
High Turnover (Sit Down Restaurant)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.62	0.62
Fast Food Restaurant with Drive Thru	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.52	0.52
Strip Mall	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	< 0.005	< 0.005

Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.14	1.14

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
High Turnover (Sit Down Restaurant)	258	294	342	100,432	21.9	23.5	27.4	8,371
Fast Food Restaurant with Drive Thru	1,068	1,232	945	391,979	96.1	98.6	75.6	34,143
Strip Mall	196	151	73.5	62,826	16.7	12.9	6.25	5,340
Parking Lot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Asphalt Surfaces	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

0	0.00	12,000	4,000	2,015

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
High Turnover (Sit Down Restaurant)	83,113	349	0.0330	0.0040	276,316
Fast Food Restaurant with Drive Thru	69,261	349	0.0330	0.0040	230,263
Strip Mall	35,357	349	0.0330	0.0040	21,553
Parking Lot	16,790	349	0.0330	0.0040	0.00
Other Asphalt Surfaces	0.00	349	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
High Turnover (Sit Down Restaurant)	728,481	128,684
Fast Food Restaurant with Drive Thru	607,067	0.00
Strip Mall	266,661	0.00
Parking Lot	0.00	0.00

Other Asphalt Surfaces	0.00	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
High Turnover (Sit Down Restaurant)	28.6	0.00
Fast Food Restaurant with Drive Thru	23.0	0.00
Strip Mall	3.78	0.00
Parking Lot	0.00	0.00
Other Asphalt Surfaces	0.00	0.00

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
High Turnover (Sit Down Restaurant)	Household refrigerators and/or freezers	R-134a	1,430	0.00	0.60	0.00	1.00
High Turnover (Sit Down Restaurant)	Other commercial A/C and heat pumps	R-410A	2,088	1.80	4.00	4.00	18.0
High Turnover (Sit Down Restaurant)	Walk-in refrigerators and freezers	User Defined	150	< 0.005	7.50	7.50	20.0
Fast Food Restaurant with Drive Thru	Household refrigerators and/or freezers	R-134a	1,430	0.00	0.60	0.00	1.00
Fast Food Restaurant with Drive Thru	Other commercial A/C and heat pumps	R-410A	2,088	1.80	4.00	4.00	18.0
Fast Food Restaurant with Drive Thru	Walk-in refrigerators and freezers	User Defined	150	< 0.005	7.50	7.50	20.0
Strip Mall	Other commercial A/C and heat pumps	R-410A	2,088	< 0.005	4.00	4.00	18.0

Strip Mall	Stand-alone retail refrigerators and freezers	R-134a	1,430	0.04	1.00	0.00	1.00
Strip Mall	Walk-in refrigerators and freezers	User Defined	150	< 0.005	7.50	7.50	20.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type
—	—

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	12.3	annual days of extreme heat
Extreme Precipitation	5.15	annual days with precipitation above 20 mm
Sea Level Rise	0.00	meters of inundation depth
Wildfire	0.59	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider different increments of sea level rise coupled with extreme storm events. Users may select from four model simulations to view the range in potential inundation depth for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 50 meters (m) by 50 m, or about 164 feet (ft) by 164 ft.

Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	1	1	1	2
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A

Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	55.4
AQ-PM	83.0
AQ-DPM	86.8
Drinking Water	78.3
Lead Risk Housing	61.7
Pesticides	0.00
Toxic Releases	92.4
Traffic	92.4
Effect Indicators	—
CleanUp Sites	64.9
Groundwater	10.6
Haz Waste Facilities/Generators	94.8
Impaired Water Bodies	0.00
Solid Waste	81.2

Sensitive Population	—
Asthma	33.0
Cardio-vascular	52.6
Low Birth Weights	29.0
Socioeconomic Factor Indicators	—
Education	61.7
Housing	38.8
Linguistic	47.1
Poverty	32.0
Unemployment	65.6

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	74.90055178
Employed	92.3649429
Median HI	68.29205697
Education	—
Bachelor's or higher	59.54061337
High school enrollment	100
Preschool enrollment	57.19235211
Transportation	—
Auto Access	82.44578468
Active commuting	63.55703837
Social	—
2-parent households	71.91068908

Voting	45.3997177
Neighborhood	—
Alcohol availability	16.30950853
Park access	48.36391634
Retail density	98.38316438
Supermarket access	79.84088284
Tree canopy	24.93263185
Housing	—
Homeownership	33.20929039
Housing habitability	35.94251251
Low-inc homeowner severe housing cost burden	90.99191582
Low-inc renter severe housing cost burden	54.20248941
Uncrowded housing	49.60862312
Health Outcomes	—
Insured adults	60.5800077
Arthritis	0.0
Asthma ER Admissions	68.0
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	72.0
Cognitively Disabled	84.2
Physically Disabled	55.6
Heart Attack ER Admissions	53.4

Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	27.6
Elderly	67.6
English Speaking	54.0
Foreign-born	38.1
Outdoor Workers	64.1
Climate Change Adaptive Capacity	—
Impervious Surface Cover	27.3
Traffic Density	84.0
Traffic Access	87.4
Other Indices	—
Hardship	24.9
Other Decision Support	—
2016 Voting	73.1

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	67.0
Healthy Places Index Score for Project Location (b)	74.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Land Use	Taken from Site plan.
Construction: Construction Phases	Taken from Project Input File
Construction: Off-Road Equipment	T/L/B replaced with Crawler Tractor to accurately calculate disturbance for Site Preparation and Grading phases Standard 8-hour work days
Construction: Architectural Coatings	SCAQMD Rule 1113
Operations: Vehicle Data	Trip Characteristics based on information provided in the Traffic Analysis Pass-by trips accounted for
Operations: Architectural Coatings	SCAQMD Rule 1113

Operations: Refrigerants	As of 1 January 2022, new commercial refrigeration equipment may not use refrigerants with a GWP of 150 or greater. Further, R-404A (the CalEEMod default) is unacceptable for new supermarket and cold storage systems as of 1 January 2019 and 2023, respectively.

Technical Appendix H3, Traffic Study

URBAN | CROSSROADS

BREA GASLIGHT SQUARE (PLN 2022-00011)

TRAFFIC ANALYSIS

PREPARED BY: Charlene So, PE | cso@urbanxroads.com
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Reference Number	Agency	Date
14783-08A TA Report	City of Brea	April 5, 2023

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
ATP	Active Transportation Plan
CA MUTCD	California Manual on Uniform Traffic Control Devices
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
HCM	Highway Capacity Manual
ICU	Intersection Capacity Utilization
ITE	Institute of Transportation Engineers
LOS	Level of Service
MD	Mid-Day
NCHRP	National Cooperative Highway Research Program
OCTA	Orange County Transportation Authority
OPR	Office of Planning and Research
PHF	Peak Hour Factor
Project	Brea Gaslight Square
SHS	State Highway System
SR	State Route
TA	Traffic Analysis
TIA	Traffic Impact Analysis
TIF	Traffic Impact Fee
v/c	Volume to Capacity
VMT	Vehicle Miles Traveled
vphgpl	Vehicles per Hour Green per Lane

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1 INTRODUCTION

This report presents the results of the Traffic Analysis (TA) for Brea Gaslight Square ("Project"), which is located between Orange Avenue and Flower Avenue and north of Imperial Highway (State Route or SR-90) at 255 Imperial Highway (SR-90) in the City of Brea, as shown on Exhibit 1-1. The purpose of this TA is to evaluate the potential circulation system deficiencies that may result from the development of the proposed Project, and where necessary recommend improvements to achieve acceptable operations consistent with General Plan level of service goals and policies. This traffic study has been prepared in accordance with the City of Brea's Transportation Impact Analysis (TIA) Guidelines (September 2020, referred to as City Guidelines) and through consultation with City of Brea staff during the scoping process. (1) The Project traffic study scoping agreement is provided in Appendix 1.1 of this TA, which has been reviewed and approved by the City of Brea.

1.1 SUMMARY OF FINDINGS

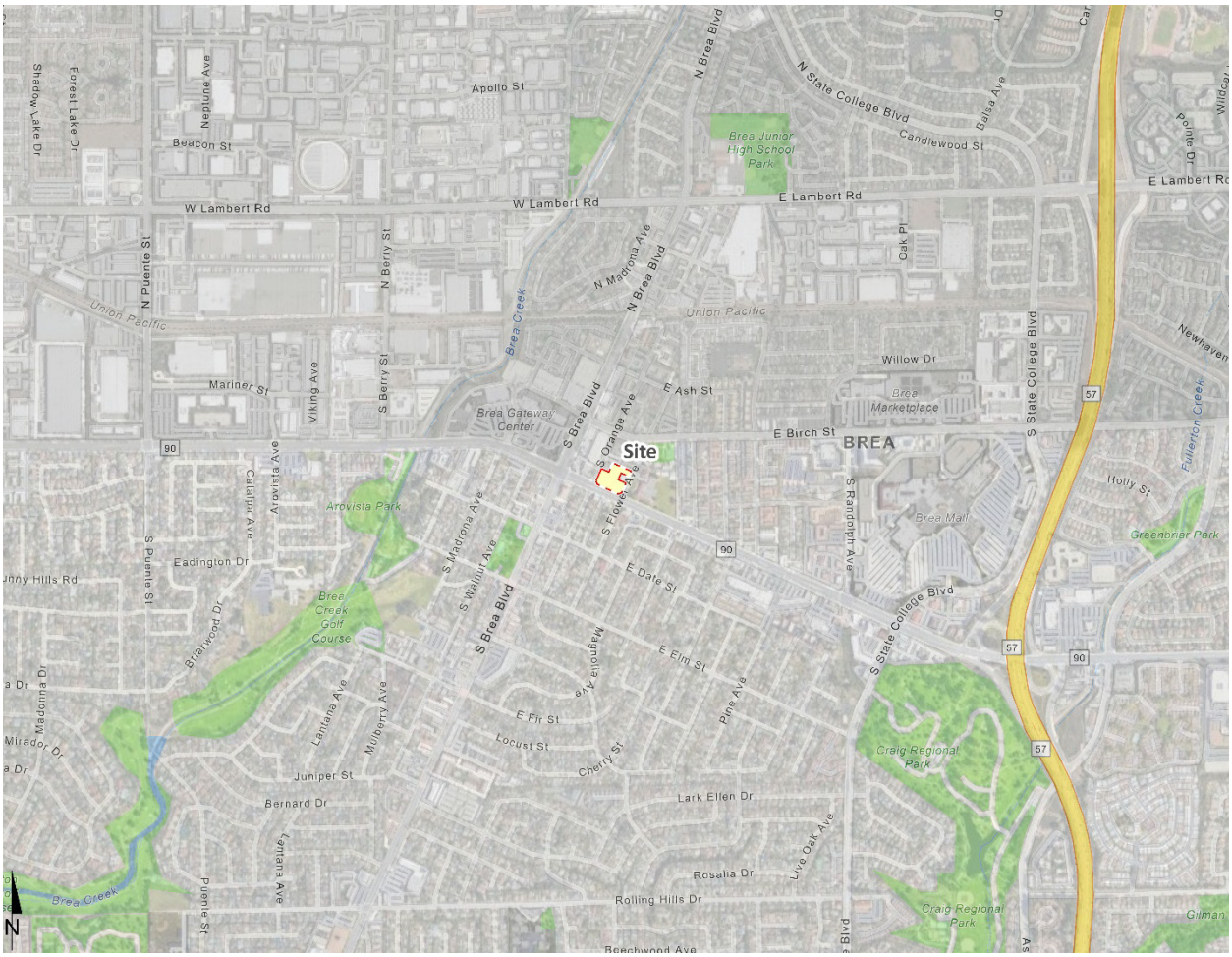
The Project is to construct the following improvements as design features in conjunction with development of the site:

- Project to maintain stop controls for egress traffic at all driveways on Orange Avenue and Flower Avenue. Access to all Project driveways will allow for full access.
- The Project frontage roadways of Orange Avenue, Imperial Highway (SR-90), and Flower Avenue are currently constructed to their ultimate General Plan roadway classification. As such, frontage improvements will be limited to sidewalk modifications to accommodate site access and landscaping improvements as required by City standards. In addition, the Project will make any improvements to driveways on Orange Avenue and Flower Avenue to meet City standards.

Intersection improvements are needed to address the cumulative LOS deficiencies identified for the Flower Avenue and Imperial Highway (SR-90) intersection under Opening Year Cumulative (2024) and General Plan Buildout traffic conditions as the addition of Project traffic would exceed the City's threshold for deficient intersections under pre-project conditions. As such, potential improvements to the intersection of Flower Avenue and Imperial Highway (SR-90) were evaluated to identify intersection enhancements needed to improve the peak hour operations back to acceptable levels of service or at a minimum better than pre-project conditions. The intersection of Flower Avenue at Imperial Highway (SR-90) has been evaluated with three potential improvements: signalization, closure of Flower Avenue north of Imperial Highway (SR-90) via a cul-de-sac, or restriction of the north leg of Flower Avenue to right-in/right-out access only (similar to the south leg). The results of each of these alternatives is discussed in Section 1.7.2 Off-site Recommendations of this report.

The addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) falls below the City's threshold. As such, no improvements were identified for the intersection of Brea Boulevard and Imperial Highway (SR-90) intersection.

EXHIBIT 1-1: LOCATION MAP



1.2 PROJECT OVERVIEW

The Project involves the redevelopment of approximately 0.95-acre of a 1.88-acre Project site (Exhibit 1-2). The site is currently occupied with six commercial/office buildings. The southern 0.95-acre portion of the Project site is proposed to be redeveloped with two proposed commercial buildings. As part of the Project, four of the existing commercial/office buildings would be demolished, including:

- Two 2,799 square foot office building fronting Orange Avenue
- One 3,166 square foot office building adjacent to Imperial Highway
- One two-story 10,109 square foot office/commercial building at the northwest corner of Flower Avenue and Imperial Highway

Two new commercial buildings would be constructed on-site in the proposed redevelopment area. A 6,000 SF commercial building is proposed at the northeast corner of South Orange Avenue and Imperial Highway, which would include a 2,400 SF sit-down restaurant and 3,600 SF of retail or medical office uses. In addition, an approximate 2,000 SF drive-through restaurant is proposed at the northwest corner of South Flower Avenue and Imperial Highway. Future tenants of the new, proposed buildings are unknown at this time. The existing site currently has access to Orange Avenue and Flower Avenue (both access points allow for full turning movements, with no access restrictions). Both access points will be maintained in their current location although it is anticipated the Project will reconstruct both driveways to meet the current City of Brea commercial driveway standards. The proposed Project is anticipated to have an opening year of 2024.

In order to develop the traffic characteristics of the proposed project, trip-generation statistics published in the Institute of Transportation Engineers (ITE) Trip Generation Manual (11th Edition, 2021). (2) The Project is anticipated to generate an increase of 510 vehicle trip-ends per day with 75 AM peak hour trips, 21 mid-day peak hour trips, and an increase of 46 PM peak hour trips in comparison to the existing uses. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 Project Trip Generation of this report.

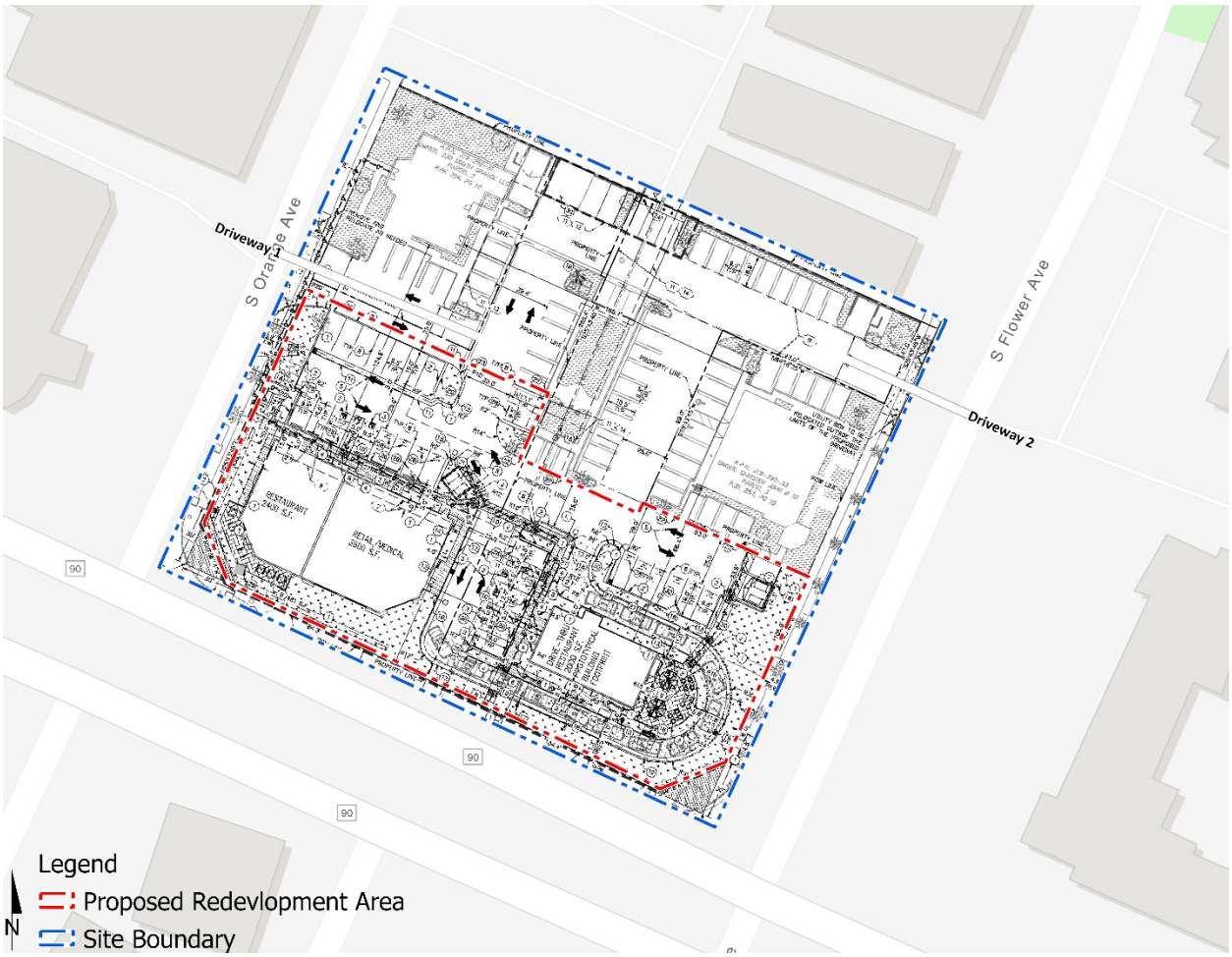
1.3 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential deficiencies to traffic and circulation have been assessed for each of the following conditions:

- Existing (2022) Conditions
- Opening Year Cumulative (2024) Without Project Conditions – Without and With the Closure of Flower Avenue
- Opening Year Cumulative (2024) With Project Conditions – Without and With the Closure of Flower Avenue
- General Plan Buildout Without Project Conditions – Without and With the Closure of Flower Avenue
- General Plan Buildout With Project Conditions – Without and With the Closure of Flower Avenue

Both the Opening Year Cumulative and General Plan Buildout analysis scenarios will be evaluated with the current roadway network as well as with the closure of Flower Avenue. The closure of Flower Avenue will be treated as an alternative and proposes a cul-de-sac at the southern end of Flower Avenue, just north of Imperial Highway (SR-90). As such, there would be no access to Imperial Highway (SR-90) from Flower Avenue to the north. The analysis scenarios have been labeled as "With Flower Connection" and "Without Flower Connection."

EXHIBIT 1-2: PRELIMINARY SITE PLAN



1.3.1 EXISTING (2022) CONDITIONS

Information for Existing (2022) conditions is disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.3.2 OPENING YEAR CUMULATIVE (2024) CONDITIONS

The Opening Year Cumulative (2024) traffic conditions analyses determine the potential near-term cumulative circulation system deficiencies. The roadway network is similar to Existing conditions except for new connections to be constructed by other known cumulative projects or the Project. However, Opening Year Cumulative conditions will be evaluated both With and Without Flower Connection. To account for background traffic growth, an ambient growth factor from Existing (2022) conditions of 2.01% (1 percent per year, compounded over 2 years) is included for Opening Year Cumulative (2024) traffic conditions.

Conservatively, this TA estimates the area ambient traffic growth and then adds traffic generated by other known or probable related projects. These related projects are at least in part already accounted for in the assumed ambient growth rates; and some of these related projects may not be implemented and operational within the 2024 Opening Year timeframe assumed for the Project. The resulting traffic growth utilized in the TA (ambient growth factor plus traffic generated by related projects) would therefore tend to overstate rather than understate background cumulative traffic deficiencies under 2024 conditions.

1.3.3 GENERAL PLAN BUILDOUT CONDITIONS

The General Plan Buildout traffic conditions analyses determine the potential long-range cumulative circulation system deficiencies. The roadway network is similar to Existing conditions except for new connections to be constructed by other known cumulative projects or the Project. However, General Plan Buildout conditions will be evaluated both With and Without Flower Connection. Traffic forecasts for General Plan Buildout traffic conditions for the intersection of Brea Boulevard and Imperial Highway (SR-90) have been generated from the Orange County Transportation Analysis Model (OCTAM). However, all other remaining study area intersections are not reflected in the traffic model. As such, the traffic volumes at all remaining study intersections have been determined by applying an ambient growth factor from Existing (2022) conditions of 17% for General Plan Buildout With Flower Connection conditions and 16% for General Plan Buildout Without Flower Connection conditions in conjunction with the traffic generated by other known or probable related projects. The Existing (2022) and General Plan Buildout Without Project volumes for Without Flower Connection conditions have also been adjusted to account for the closure of Flower Avenue. Additional volume development discussion is provided in Section 4.7.1 With Flower Connection and Section 4.7.2 Without Flower Connection.

The General Plan Buildout conditions analysis will be utilized to determine if improvements funded through regional transportation mitigation fee programs, such as the City's Traffic Impact Fee (TIF) program, can accommodate the long-range cumulative traffic at the target Level of Service (LOS) identified in the City of Brea (lead agency) General Plan. (3) Each of these transportation fee programs are discussed in more detail in Section 7 Local and Regional Funding Mechanisms.

1.4 STUDY AREA

To ensure that this TA satisfies the City of Brea's traffic study requirements, Urban Crossroads, Inc. prepared a Project traffic study scoping package for review by City of Brea staff prior to the preparation of this report. This agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The agreement approved by the City is included in Appendix 1.1 of this TA.

The 7 study area intersections shown on Exhibit 1-3 and listed in Table 1-1 were selected for evaluation in this TA based on consultation with City of Brea staff. The study area includes intersections where the Project is anticipated to contribute 25 or more peak hour trips per the City's Guidelines. (1) The "25 peak hour trip" criterion represents a minimum number of trips in an hour at which a typical intersection would have the potential to be substantively affected by a given development proposal.

The intent of a Congestion Management Program (CMP) is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related deficiencies, and improve air quality. The Orange County CMP became effective with the passage of Proposition 111 in 1990 and most recently updated in 2021. The Orange County Transportation Authority (OCTA) adopted the 2021 CMP for the County of Orange in November 2021. (4) The intersection of Brea Boulevard at Imperial Highway (SR-90) is identified as a CMP intersection.

1.5 DEFICIENCIES

This section provides a summary of deficiencies by analysis scenario. Section 2 Methodologies provides information on the methodologies used in the analysis and Section 3 Area Conditions, Section 5 Opening Year Cumulative (2024) Traffic Conditions, and Section 6 General Plan Buildout Traffic Conditions includes the detailed analyses. A summary of LOS results for all analysis scenarios are presented in Table 1-2 for With Flower Connection conditions. The summary of LOS results for all analysis scenarios Without Flower Connection is shown in Table 1-3.

1.5.1 EXISTING (2022) CONDITIONS

Intersection Operations

The study area intersections are currently operating at an acceptable LOS during the peak hours, with the exception of the following intersection:

- Flower Av. & Imperial Hwy. (SR-90) (#7) – LOS F AM, MD, and PM peak hours

Queues

The following movements currently experience queuing issues during one or more weekday peak hours under Existing (2022) traffic conditions:

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours

EXHIBIT 1-3: STUDY AREA

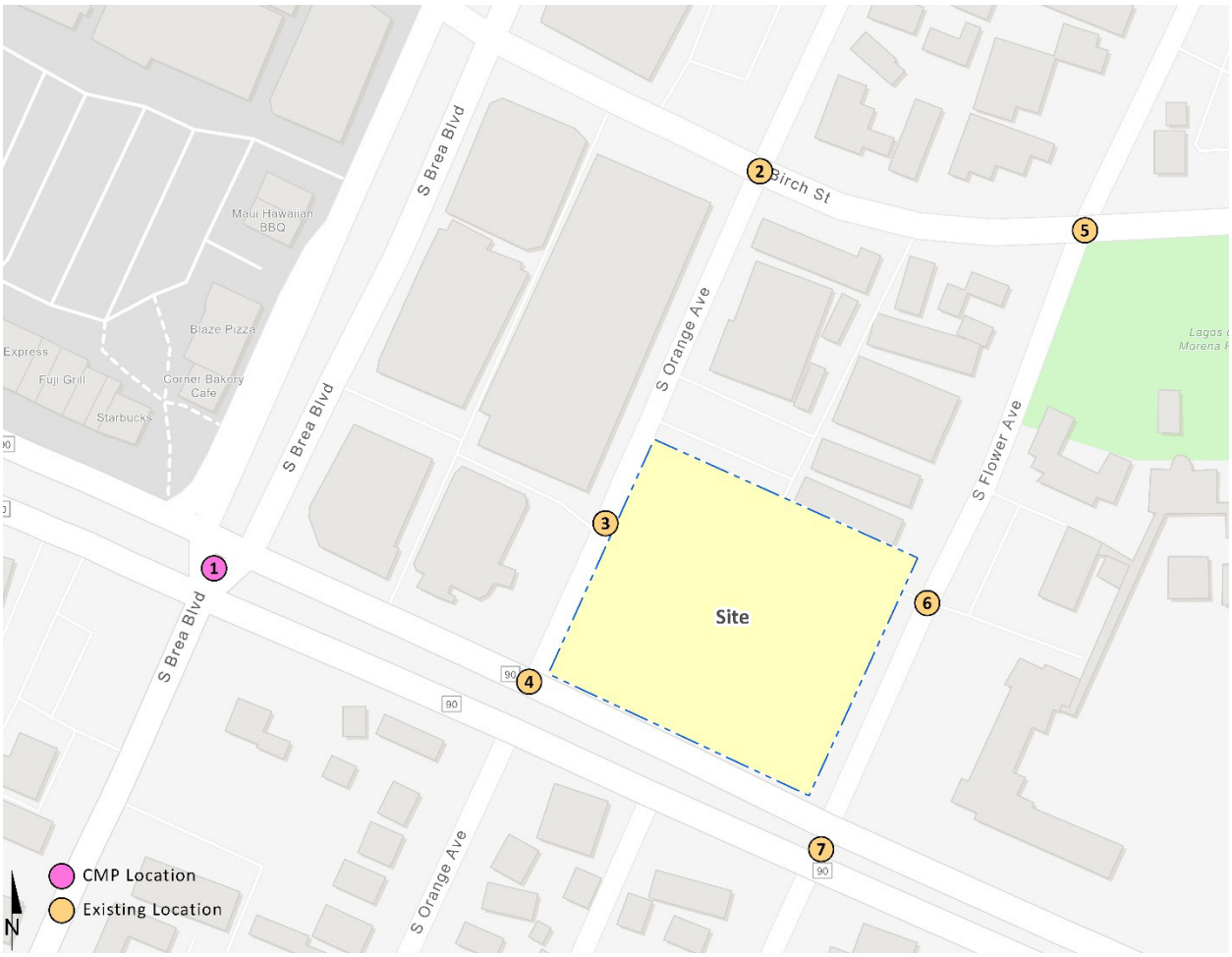


TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

#	Intersection	Jurisdiction	CMP?
1	Brea Bl. & Imperial Hwy. (SR-90)	Brea/Caltrans	Yes
2	Orange Av. & Birch St.	Brea	No
3	Orange Av. & Driveway 1	Brea	No
4	Orange Av. & Imperial Hwy. (SR-90)	Brea/Caltrans	No
5	Flower Av. & Birch St.	Brea	No
6	Flower Av. & Driveway 2	Brea	No
7	Flower Av. & Imperial Hwy. (SR-90)	Brea/Caltrans	No

TABLE 1-2: SUMMARY OF LOS – WITH FLOWER CONNECTION

#	Intersection	Existing (2022)			2024 Without Project			2024 With Project			GPBO Without Project			GPBO With Project		
		AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	E	F	E	E	F	E
2	Orange Av. & Birch St.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
3	Orange Av. & Driveway 1	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
4	Orange Av. & Imperial Hwy. (SR-90)	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
5	Flower Av. & Birch St.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
6	Flower Av. & Driveway 2	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
7	Flower Av. & Imperial Hwy. (SR-90)	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

A - D = A - D E = E F = F

TABLE 1-3: SUMMARY OF LOS – WITHOUT FLOWER CONNECTION

#	Intersection	Existing (2022)			2024 Without Project			2024 With Project			GPBO Without Project			GPBO With Project		
		AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	A - D	A - D	A - D	E	A - D	A - D	E	A - D	A - D	E	F	E	E	F	E
2	Orange Av. & Birch St.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
3	Orange Av. & Driveway 1	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
4	Orange Av. & Imperial Hwy. (SR-90)	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
5	Flower Av. & Birch St.	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
6	Flower Av. & Driveway 2	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D
7	Flower Av. & Imperial Hwy. (SR-90)	F	F	F	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D	A - D

A - D = A - D E = E F = F

1.5.2 OPENING YEAR CUMULATIVE (2024) CONDITIONS

Intersection Operations

Consistent with Existing traffic conditions, the following study area intersection is anticipated to continue to operate at an unacceptable LOS during the peak hours under Opening Year Cumulative (2024) Without Project traffic conditions With Flower Connection (see Table 1-2):

- Flower Av. & Imperial Hwy. (SR-90) (#7) – LOS F AM, MD, and PM peak hours

Without Flower Connection, the following study area intersection is anticipated to operate at an unacceptable LOS during the peak hours under Opening Year Cumulative (2024) Without Project traffic conditions (see Table 1-3):

- Brea Bl. & Imperial Hwy. (SR-90) (#1) – LOS E AM peak hour only

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic (for both With and Without Flower Connection), in addition to the locations identified for Opening Year Cumulative (2024) Without Project traffic conditions.

Queues

The following movements are anticipated to experience queuing issues during the weekday AM, MD, and PM peak 95th percentile traffic flows under Opening Year Cumulative (2024) Without Project With Flower Connection traffic conditions (* includes Project driveways evaluated in Section 1.6 Queuing Analysis):

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, MD and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD, and PM peak hours
- Orange Av. & Driveway 1 (#3) – southbound left-through turn lane, PM peak hour only *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – southbound right turn lane, PM peak hour only *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – westbound through-right turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – southbound left turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – southbound right turn lane, PM peak hour only *

The following movements are anticipated to experience queuing issues during the weekday AM, MD, and PM peak 95th percentile traffic flows under Opening Year Cumulative (2024) Without Project Without Flower Connection traffic conditions:

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD, and PM peak hours
- Flower Av. & Birch St. (#5) – northbound left-through-right turn lane, AM and MD peak hours

There are no additional study area intersections or movements anticipated to experience queuing issues during the peak hours with the addition of Project traffic (for both With and Without Flower Connection), in addition to the movements identified for Opening Year Cumulative (2024) Without Project traffic conditions.

1.5.3 GENERAL PLAN BUILDOUT CONDITIONS

Intersection Operations

The following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours under General Plan Buildout Without Project traffic conditions With Flower Connection (see Table 1-2):

- Brea Bl. & Imperial Hwy. (SR-90) (#1) – LOS E AM and PM peak hours, LOS F MD peak hour only
- Flower Av. & Imperial Hwy. (SR-90) (#7) – LOS F AM, MD, and PM peak hours

Without Flower Connection, the following study area intersection is anticipated to operate at an unacceptable LOS during the peak hours under General Plan Buildout Without Project traffic conditions (see Table 1-3):

- Brea Bl. & Imperial Hwy. (SR-90) (#1) – LOS E AM and PM peak hours, LOS F MD peak hour only

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic (for both With and Without Flower Connection), in addition to the locations identified for General Plan Buildout Without Project traffic conditions.

Queues

The following movements are anticipated to experience queuing issues during the weekday MD or PM peak 95th percentile traffic flows under General Plan Buildout Without Project traffic conditions With Flower Connection (* includes Project driveways evaluated in Section 1.6 Queuing Analysis):

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – southbound left turn lane, MD peak hour only
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, MD and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD, and PM peak hours
- Orange Av. & Driveway 1 (#3) – southbound left-through turn lane, MD and PM peak hours *
- Orange Av. & Driveway 1 (#3) – westbound left-right lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – southbound right turn lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – westbound through-right turn lane, MD and PM peak hours *
- Flower Av. & Driveway 2 (#6) – southbound through-right turn lane, PM peak hour only *
- Flower Av. & Driveway 2 (#6) – eastbound left-right turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – southbound left turn lane, AM, MD, and PM peak hours *
- Flower Av. & Imperial Hwy. (#7) – southbound right turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – eastbound left turn lane, AM peak hour only
- Flower Av. & Imperial Hwy. (#7) – westbound through-right turn lane, PM peak hour only *

The following movements are anticipated to experience queuing issues during the weekday MD or PM peak 95th percentile traffic flows under General Plan Buildout Without Project traffic conditions Without Flower Connection (* includes Project driveways evaluated in Section 1.6 Queuing Analysis):

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – southbound left turn lane, MD peak hour only
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD and PM peak hours
- Orange Av. & Driveway 1 (#3) – southbound left-through turn lane, MD and PM peak hours *
- Orange Av. & Driveway 1 (#3) – westbound left-right lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – southbound right turn lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – westbound through-right turn lane, MD and PM peak hours *

- Flower Av. & Birch St. (#5) – northbound left-through-right turn lane, AM and MD peak hours
- Flower Av. & Birch St. (#5) – westbound left turn lane, AM and MD peak hours

There are no additional study area intersections or movements anticipated to experience queuing issues during the peak hours with the addition of Project traffic (for both With and Without Flower Connection), in addition to the movements identified for General Plan Buildout Without Project traffic conditions, with the exception of the following:

- Flower Av. & Imperial Hwy. (#7) – southbound left turn lane, MD peak hour only under General Plan Buildout Without Flower Connection traffic conditions

1.6 SITE ADJACENT QUEUING ANALYSIS

A queuing analysis has been performed for the Project driveways on Orange Avenue and Flower Avenue as well as the intersections of Orange Avenue and Flower Avenue along Imperial Highway (SR-90) under Opening Year Cumulative (2024) and General Plan Buildout With Project traffic conditions. The traffic modeling and signal timing optimization software package SimTraffic has been utilized to assess the queues. SimTraffic is designed to model networks of signalized and unsignalized intersections, with the primary purpose of checking and fine-tuning signal operations. SimTraffic uses the input parameters from Synchro to generate random simulations. These random simulations generated by SimTraffic have been utilized to determine the 95th percentile queue lengths observed for each applicable turn lane. The SimTraffic simulation has been recorded 5 times, during the weekday AM, MD, and PM peak hours, and has been seeded for 15-minute periods with 60-minute recording intervals. Queuing analysis worksheets for the weekday AM, MD, and PM peak hours are provided in Appendix 1.2 of this report for both Opening Year Cumulative (2024) and General Plan Buildout With Project traffic conditions (no improvements are assumed and evaluate the existing lanes and traffic controls).

No site adjacent queues are anticipated under Opening Year Cumulative (2024) traffic conditions (see Table 1-4), with the exception of the weekday PM peak hour where queues are anticipated in the southbound directions along Orange Avenue and Flower Avenue because cars are not able to turn onto westbound Imperial Highway (SR-90). The queue along Orange Avenue is anticipated to spillback onto Birch Street, while the queue along Flower Avenue is anticipated to spillback to Driveway 2 (causing a blockage). Although not identified in Table 1-4, the queues in the southbound directions on both Orange Avenue and Flower Avenue could potentially lead to queuing and circulation issues on-site at Driveway 1 and Driveway 2.

TABLE 1-4: PEAK HOUR QUEUING SUMMARY FOR OPENING YEAR CUMULATIVE (2024) CONDITIONS – WITH FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)			Acceptable? [1]		
				AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
3	Orange Av. & Driveway 1	NBT/R	120	0	0	0	Yes	Yes	Yes
		SBL/T	360	56	34	**415**	Yes	Yes	**No**
		WBL/R	100	18	56	98	Yes	Yes	Yes
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	58	48	50	Yes	Yes	Yes
		SBR	120	72	117	**158**	Yes	Yes	**No**
		EBT/R	260	38	6	13	Yes	Yes	Yes
		WBT/R	320	56	149	**407**	Yes	Yes	**No**
6	Flower Av. & Driveway 2	NBL/T	230	50	12	19	Yes	Yes	Yes
		SBT/R	360	13	0	327	Yes	Yes	Yes
		EBL/R	85	56	33	78	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	24	15	33	Yes	Yes	Yes
		SBL	100	70	53	**117**	Yes	Yes	**No**
		SBR	230	66	69	**235**	Yes	Yes	**No**
		EBL	125	114	66	82	Yes	Yes	Yes
		EBT/R	320	8	9	6	Yes	Yes	Yes
		WBT/R	610	30	12	522	Yes	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

Increasing volumes along Imperial Highway (SR-90) under General Plan Buildout traffic conditions is anticipated to result in queues along Imperial Highway (SR-90) in the westbound direction from Brea Boulevard back to east of Flower Avenue (see Table 1-5). Due to the heavy volume along Imperial Highway (SR-90), vehicles waiting on side streets like Orange Avenue and Flower Avenue are anticipated to experience longer delays and queues. These queues in the southbound directions on both Orange Avenue and Flower Avenue are anticipated to spill back onto Birch Street and could affect the ability of vehicles trying to exit the Project (or from other uses via private driveways along these streets). The peak hour queues are anticipated in the southbound left turn lane at Flower Avenue in the AM peak hour, the southbound direction on Orange Avenue north of Imperial Highway (SR-90) during the MD peak hour, and the southbound directions along both Orange Avenue and Flower Avenue during the PM peak hour (which would spill back onto Birch Street).

There is also a queue anticipated in the eastbound left turn pocket on Imperial Highway (SR-90) at Flower Avenue during the AM peak hour only.

TABLE 1-5: PEAK HOUR QUEUING SUMMARY FOR GENERAL PLAN BUILDOUT CONDITIONS – WITH FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)			Acceptable? [1]		
				AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
3	Orange Av. & Driveway 1	NBT/R	120	0	0	0	Yes	Yes	Yes
		SBL/T	360	16	**484**	**469**	Yes	**No**	**No**
		WBL/R	100	57	**124**	**101**	Yes	**No**	**No**
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	56	51	63	Yes	Yes	Yes
		SBR	120	83	**155**	**127**	Yes	**No**	**No**
		EBT/R	260	51	0	51	Yes	Yes	Yes
		WBT/R	320	164	**398**	**351**	Yes	**No**	**No**
6	Flower Av. & Driveway 2	NBL/T	230	81	16	57	Yes	Yes	Yes
		SBT/R	360	150	71	**506**	Yes	Yes	**No**
		EBL/R	85	66	38	**108**	Yes	Yes	**No**
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	23	24	27	Yes	Yes	Yes
		SBL	100	**168**	102	**119**	**No**	Yes	**No**
		SBR	230	154	213	**276**	Yes	Yes	**No**
		EBL	125	**164**	98	86	**No**	Yes	Yes
		EBT/R	320	186	9	8	Yes	Yes	Yes
		WBT/R	610	148	458	**781**	Yes	Yes	**No**

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

The installation of a traffic signal at the intersection of Flower Avenue at Imperial Highway (SR-90) is anticipated to improve the peak hour queues (see Table 1-6). However, there is still queuing anticipated in the westbound direction along Imperial Highway (SR-90) during the MD and PM peak hours that could affect the southbound queues along Orange Avenue and Flower Avenue. In addition, there is also a queuing issue anticipated for the eastbound left turn pocket on Imperial Highway (SR-90) at Flower Avenue during the AM peak hour only.

TABLE 1-6: PEAK HOUR QUEUING SUMMARY FOR GENERAL PLAN BUILDOUT CONDITIONS – WITH PROPOSED SIGNAL

#	Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)			Acceptable? [1]		
				AM Peak Hour	MD Peak Hour	PM Peak Hour	AM	MD	PM
3	Orange Av. & Driveway 1	NBT/R	120	8	0	0	Yes	Yes	Yes
		SBL/T	360	32	332	213	Yes	Yes	Yes
		WBL/R	100	62	**116**	**115**	Yes	**No**	**No**
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	67	57	49	Yes	Yes	Yes
		SBR	120	104	**165**	**163**	Yes	**No**	**No**
		EBT/R	260	29	0	0	Yes	Yes	Yes
		WBT/R	320	242	**394**	**387**	Yes	**No**	**No**
6	Flower Av. & Driveway 2	NBL/T	230	59	35	36	Yes	Yes	Yes
		SBT/R	360	18	0	0	Yes	Yes	Yes
		EBL/R	85	50	29	39	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	20	23	25	Yes	Yes	Yes
		SBL	100	45	53	51	Yes	Yes	Yes
		SBR	230	80	101	87	Yes	Yes	Yes
		EBL	125	**158**	100	104	**No**	Yes	Yes
		EBT/R	320	181	181	147	Yes	Yes	Yes
		WBT/R	610	467	**676** [2]	**727** [2]	Yes	**No**	**No**

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] The lane with the highest queue is reported. Other adjacent lane(s) in the same direction have capacity.

The implementation of a right-in/right-out access only at the intersection of Flower Avenue at Imperial Highway (SR-90) is anticipated to improve the peak hour queues (see Table 1-7). However, there is still queuing anticipated in the southbound directions on Orange Avenue as well as the westbound direction along Imperial Highway (SR-90) during the MD and PM peak hours that could affect the ability of vehicles existing from the Project (or other existing uses fronting Orange Avenue).

TABLE 1-7: PEAK HOUR QUEUING SUMMARY FOR GENERAL PLAN BUILDOUT CONDITIONS – WITH RIGHT-IN/RIGHT-OUT AT FLOWER AND IMPERIAL

#	Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM
3	Orange Av. & Driveway 1	NBT/R	120	5	4	0	Yes	Yes	Yes
		SBL/T	360	17	**497**	**477**	Yes	**No**	**No**
		WBL/R	100	60	**117**	**118**	Yes	**No**	**No**
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	60	53	54	Yes	Yes	Yes
		SBR	120	84	**150**	**131**	Yes	**No**	**No**
		EBT/R	260	0	38	42	Yes	Yes	Yes
		WBT/R	320	172	**399**	**418**	Yes	**No**	**No**
6	Flower Av. & Driveway 2	NBL/T	230	35	7	11	Yes	Yes	Yes
		SBT/R	360	12	254	283	Yes	Yes	Yes
		EBL/R	85	50	17	63	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	23	16	26	Yes	Yes	Yes
		SBR	230	75	232	**273**	Yes	Yes	**No**
		EBT/R	320	0	11	0	Yes	Yes	Yes
		WBT/R	610	103	458	**695** [2]	Yes	Yes	**No**

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] The lane with the highest queue is reported. Other adjacent lane(s) in the same direction have capacity.

Lastly, the same southbound and westbound queues are affected along Orange Avenue between Driveway 1 and Imperial Highway (SR-90) during the MD and PM peak hours Without Flower Connection (see Table 1-8). These queues are comparable to those observed in Table 1-6 with the proposed signalization of Flower Avenue at Imperial Highway (SR-90) but without the queuing deficiencies at the intersection of Flower Avenue at Imperial Highway (SR-90).

TABLE 1-8: PEAK HOUR QUEUING SUMMARY FOR GENERAL PLAN BUILDOUT CONDITIONS – WITHOUT FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM
3	Orange Av. & Driveway 1	NBT/R	120	0	3	0	Yes	Yes	Yes
		SBL/T	360	28	**429**	**501**	Yes	**No**	**No**
		WBL/R	100	54	**117**	**118**	Yes	**No**	**No**
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	63	54	55	Yes	Yes	Yes
		SBR	120	70	**161**	**153**	Yes	**No**	**No**
		EBT/R	260	0	39	66	Yes	Yes	Yes
		WBT/R	320	57	**365**	**417**	Yes	**No**	**No**
6	Flower Av. & Driveway 2	NBL/T	230	0	0	0	Yes	Yes	Yes
		SBT/R	360	18	0	0	Yes	Yes	Yes
		EBL/R	85	50	19	39	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	28	19	28	Yes	Yes	Yes
		EBT/R	320	0	8	9	Yes	Yes	Yes
		WBT	610	0	159	517	Yes	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

The peak hour queues for the southbound approach, eastbound left and westbound through movements at the intersection of Flower Avenue at Imperial Highway (SR-90) can all or partially be improved through the implementation of a traffic signal, restriction of access to right-in/right-out only, or full closure of the northern leg. However, the proposed improvements to Flower Avenue at Imperial Highway (SR-90) are not anticipated to resolve the anticipated General Plan Buildout peak hour queues in the westbound and southbound directions along Orange Avenue at Imperial Highway (SR-90), the Project driveway, or Birch Street. As traffic along Imperial Highway (SR-90) increases, particularly in the westbound direction, it is likely that drivers will use alternative routes or change their travel patterns during the peak hours in order to avoid congestion and high delays in the southbound direction on both Flower Avenue and Orange Avenue.

1.7 RECOMMENDATIONS

1.7.1 SITE ADJACENT AND SITE ACCESS RECOMMENDATIONS

The following recommendations are based on the minimum improvements needed to accommodate site access and maintain acceptable peak hour operations for the proposed Project. The driveway intersection recommendations are shown on Exhibit 1-9 and roadway improvements are summarized below. The Project shall maintain stop controls for egress traffic at all driveways on Orange Avenue and Flower Avenue. See discussion in Section 1.6 Queuing Analysis related to the future recommendations at Orange Avenue and Flower Avenue on Imperial Highway (SR-90) in order to address potential queuing issues during the peak hours.

The Project frontage roadways of Orange Avenue, Imperial Highway (SR-90), and Flower Avenue are currently constructed to their ultimate General Plan roadway classification. As such, frontage improvements will be limited to sidewalk modifications to accommodate site access and landscaping improvements as required by City standards. In addition, the Project will make any improvements to driveways on Orange Avenue and Flower Avenue to meet City standards.

Wherever necessary, roadways adjacent to the Project, site access points and site-adjacent intersections will be constructed to be consistent with the identified roadway classifications and respective cross-sections in the City of Brea General Plan Circulation Element.

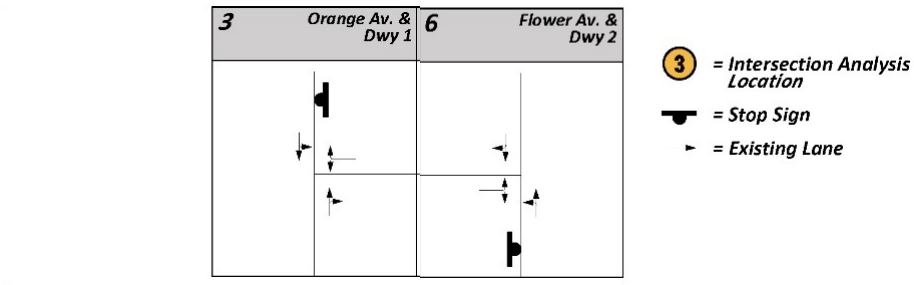
On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

1.7.2 OFF-SITE RECOMMENDATIONS

The improvements needed to address the cumulative LOS deficiencies identified for the Flower Avenue and Imperial Highway (SR-90) intersection under Opening Year Cumulative (2024) and General Plan Buildout traffic conditions are shown in Table 1-9 for With Flower Connection conditions only. Since the addition of Project traffic would exceed the City's threshold for deficient intersections under pre-project conditions, potential improvements for the deficiency at only the Flower Avenue and Imperial Highway (SR-90) intersection were evaluated and are shown in Table 1-9. Intersection enhancements are necessary to improve the peak hour intersection operations back to acceptable LOS. The Project Applicant would also be required to pay TIF fees consistent with the City's requirements (see Section 7 Local and Regional Funding Mechanisms). Three alternative improvements have been considered and evaluated for the intersection of Flower Avenue at Imperial Highway (SR-90): signalization, restriction of the north leg of Flower Avenue to right-in/right-out access only (similar to the south leg), or closure of Flower Avenue north of Imperial Highway (SR-90) via a cul-de-sac.

EXHIBIT 1-4: SITE ACCESS RECOMMENDATIONS





* See Section 1.7 regarding improvement options for both Orange Avenue and Flower Avenue on Imperial Highway (SR-90) (Intersection #4 and Intersection #7).

TABLE 1-9: SUMMARY OF INTERSECTION IMPROVEMENTS – WITH FLOWER CONNECTION

#	Intersection Location	Jurisdiction	Analysis Scenarios		Improvements included in Fee Program?
			2024 With Project	GPBO With Project	
4	Orange Av. & Imperial Hwy. (SR-90)	Brea	See Footnote[3]	--	No
7	Flower Av. & Imperial Hwy. (SR-90)	Brea	Install a traffic signal[4]	Same	No
			Restrict north leg to right-in/right-out only[5]	Same	No
			Close connection to the north of Imperial Hwy.[6]	Same	No

Note: Imperial Highway (SR-90) is a Caltrans facility, and all improvements along Imperial Highway (SR-90) should be coordinated with Caltrans.

[1] Identifies the Project's responsibility to construct an improvement or contribute fair share or fee payment towards the implementation of the improvements shown. If identified as a Project construct obligation, then no fair share percentage has been identified.

[2] Program improvements constructed may be eligible for fee credit, at discretion of City. See Table 7-1 for Fair Share Calculations.

[3] As traffic along Imperial Highway (SR-90) increase, it is likely that drivers will use alternative routes or change their travel patterns during the peak hours in order to avoid congestion and high delays in the southbound direction on Orange Avenue . An option to close off both Orange Avenue and Flower Avenue is not under consideration by the City.

[4] Alternative improvements to signalization would be to restrict access to right-in/right-out only for the north leg or close off Flower Avenue to the north of Imperial Highway.

[5] Restricting access to right-in/right-out only for the north leg is an alternative improvement to signalization.

[6] Although a signal would address the LOS deficiency, a queuing issue is anticipated during the peak hours along Imperial Highway (SR-90) and Flower Avenue. As traffic along Imperial Highway (SR-90) increase, it is likely that drivers will use alternative routes or change their travel patterns during the peak hours in order to avoid congestion and high delays in the southbound direction on Flower Avenue . Based on the analysis conducted, Flower Avenue at Imperial Highway (SR-90) would need to be closed in order to improve and eliminate peak hour queues along westbound Imperial Highway (SR-90) and southbound Flower Avenue (see Table 1-9).

The addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) under Without Flower Connection conditions falls below the City's threshold. As such, no improvements were identified for Without Flower Connection traffic conditions for the intersection of Brea Boulevard and Imperial Highway (SR-90) intersection.

Alternative 1: Signalization of Flower Avenue at Imperial Highway (SR-90)

The first alternative considered and evaluated assumes the intersection of Flower Avenue at Imperial Highway (SR-90) would maintain its current access but would be improved to signalize the intersection (right-in/right-out for the southern leg and full access for the northern leg of Flower Avenue). Based on peak hour volumes, the intersection is anticipated to meet a peak hour volume-based traffic signal warrant under Opening Year Cumulative (2024) With Project traffic conditions. With the installation of a signal at this location, the intersection is anticipated to operate at LOS A or B under both Opening Year Cumulative and General Plan Buildout With Project traffic conditions (see Table 5-5 and Table 6-5).

The installation of a traffic signal at the intersection of Flower Avenue at Imperial Highway (SR-90) is anticipated to improve the peak hour queues from the pre-project conditions; however, there is still queuing anticipated in the westbound direction along Imperial Highway (SR-90) during the MD and PM peak hours that could affect the southbound queues along Orange Avenue and Flower Avenue (see Table 1-6). In addition, there is also a queuing issue anticipated for the eastbound left turn pocket on Imperial Highway (SR-90) at Flower Avenue during the AM peak hour only. The eastbound left turn queue at Flower Avenue could be accommodated by increasing the storage length by modifying the existing median. However, there are queuing issues anticipated for the westbound left turn lanes at the intersection of Brea Boulevard and Imperial Highway (SR-90) during the MD and PM peak hours which could not be accommodated if there are improvements made to address the eastbound left turn queue at Flower Avenue. Southbound queues along Orange Avenue towards Imperial Highway (SR-90) would also affect the westbound movement at the Project driveway on Orange Avenue and would lead to on-site queuing/circulation issues. It should be noted that the addition of Project traffic has a nominal effect on the peak hour queuing results at the off-site study area intersections, such as intersections of Brea Boulevard at Imperial Highway (SR-90) and the intersections along Birch Street.

Although the intersection of Flower Avenue at Imperial Highway (SR-90) meets the peak hour volume-based warrant, additional warrants should be evaluated to determine if other warrants are met (such as the warrants based on 4-hour volumes, 8-hour volumes, collision history, pedestrian volume, etc.). Additional evaluation may also be necessary to determine the effects signalization has on existing school pedestrian traffic and pick-up/drop-off vehicular traffic flows for the adjacent Laurel Elementary School.

Alternative 2: Right-in/Right-out at Flower Avenue and Imperial Highway (SR-90)

The second alternative considered and evaluated assumes the intersection of Flower Avenue at Imperial Highway (SR-90) would maintain its current access for the southern leg but also assumes modifications to the existing median needed to restrict the northern leg also to right-in/right-out access only. Restriping would also need to occur on the north leg of Flower Avenue in order to eliminate the existing southbound left turn lane. With the access restriction for the north leg, the intersection is anticipated to continue to operate at LOS E or F under Opening Year Cumulative and General Plan Buildout With Project traffic conditions but with improved delays from the without improvement conditions (see Table 5-5 and Table 6-5).

The right-in/right-out access restriction to the north leg of Flower Avenue at Imperial Highway (SR-90) is anticipated to improve the peak hour queues from the pre-project conditions; however, there is still queuing anticipated in the westbound direction along Imperial Highway (SR-90) during the MD and PM peak hours that could affect the southbound queues along Orange Avenue and Flower Avenue (see Table 1-7). The only queuing issue eliminated with the access restriction from the signalized or full access alternative is the eastbound left turn queue at Flower Avenue and Imperial Highway (SR-90) since it would no longer be applicable. Southbound queues along Orange Avenue towards Imperial Highway (SR-90) would also affect the westbound movement at the Project driveway on Orange Avenue and would lead to on-site queuing/circulation issues.

The right-in/right-out access restriction for the northern leg of Flower Avenue at Imperial Highway (SR-90) would alter the existing travel patterns for vehicles in the area, including pick-up/drop-off circulation associated with the adjacent Laurel Elementary School. Due to the re-routing of traffic to adjacent intersections, there may be increased delays for adjacent intersections. However, similar to the Without Flower Connection alternative, the reallocation of these trips should not result in any project-related deficiencies. Should this alternative be selected, additional engineering studies are recommended to determine the viability of the proposed access restriction. Reconfiguration of the intersection to restrict access will need to ensure that California Manual on Uniform Control Devices (CA MUTCD), City of Brea design standards, Caltrans design standards, and Americans with Disabilities Act (ADA) standards are all met.

Alternative 3: Full Closure of Flower Avenue North of Imperial Highway (SR-90)

Lastly, the third alternative considered and evaluated assumes the intersection of Flower Avenue north of Imperial Highway (SR-90) would be fully closed and the southern terminus of Flower Avenue would become a cul-de-sac just north of Imperial Highway (SR-90). However, access for the southern leg would remain with its current right-in/right-out access. The cul-de-sac should meet the guidelines identified in the City's Municipal Code Section 18.92.120 Cul-de-sac Streets and Alleys. The City Standard Plans should be used in the design of the proposed off-set cul-de-sac (or the County of Orange Standard Plans if the City does not have standards). It is anticipated that the design would require right-of-way acquisition from the adjacent Laurel Elementary School in addition to the existing pedestrian connections/walkways that would need to be redesigned. The median along Imperial Highway (SR-90) would also need to be closed. With the closure of the north leg of Flower Avenue, the intersection is anticipated to operate at LOS C or D under Opening Year Cumulative and General Plan Buildout With Project traffic conditions, respectively (see Table 5-5 and Table 6-5).

The closure of the north leg of Flower Avenue at Imperial Highway (SR-90) is anticipated to improve the peak hour queues from the pre-project conditions; however, there is still queuing anticipated in the westbound direction along Imperial Highway (SR-90) during the MD and PM peak hours that could affect the southbound queues along Orange Avenue and Flower Avenue (see Table 1-8). Southbound queues along Orange Avenue towards Imperial Highway (SR-90) would also affect the westbound movement at the Project driveway on Orange Avenue and would lead to on-site queuing/circulation issues. The southbound and eastbound left turn queues at Flower Avenue and Imperial Highway (SR-90) would be eliminated with the full closure of Flower Avenue north of Imperial Highway (SR-90) since these movements would no longer be applicable. The queuing analysis results identify potential queuing issues for the northbound left-through-right and westbound left turn lanes at the intersection of Flower Avenue and Birch Street during one or more peak hours under General Plan Buildout Without Flower Connection traffic conditions (see Table 6-4). It should be noted that the addition of Project traffic has a nominal effect on the peak hour queuing results with the exception of the

westbound left turn lane at Flower Avenue and Birch Street. The westbound left turn lane requires 215-feet of storage in order to accommodate the 95th percentile AM peak hour queues under General Plan Buildout Without Flower Connection traffic conditions; however, the existing left turn lane accommodates up to 210-feet of storage within the striped left turn pocket and the opening/transition area which leads into a painted two-way-left turn lane east of the eastbound left turn pocket at Flower Avenue. As such, the additional peak hour vehicles could be accommodated within the existing left turn lane, storage/transition area, and painted median without restriping as there is sufficient space.

Similar to the right-in/right-out access restriction, the closure of Flower Avenue north of Imperial Highway (SR-90) would also alter the existing travel patterns for vehicles in the area, including pick-up/drop-off circulation associated with the adjacent Laurel Elementary School (both vehicular traffic and pedestrian routes). Due to the re-routing of traffic to adjacent intersections, there may be increased delays for adjacent intersections, however, the reallocation of these trips should not result in any project-related deficiencies (see Table 5-2 and 6-2). Should this alternative be selected, additional engineering studies are recommended to determine the viability of the proposed closure of Flower Avenue. Closure of Flower Avenue north of Imperial Highway (SR-90) will need to ensure that CA MUTCD, City of Brea design standards, Caltrans design standards, and ADA standards are all met.

1.8 DRIVE-THRU QUEUING ANALYSIS

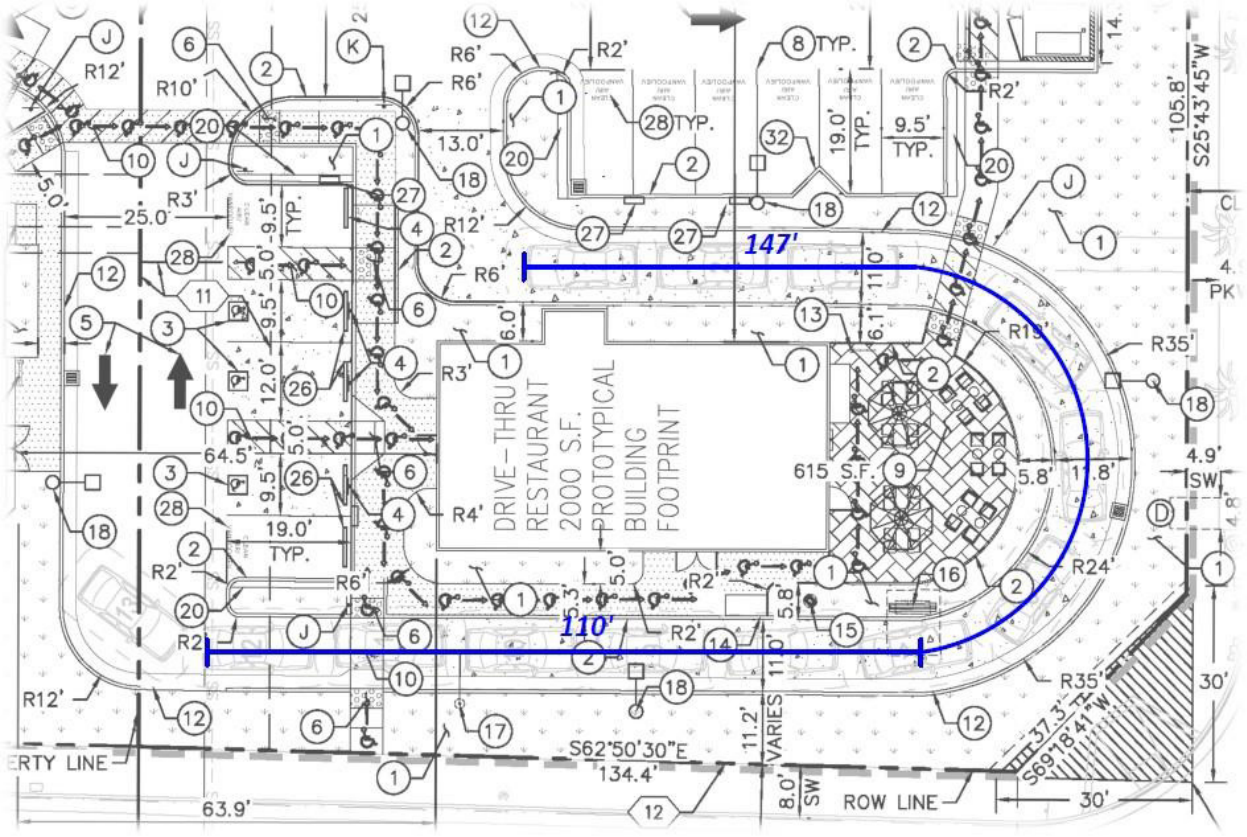
The proposed site plan prepared on December 8, 2022, by Kimley-Horn and Associates, Inc. as shown on Exhibit 1-5 indicates that the drive-thru lane will provide approximately 257 feet of storage length for vehicles. It should be noted that approximately 20 to 25 feet per vehicle is an industry standard used to estimate the length needed for a queued vehicle. However, since the drive-thru operations involve relatively low speeds, a slightly shorter distance between vehicles is often observed. This can result in allowing more vehicles to queue in a given length. While a reduced queue length is appropriate, this analysis relies on a more conservative vehicle length of 25 feet per queued vehicle. As such, approximately 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, approximately 4 vehicles are anticipated to be accommodated in the 110 feet from the order board to drive isle.

Per City of Brea Municipal Code Section 20.08.040 Off-Street Parking and Loading, “Drive through” or “Drive in” restaurants shall also provide a minimum of one hundred sixty (160) feet of stacking space, as measured from the pick-up window, for each drive through lane. The site plan can accommodate a total of 257 feet of stacking space within the drive-thru, suggesting a surplus of on-site drive-thru lane capacity approaching 97 feet.

1.9 ON-SITE CIRCULATION

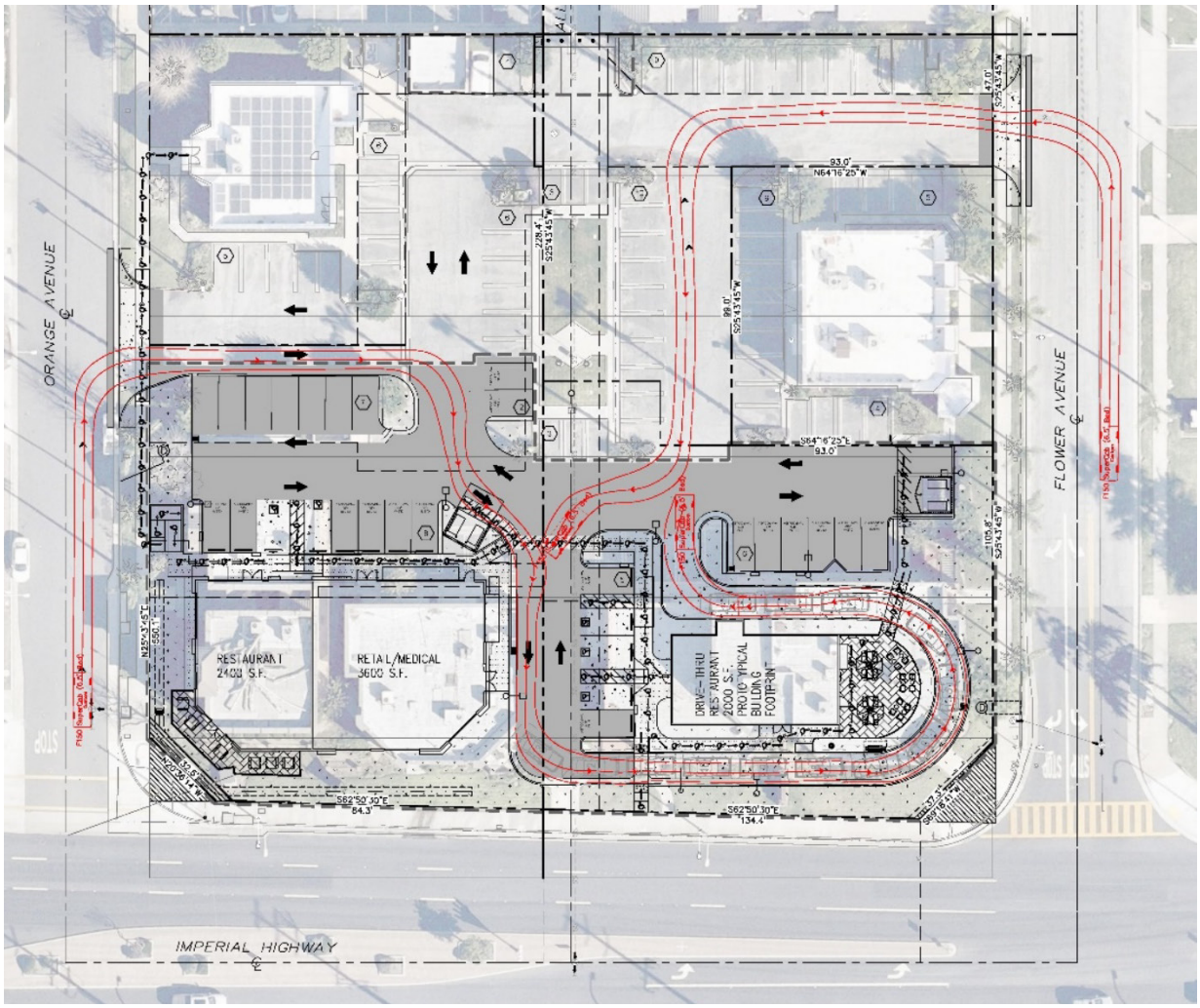
Exhibit 1-6 identifies the on-site circulation for the site based on the plans prepared by Kimley-Horn and Associates, Inc. The exhibit identifies all internal drive aisle which allow for two-way traffic. Access to and from the site will be accommodated via modified driveways on Orange Avenue and Flower Avenue. The exhibit also illustrates a vehicle accessing the drive-through component from both Orange Avenue and Flower Avenue by identifying the travel path (denoted in red). The design vehicle selected was a vehicle model for an F150 Truck which is approximately 19-feet long and 6.5-feet wide. This larger vehicle model was selected as opposed to a standard passenger car since the turning track for an F150 Truck is wider than the passenger car and requires more room for completing turning maneuvers on-site.

EXHIBIT 1-5: DRIVE-THRU QUEUING

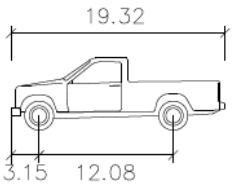


* Note: 6 vehicles are anticipated to be accommodated in the 147 feet between the pickup window and order board. Additionally, 4 vehicles are anticipated to be accommodated in the 110 feet from the order board to drive isle. Order board is denoted by ⑯ symbol.

EXHIBIT 1-6: ON-SITE CIRCULATION



Design Vehicle:



F150 SuperCab (6.5' Bed)

	feet
Width	: 6.50
Track	: 6.50
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

1.10 PEDESTRIAN & BICYCLE FACILITIES

No changes are proposed to the existing sidewalks that front the Project on Orange Avenue, Imperial Highway (SR-90), and Flower Avenue. As shown on Exhibit 1-6, there are walkways on-site along the restaurant and retail use to the west on the site leading to striped crosswalks across the parking area to the walkway around the drive-through restaurant use. That walkway can be used to circulate the drive-through restaurant use to access the crosswalk in the northeast to cross the drive-through to access the existing dentist office to the north. Pedestrian access could also be accommodated from the west side of the drive-through restaurant across the drive-through to access the existing sidewalk south on Imperial Highway (SR-90). All striped crosswalks shown are new as those paths do not currently exist. There are no existing bicycle facilities near the Project frontage.

2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with City Guidelines.

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors, such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow.

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The 6th Edition Highway Capacity Manual (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (5) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

Intersection Capacity Utilization (ICU)

The City of Brea requires signalized CMP intersections to be evaluated through ICU analysis which compares the peak hour traffic volumes to intersection capacity. Lane capacities of 1,700 vehicles per hour of green time have been assumed for the ICU calculations. 0.05 of volume to capacity (V/C) has been assumed representing 5 percent for the yellow and all-red signal indication and inherent vehicle delay between cycles with an assumed signal cycle of 100 seconds. The ICU LOS definitions based on V/C ratio are presented in Table 2-1. The Traffix software package has been utilized to evaluate the signalized intersections using the ICU methodology with the analysis parameters discussed above.

TABLE 2-1 INTERSECTION CAPACITY UTILIZATION (ICU) LOS DEFINITIONS

Level of Service	Critical Volume to Capacity Ratio
A	0.00 - 0.60
B	0.61 - 0.70
C	0.71 - 0.80
D	0.81 - 0.90
E	0.91 - 1.00
F	>1.00

Source: 2021 OCTA CMP, Figure 1 (Chapter 2)

Highway Capacity Analysis (HCM)

The City of Brea and the California Department of Transportation (Caltrans) require signalized intersection operations analysis based on the methodology described in the HCM. (5) Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections LOS is related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-2.

The traffic modeling and signal timing optimization software package Synchro (Version 11) has been utilized to analyze signalized intersections. Synchro is a microscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

TABLE 2-2: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0[1]
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	80.01 and up	F

Source: HCM, 6th Edition

[1] If V/C is greater than 1.0 then LOS is F per HCM.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15-minute volumes. Customary practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g., PHF = [Hourly Volume] / [4 x Peak 15-

minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (5)

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of Brea and Caltrans require the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (5) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-3). At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. Delay for the intersection is reported for the worst individual movement at a two-way stop-controlled intersection. For all-way stop controlled intersections, LOS is computed for the intersection as a whole (average delay).

TABLE 2-3: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0[1]
Little or no delays.	0 to 10.00	A
Short traffic delays.	10.01 to 15.00	B
Average traffic delays.	15.01 to 25.00	C
Long traffic delays.	25.01 to 35.00	D
Very long traffic delays.	35.01 to 50.00	E
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F

Source: HCM, 6th Edition

[1] If V/C is greater than 1.0 then LOS is F per HCM.

2.3 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TA uses the signal warrant criteria presented in the latest edition of the Caltrans' California Manual on Uniform Traffic Control Devices (CA MUTCD), for all study area intersections. (6)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. The CA MUTCD indicates that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (6) Specifically, this TA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Rural warrants have been utilized for intersections located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour and urban warrants have been utilized for those that operate at less than 40 miles per hour. For

the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

As shown in Table 2-4, traffic signal warrant analyses were performed for the following unsignalized study area intersections during the peak weekday conditions wherein the Project is anticipated to contribute the highest trips:

TABLE 2-4: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

#	Intersection
2	Orange Av. & Birch St.
3	Orange Av. & Driveway 1
6	Flower Av. & Driveway 2
7	Flower Av. & Imperial Hwy. (SR-90)

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 Area Conditions of this report. The traffic signal warrant analyses for future conditions are presented in Section 5 Opening Year Cumulative (2024) Traffic Conditions and Section 6 General Plan Buildout Traffic Conditions of this report. Note that traffic signal warrants were not performed for Orange Avenue at Imperial Highway (SR-90) as the intersection is currently restricted to right-in/right-out access only and would not be a suitable location for signalization.

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.4 INTERSECTION QUEUING ANALYSIS

The HCM 95th percentile back of queue has been reported for all turn pocket storage lengths at the study area intersections. Specifically, the queuing analysis is utilized to identify any potential queuing and “spill back” into the adjacent through lane from the left turn pocket. Storage (turn-pocket) length recommendations at the intersections are based upon the 95th percentile back of queue as reported on the HCM worksheets for each applicable location and analysis scenario. For the purposes of determining the length (in feet), the vehicles per lane reported in the HCM analysis worksheet has been multiplied by a length of 25-feet.

2.5 GENERAL PLAN CONSISTENCY REQUIREMENTS

Minimum Acceptable LOS and associated definitions of intersection deficiencies has been obtained from each of the applicable surrounding jurisdictions. Per the City's General Plan Circulation Element and Growth Management Element requirements, a volume/capacity ratio of 0.90 (Level of Service D) shall be the lowest acceptable LOS at intersections. Improvements required to bring intersections and roadway segments to acceptable service levels must be clearly described as feasible. Per the City's guidelines, ICU analysis will be conducted for any signalized CMP intersections.

2.6 LEVEL OF SERIVCE (LOS) CRITERIA

This section outlines the methodology used in this analysis related to identifying circulation system deficiencies.

2.6.1 CITY OF BREA

An effect on traffic operations occurs if the project causes one or more study intersections to operate at LOS D or better to degrade to LOS E or F; for intersections already operating at LOS E a change in control delay of 4 seconds and for intersections operating at LOS F a change in control delay of 2 seconds shall be considered unacceptable and cause an effect on traffic operations.

If a project causes an effect on traffic operations, improvements to study intersections may be required to bring back the intersection to an acceptable LOS or make other improvements to the intersection comparable to the operational deficiency. If a feasible identified improvement(s) cannot be provided as determined by the City Traffic Engineer, then contribution of fair share towards an improvement will be considered. Unsignalized intersections operating at a deficient LOS with or without project conditions shall be evaluated for the installation of a traffic signal using the traffic signal peak hour warrant and crash experience warrant per the latest version of the California Manual on Uniform Traffic Control Devices (CA MUTCD). Where applicable, any new traffic signals shall be analyzed and/or reviewed to ensure the new traffic signal operations does not unduly disrupt arterial synchronization.

2.6.2 CMP

The 2021 CMP identifies a minimum LOS E for CMP locations, unless the baseline operations of the CMP intersection is lower (e.g., LOS F). CMP statues require that CMP intersections maintain an LOS E or better, unless the baseline is currently LOS F. If this is the case, then the ICU rating cannot increase by more than 0.10.

2.6.3 CALTRANS FACILITIES

Senate Bill 743 (SB 743), approved in 2013, endeavors to change the way transportation impacts will be determined according to the California Environmental Quality Act (CEQA). The Office of Planning and Research (OPR) has recommended the use of vehicle miles traveled (VMT) as the replacement for automobile delay-based LOS. Caltrans acknowledges automobile delay will no longer be considered a CEQA impact for development projects and will use VMT as the metric for determining impacts on the State Highway System (SHS). However, LOS D has been utilized as the target LOS for Caltrans facilities, consistent with the City. The same criteria listed for the City under Section 2.6.1 have been used at the intersections along Imperial Highway (SR-90).

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3 AREA CONDITIONS

This section provides a summary of the existing circulation network, the City of Brea General Plan Circulation Network, and a review of existing peak hour intersection operations, traffic signal warrant, and queuing analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the scoping agreement with City of Brea staff (Appendix 1.1), the study area includes a total of 7 existing and future intersections as shown previously on Exhibit 1-3, where the Project is anticipated to contribute 25 or more peak hour trips (or added at the City's request during the scoping process). Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 CITY OF BREA GENERAL PLAN CIRCULATION ELEMENT

As noted previously, the Project site is located within the City of Brea. The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the study area, as identified on City of Brea General Plan Circulation Element, are described subsequently. Exhibit 3-2 shows the City of Brea General Plan Circulation Element and Below is a summary of the major study area roadways and their General Plan classifications:

- Major Arterial (right-of-way is 120-feet, typically 6-lane divided roadways): Brea Boulevard, south of Birch Street
- Smart Street (arterial classification with enhanced traffic-carrying capacity): Imperial Highway (SR-90)
- Primary Arterial (right-of-way 100-feet, typically 4-lane divided roadways): Brea Boulevard, north of Birch Street
- Secondary Arterial (right-of-way 80-feet, typically 2 to 4 lane divided roadways): Birch Street
- Local Roadway (2 lanes with low speeds providing direct access to abutting properties): Orange Avenue, Flower Avenue

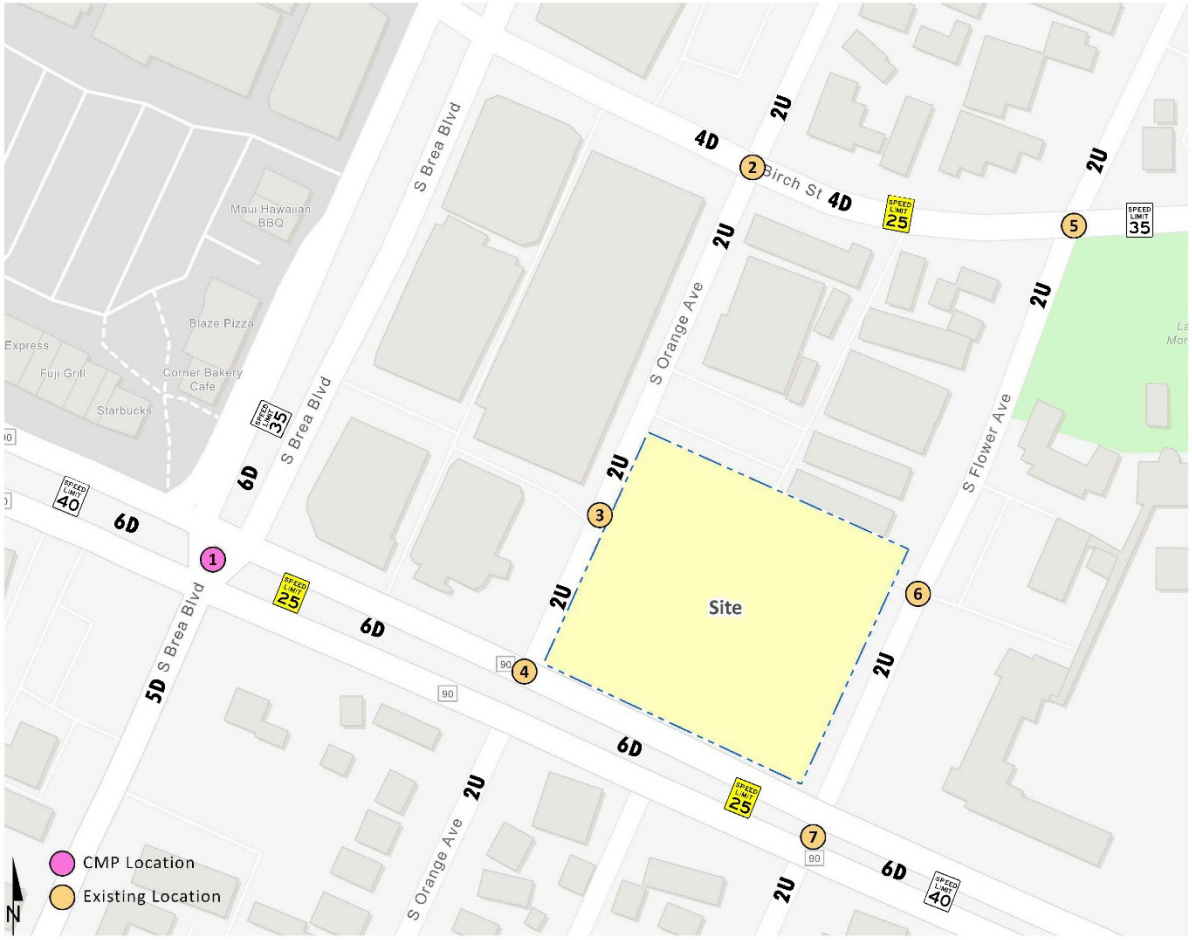
Imperial Highway (SR-90) is owned and operated by the Caltrans, but some improvements to sidewalks and street-scope could potentially improve accessibility along this roadway and could be accommodated by maintaining the existing travel lanes but instead narrowing them. Modifications to Imperial Highway (SR-90) will require coordination and approvals from Caltrans.

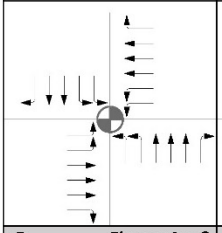
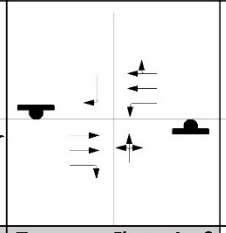
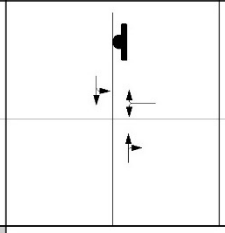
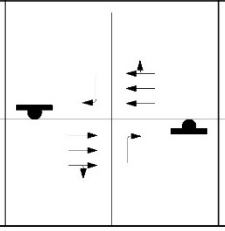
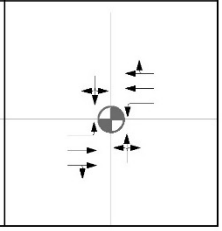
3.3 BICYCLE & PEDESTRIAN FACILITIES

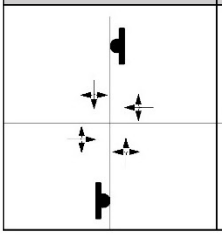
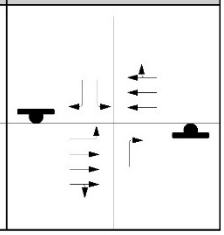
The City's existing and planned bicycle network is shown on Exhibit 3-3. The only existing bike lanes in the study area are along Brea Boulevard, north of Birch Street. Brea Boulevard is currently striped with Class II (on-street, striped) bike lanes. Based on the City's Active Transportation Plan (ATP), Birch Street and Brea Boulevard, south of Birch Street, are proposed to have bikeway improvements. (7) The ATP indicates that a road diet along Birch Street, if considered, could accommodate a cycle track/shared use path which could be provided to serve as a buffer between cars and pedestrians. For Brea Boulevard, buffered bike lanes or a cycle track can be considered south of Birch Street with the loss of on-street parking.

Exhibit 3-4 illustrates the existing and proposed Trails within the City. Brea Boulevard and Birch Street are both identified as Boulevard Corridors which include enhanced landscaping and wide sidewalks for pedestrians and on-street parking is encouraged. Imperial Highway (SR-90) is identified as a landscaped corridor (Major Trail).

EXHIBIT 3-1: EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS

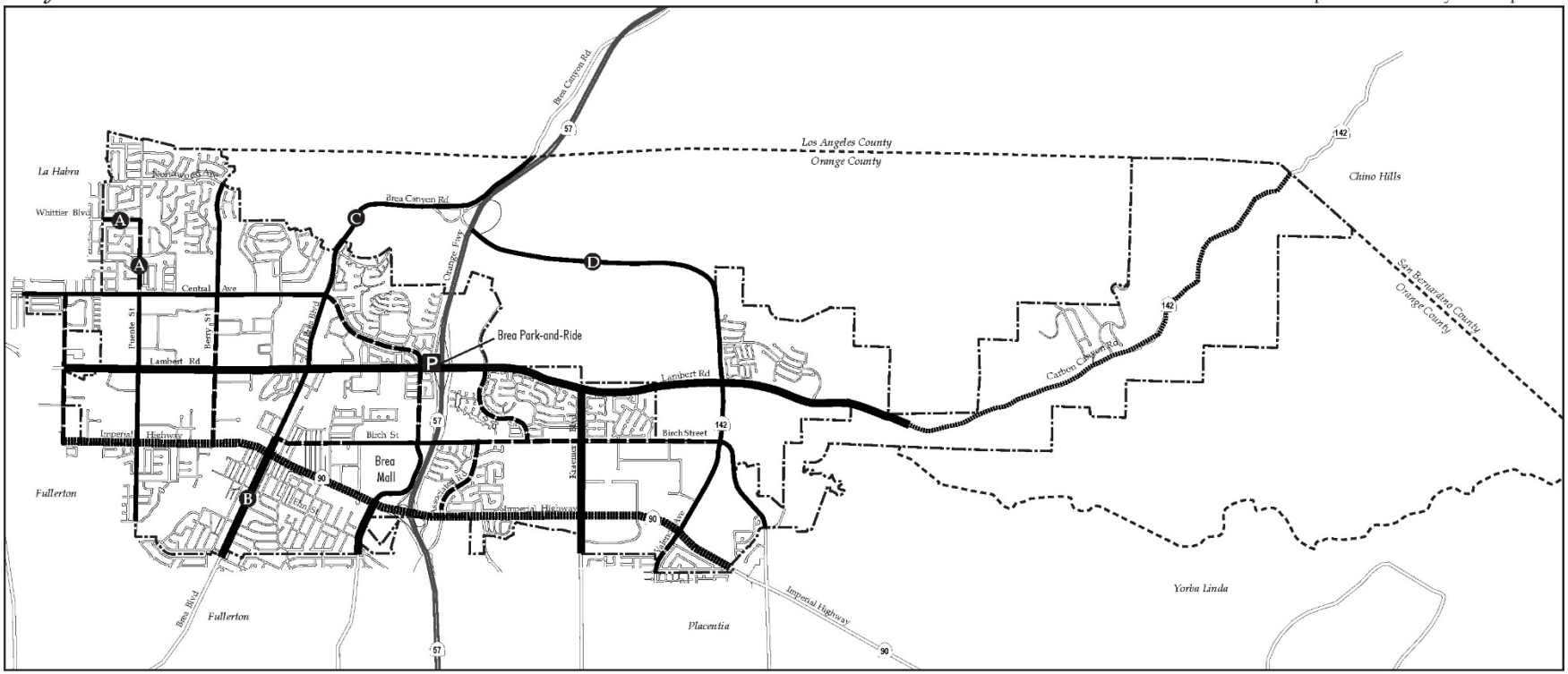


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Dwy 1	4 Orange Av. & Impoerial Hwy. (SR-90)	5 Flower Av. & Birch St.
				

6 Flower Av. & Dwy 2	7 Flower Av. & Imperial Hwy. (SR-90)
	

= Traffic Signal
= Stop Sign
= Existing Lane

EXHIBIT 3-2: CITY OF BREA CIRCULATION ELEMENT



Legend

- City Boundary
- Sphere of Influence

Arterial Highways

- Major Arterial
- Smart Street
- Primary Arterial
- Secondary Arterial
- Modified Secondary Arterial
- Collector/Commuter Roadway

P Park and Ride

N, W, E, S

0 3,000 6,000 9,000 12,000 Feet

0 0.5 1 1.5 2 Miles

Notes:

A Whittier Boulevard and Puente Street north of Central Avenue will be redesignated as Collector/Commuter Roadway following parallel changes to the Orange County Transportation Authority (OCTA) Master Plan of Arterial Highways (MPAH).

B South Brea Boulevard south of Imperial Highway will be redesignated Primary Arterial following parallel changes to the OCTA MPAH.

C Brea Canyon Road will be redesignated Modified Secondary Arterial following changes to the OCTA MPAH.

D The Valencia Avenue extension between the entrance to the Olinda Alpha landfill and SR-57 will be deleted following parallel changes to the OCTA MPAH.

BREA GENERAL PLAN

Figure CD-8

Master Plan of Roadways

EXHIBIT 3-3: CITY OF BREA EXISTING AND PLANNED BICYCLE NETWORK

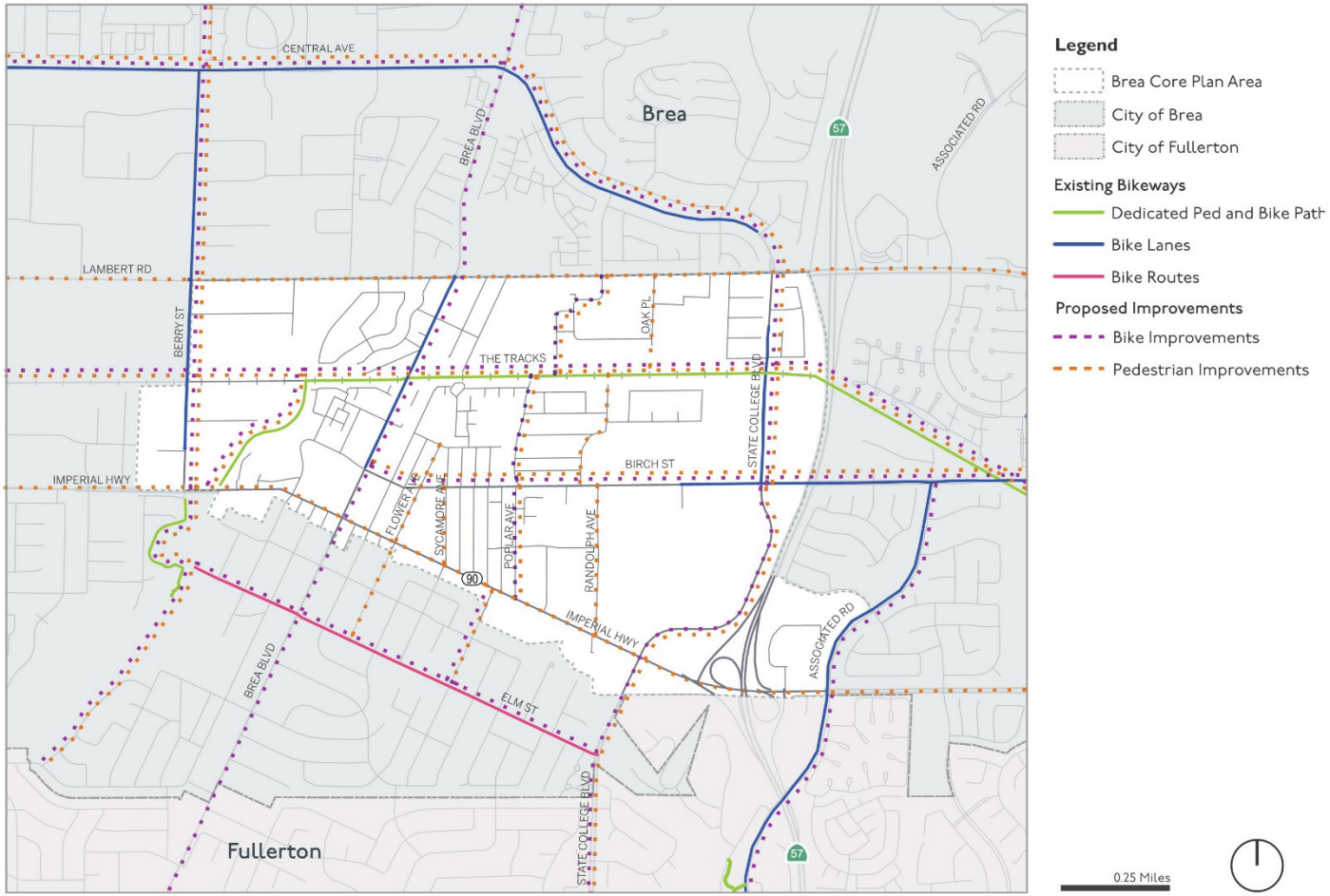
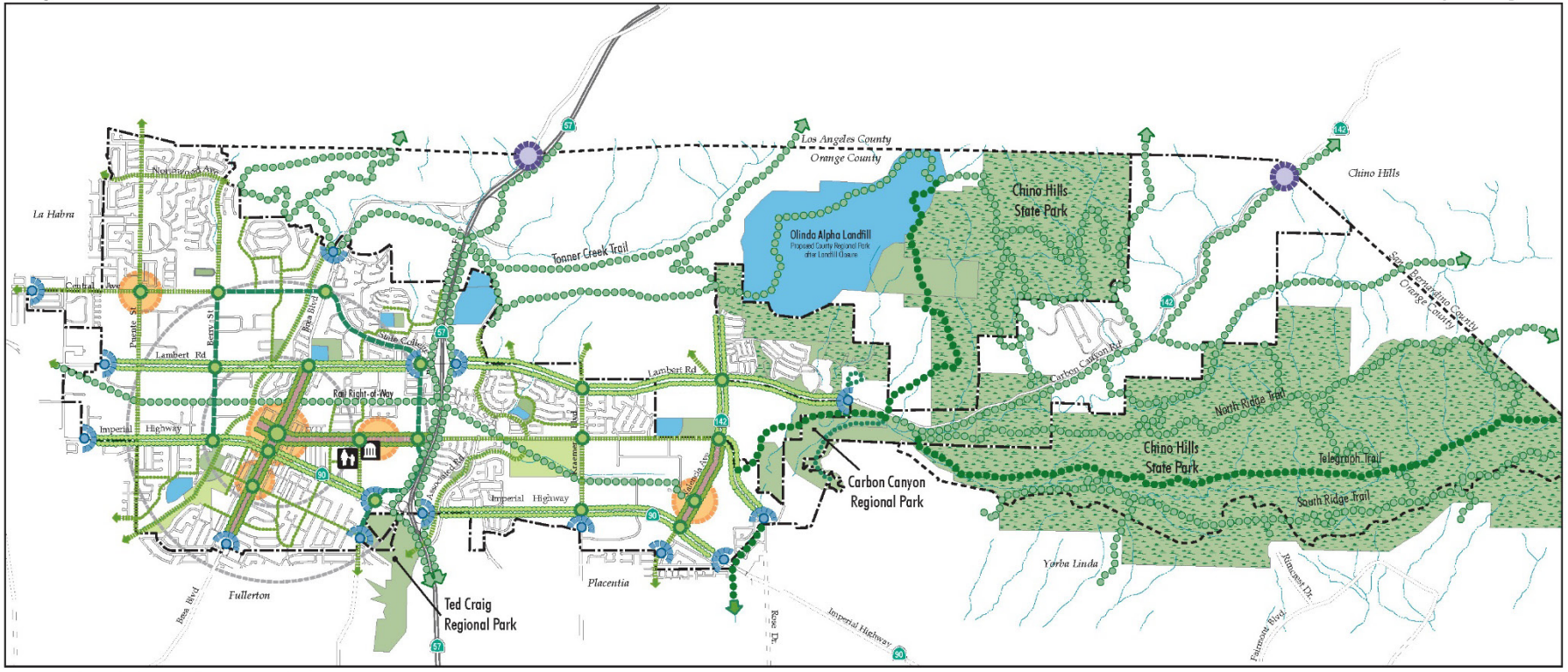


EXHIBIT 3-4: CITY OF BREA TRAILS



Source: RTKL Associated Inc., April 2002 and Cotton/Bridges/Associates, 2002.

Legend

- City Boundary
- Sphere of Influence
- Creeks, Streams, and Drainage Channels

Activity and Design Elements

- Boulevard Corridor
- Activity Node
- Focal Intersection
- City Gateway
- City Entrance Signage

Trails and Linkages

- Landscaped Corridor (Major Trail)
- Major Linkage (Downtown Circuit)
- Major Linkage
- Neighborhood Linkages

Nature/Wilderness Trails
(Hiking, equestrian, and mountain biking)

- Regional Trail
- Community Trail
- Local Trail

Public, Parks, and Recreation Facilties

- Parks and Recreation Facilties
- Dedicated Open Space
- Golf Course
- Public Facilities
- Civic and Cultural Center (Includes: City Hall, Curtis Theatre, School District Office, and Library)
- Brea Community Center

Radius from Downtown Brea
1/4 mile five minutes walking distance
1/2 mile ten minutes walking distance

N W E S

0 3,000 6,000 9,000 12,000 Feet

0 0.5 1 1.5 2 Miles

BREA GENERAL PLAN

Figure CD-14
Urban Design Plan Map

Exhibit 3-5 illustrates the existing crosswalks and existing sidewalks within the study area. As shown on Exhibit 3-5, there are sidewalks provided along all frontage of the Project as well as the surrounding roadways and good connectivity to other sidewalks via crosswalks at study intersections. The intersections of Brea Boulevard at Imperial Highway (SR-90) and Flower Avenue at Birch Street both have crossing guards when school children are present. Per the City's ATP, Birch Street, east of Brea Boulevard, and Flower Avenue within the study area are proposed for pedestrian improvements. These improvements would enhance pedestrian access to transit and commercial areas.

3.4 TRANSIT SERVICE

The study area is currently served by OCTA with bus service along Brea Boulevard and Birch Street. OCTA route 129 serves the City of La Habra to the City of Anaheim (and through the City of Brea) via La Habra Boulevard, Brea Boulevard, Birch Street and Kraemer Boulevard. There are existing stops along Brea Boulevard north of Birch Street and along Birch Street east of Brea Boulevard. Bus service frequency is approximately 55-minute intervals on a typical weekday. OCTA Route 143 serves the City of La Habra to City of Brea via Whittier Boulevard, Harbor Boulevard, Brea Boulevard, and Birch Street. There are existing stops along Brea Boulevard south of Birch Street and also north and south of Imperial Highway (SR-90). Bus service frequency is approximately 50-minute intervals on a typical weekday. The existing bus routes and stops are illustrated on Exhibit 3-6. These OCTA routes could serve the Project. Transit service is reviewed and updated by OCTA periodically to address ridership, budget, and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

3.5 EXISTING (2022) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in September and December 2022. The following peak hours were selected for analysis:

- AM Peak Period: 7:00-9:00 AM
- Mid-Day Peak Period: 12:00-2:00 PM (Wednesday counts only); 1:00-3:00 PM
- PM Peak Period: 4:00-6:00 PM

The 2022 weekday AM, MD, and PM peak hour count data is representative of typical weekday peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity or detour routes and near-by schools were in session and operating on normal schedules. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1.

Baseline volumes were only adjusted to account for volume balancing between closely spaced intersections with the exception of the southbound direction between Driveway 1 and Imperial Highway (SR-90) along Flower Avenue, which was not adjusted as to not arbitrarily increase volumes at the intersection of Flower Avenue at Imperial Highway (SR-90) for purposes of the traffic signal warrant analysis. Modifications to the existing baseline for the existing roadway conditions along with modifications to the baseline volumes for Without Flower Connection conditions are provided in Appendix 3.1. For the Without Flower connection scenarios, traffic volumes exiting and entering the north leg of Flower Avenue at Imperial Highway (SR-90) have been reassigned to the intersection of Flower Avenue at Birch Street. As Flower Avenue provides access to Laurel Elementary School, this reassignment conservatively (worst-case scenario) assesses the effects the potential closure of Flower Avenue at Imperial Highway (SR-90) would have at the intersection with Birch Street.

EXHIBIT 3-5: EXISTING PEDESTRIAN FACILITIES

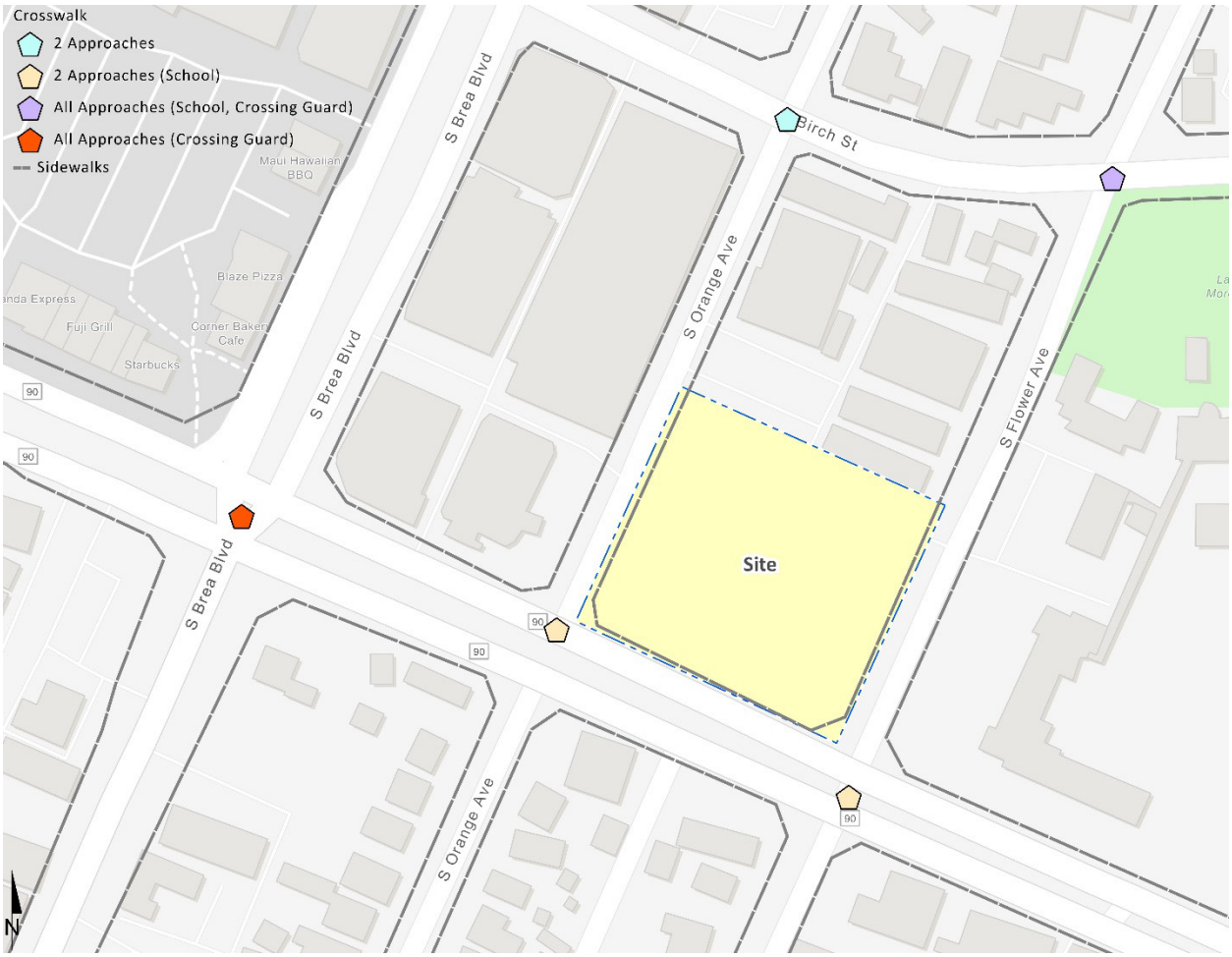
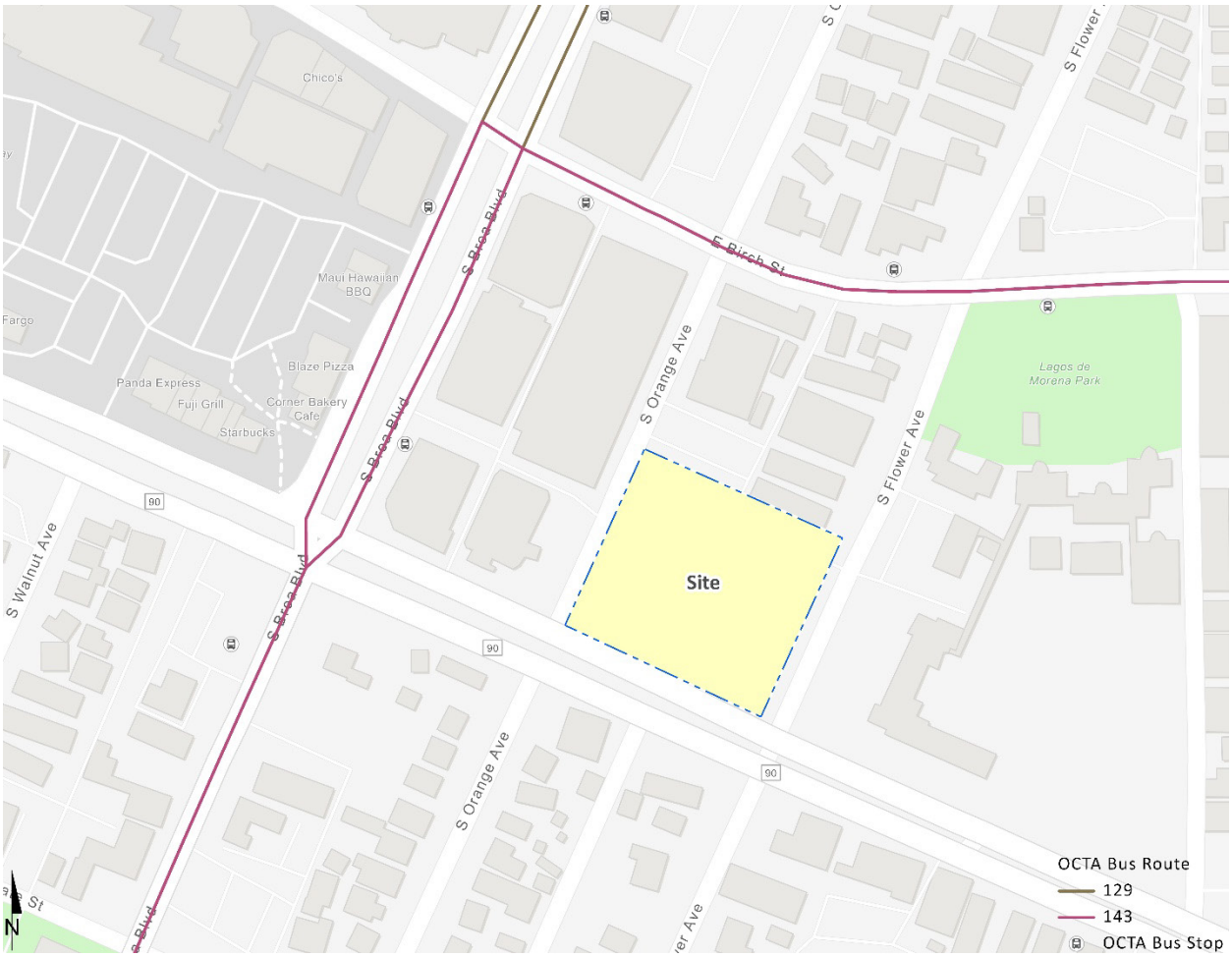


EXHIBIT 3-6: TRANSIT ROUTES



Existing weekday Average Daily Traffic (ADT) volumes are shown on Exhibit 3-7. Where actual 24-hour tube count data was not available, Existing ADT volumes were based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 13.09 = Leg Volume

A comparison of the PM peak hour and daily traffic volumes of various roadway segments within the study area indicated that the peak-to-daily relationship is approximately 7.64 percent (see Appendix 3.1 for additional information on the calculation). As such, the above equation utilizing a factor of 13.09 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 7.64 percent (i.e., 1/0.0764 = 13.09) and was assumed to sufficiently estimate ADT volumes for planning-level analyses. Existing weekday AM, MD, and PM peak hour intersection volumes are shown on Exhibit 3-7 (MD volumes shown on second page).

3.6 INTERSECTION OPERATIONS ANALYSIS

Existing peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1, which indicates that the study area intersections are currently operating at an acceptable LOS during the peak hours, with the exception of the following intersection:

- Flower Av. & Imperial Hwy. (SR-90) (#7) – LOS F AM, MD, and PM peak hours

The intersection operations analysis worksheets are included in Appendix 3.2 of this TA.

TABLE 3-1: INTERSECTION ANALYSIS FOR EXISTING (2022) CONDITIONS

#	Intersection	Traffic Control[2]	Delay[1] (secs.) AM	Delay[1] (secs.) MD	Delay[1] (secs.) PM	Level of Service AM	Level of Service MD	Level of Service PM
1	Brea Bl. & Imperial Hwy. (SR-90)	TS	41.7	36.9	40.4	D	D	D
	- ICU Analysis (CMP) [3]		*0.64*	*0.73*	*0.79*	*B*	*C*	*C*
2	Orange Av. & Birch St.	CSS	13.0	16.8	17.8	B	C	C
3	Orange Av. & Driveway 1	CSS	8.9	9.0	8.9	A	A	A
4	Orange Av. & Imperial Hwy. (SR-90)	CSS	22.3	19.2	20.0	C	C	C
5	Flower Av. & Birch St.	TS	9.0	10.3	5.0	A	B	A
6	Flower Av. & Driveway 2	CSS	16.0	8.9	9.7	C	A	A
7	Flower Av. & Imperial Hwy. (SR-90)	CSS	**>200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**

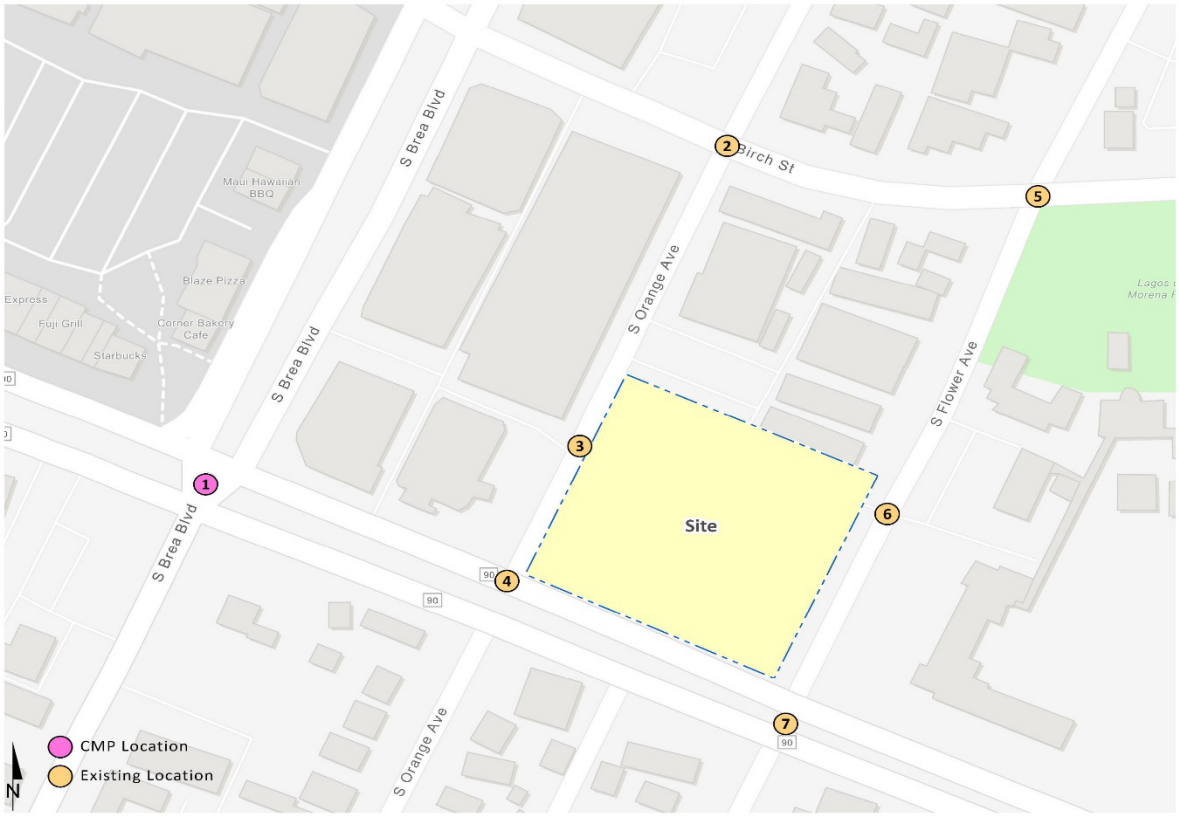
* **BOLD** = Unacceptable LOS

[1] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

[3] ICU is reported in volume-to-capacity (v/c). ICU analysis conducted for signalized CMP intersections.

EXHIBIT 3-7: EXISTING (2022) TRAFFIC VOLUMES



1 Brea Bl. & Imperial Hwy. (SR-90)

									48,950
								↱	93(144)
								←	1247(1447)
								↰	145(250)
								↰	↑	↱
							140(199)	→	400(492)	431(672)	149(229)	***34,400***
							1350(1465)	→				
							348(430)	↳				
							55,250					
	↲	↓	↳									
	146(177)	567(559)	166(242)									
25,600												

2 Orange Av. & Birch St.

									27,350
								↱	5(19)
								←	652(1059)
								↰	15(30)
								↰	↑	↱
							579(933)	→	6(5)	1(6)	16(41)	***1,500***
							15(32)	↳				
							27,000					
	↲											
	15(26)											
650												

3 Orange Av. & Driveway 1

									200
								↱	15(6)
								↰	4(5)
									↑	↱
									18(35)	1(1)	***1,000***
	↓	↳									
	18(36)	28(5)									
1,100											

4 Orange Av. & Imperial Hwy. (SR-90)

									50,800
								↱	19(36)
								←	1579(1894)
									↱
							1711(1775)	→	35(26)	***600***
							13(18)	↳		
							49,000			
	↲									
	22(41)									
1,000										

5 Flower Av. & Birch St.

									28,750
								↱	10(8)
								←	564(1036)
								↰	56(87)
								↰	↑	↱
							18(24)	→	80(15)	46(10)	25(54)	***2,300***
							592(977)	→				
							14(7)	↳				
							27,250					
	↲	↓	↳									
	13(15)	10(2)	46(26)									
1,100												

6 Flower Av. & Driveway 2

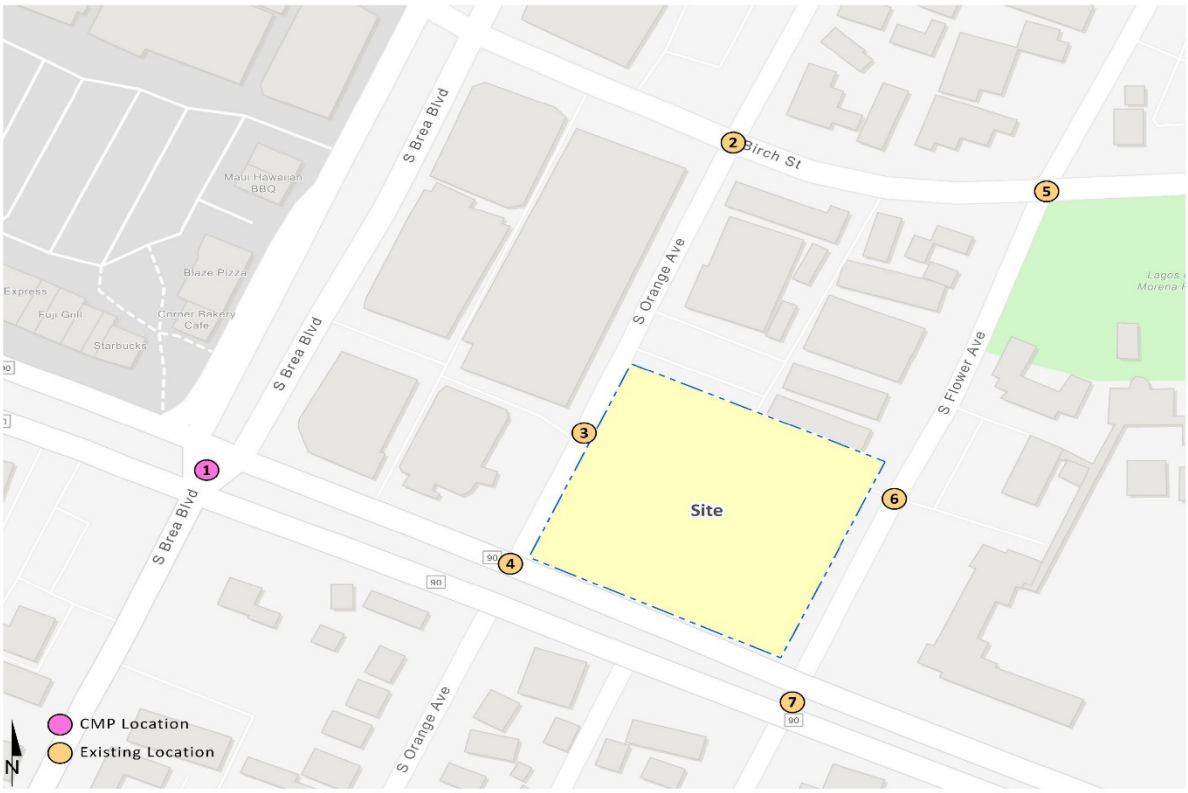
									100
								↱	2(1)
								↰	0(1)
								↰	↑	↱
							16(6)	→	25(16)	164(88)	12(3)	***2,350***
							4(6)	↳				
							600					
	↲	↓	↳									
	21(19)	100(63)	18(4)									
2,400												

7 Flower Av. & Imperial Hwy. (SR-90)

									49,150
								↱	121(65)
								←	1525(1874)
									↱
							80(42)	→	4(7)	***150***
							1625(1780)	→		
							3(5)	↳		
							50,800			
	↲		↳							
	73(56)		7(14)							
2,250										

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
207 ↲ 514 ↓ 235 ↳ / 135 ↰ 1311 ← 272 ↑	21 ↲ / 20 ↰ 936 ← 23 ↑	48 ↓ 22 ↳ / 19 ↰ 8 ↑	56 ↲ / 34 ↰ 1818 ←
199 → / 387 ↰ 531 ↑ 202 ↱	814 → / 14 ↰ 1 ↑ 67 ↱	28 ↑ 6 ↱	1648 → / 21 ↲ 23 ↱
1187 →			
329 ↲	36 ↲		

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
20 ↲ 3 ↓ 33 ↳ / 19 ↰ 920 ← 76 ↑	3 ↲ 71 ↓ 10 ↳ / 1 ↰	59 ↲ 12 ↳ / 64 ↰ 1793 ←
25 → / 43 ↰ 35 ↑ 51 ↱	3 ↰ 99 ↑ 8 ↱	46 → / 1592 → / 13 ↲ / 3 ↱
858 →		
19 ↲		

MD Peak Hour Intersection Volumes

3.7 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing (2022) traffic conditions are based on existing peak hour intersection turning volumes. There are currently no study area intersections that meet a peak hour volume-based traffic signal warrant under Existing (2022) traffic conditions. Existing (2022) conditions traffic signal warrant analysis worksheets are provided in Appendix 3.3.

3.8 INTERSECTION QUEUING ANALYSIS

A queuing analysis was performed at the study area intersections to determine if any peak hour queues would spill out of the left turn pockets into the adjacent through lanes. Queuing analysis findings are presented in Table 3-2 for the off-site study area intersections (site access locations are addressed in Section 1.6 Queuing Analysis of this TA). It is important to note that turn pocket measurements reflect the storage length (without consideration of transition areas), as such, up to an additional 25-feet (or length of one passenger vehicle) is assumed to be accommodated within the transition area. As shown in Table 3-2, the following movement currently experiences a queuing issue during the weekday MD peak 95th percentile traffic flows:

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours

The existing queues in the northbound left are reported for the shorter Number 2 left turn lane (the Number 1 left turn lane accommodates approximately 360-feet of storage). With the back-to-back left turn storage for the southbound left at Date Street, there is no ability to accommodate additional storage for the northbound left turn pocket at Imperial Highway (SR-90). The eastbound right turn pocket storage cannot be increased due to an existing street located west of the existing turn pocket (Walnut Avenue). Since Imperial Highway (SR-90) is a Caltrans facility, any improvements along Imperial Highway (SR-90) will require coordination with Caltrans. Worksheets for Existing (2022) traffic conditions queuing analysis are provided in Appendix 3.4.

TABLE 3-2: QUEUING SUMMARY FOR EXISTING (2022) CONDITIONS

#	Intersection	Movement	Available Stacking Distance (Feet)	Existing (2022) 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	NBL[3]	140	**435**	**248**	**333**	**No**	**No**	**No**
		NBR	125	108	93	108	Yes	Yes	Yes
		SBL	200	83	145	133	Yes	Yes	Yes
		SBR	545	100	150	128	Yes	Yes	Yes
		EBL	200	85	128	125	Yes	Yes	Yes
		EBR	140	**243**	**170**	**215**	**No**	**No**	**No**
		WBL	170	95	193 [2]	195 [2]	Yes	Yes	Yes
		WBR	170	53	63	63	Yes	Yes	Yes
2	Orange Av. & Birch St.	NBL/T/R	180	5	23	15	Yes	Yes	Yes
		SBR	100	3	5	5	Yes	Yes	Yes
		EBR	75	0	0	0	Yes	Yes	Yes
		WBL	140	3	3	5	Yes	Yes	Yes
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	13	5	8	Yes	Yes	Yes
		SBR	120	8	20	13	Yes	Yes	Yes
5	Flower Av. & Birch St.	NBL/T/R	60	35	35	13	Yes	Yes	Yes
		SBL/T/R	60	15	13	10	Yes	Yes	Yes
		EBL	125	5	10	3	Yes	Yes	Yes
		WBL	125	15	30	13	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	3	0	3	Yes	Yes	Yes
		SBL	100	23	48	48	Yes	Yes	Yes
		SBR	230	33	35	28	Yes	Yes	Yes
		EBL	125	68	48	35	Yes	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Although 95th percentile queue is anticipated to exceed the available storage provided by the formally striped turn lanes, the dual turn lanes have sufficient unstriped storage area to accommodate the excess queue.

[3] Queue reported for the Number 2 Northbound Left turn lane which has approximately 140-feet of storage.

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4 PROJECTED FUTURE TRAFFIC

The Project consists of the development of a new 6,000 square foot building located on the northeast corner of Orange Avenue and Imperial Highway that includes a 2,400 square foot restaurant and 3,600 square foot retail/medial office use. A 2,000 square foot coffee shop with drive-through window is proposed on the northwest corner of Flower Avenue and Imperial Highway (SR-90). The proposed Project is anticipated to have an opening year of 2024. The existing site currently has access to Orange Avenue and Flower Avenue (both access points allow for full turning movements, with no access restrictions). Both access points will be maintained although it is anticipated the Project will reconstruct the driveways to meet the current City of Brea commercial driveway standards.

4.1 PROJECT TRIP GENERATION

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development.

4.1.1 EXISTING TRAFFIC

The Project includes the demolition of 4 existing buildings in order to redevelop the site with the proposed uses. These 4 buildings are currently occupied and generating traffic. In an effort to understand the existing traffic associated with the current uses, traffic counts were collected at the driveways on September 20 and 21, 2022 (Tuesday and Wednesday). Laurel Elementary was in session on these dates, although Wednesday is an early release day where school still starts at 8:00 AM but releases at 1:25 PM (regular release is at 2:10 PM). A summary of the count data collected is shown on Appendix 1.1. It should be noted that the site also includes two other buildings that will remain on the site and traffic associated with these uses have not been included in the driveway data collected. The two buildings that are to remain are located on Assessor's Parcel Number (APN) 319-292-31 and APN 319-292-33.

Table 4-1 summarizes the average existing trip generation based on the count data collected over two consecutive days. The existing site currently generates an average of 362 two-way trips per day, with 44 trips during the AM peak hour, 41 trips during the mid-day peak hour, and 27 trips during the PM peak hour.

TABLE 4-1: EXISTING TRIP GENERATION

	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Land Use	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Actual Vehicles:										
Existing Use										
Passenger Cars:	31	13	44	18	23	41	7	20	27	356
2-axle Trucks:	0	0	0	0	0	0	0	0	0	6
3-axle Trucks:	0	0	0	0	0	0	0	0	0	0
4+-axle Trucks:	0	0	0	0	0	0	0	0	0	0
Total Trucks:	0	0	0	0	0	0	0	0	0	6
Total Trips	**31**	**13**	**44**	**18**	**23**	**41**	**7**	**20**	**27**	**362**

4.1.2 PROPOSED PROJECT

In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published in the ITE Trip Generation Manual (11th Edition, 2021) for the proposed land uses was utilized. For purposes of this analysis, the following ITE land use codes have been evaluated for the Project (see Table 4-2 for the trip generation rates):

- 3,600 square feet of Strip Retail (ITE Land Use Code 822) (more conservative than medical/dental office)
- 2,400 square foot High Turnover (Sit-Down) Restaurant use (ITE Land Use Code 932)
- 2,000 square foot Coffee/Donut Shop with Drive-Thru Window use (ITE Land Use Code 937)

TABLE 4-2: TRIP GENERATION RATES

	ITE		AM Peak Hour			Mid-Day Peak Hour[3]			PM Peak Hour			Weekday
Land Use[1]	Code	Units[2]	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Strip Retail	822	TSF	1.42	0.94	2.36	1.88	1.88	3.76	3.30	3.29	6.59	54.45
High Turnover Sit-Down Restaurant	932	TSF	5.26	4.31	9.57	3.48	6.00	9.49	5.52	3.53	9.05	107.20
Coffee/Donut Shop with Drive-Thru	937	TSF	43.80	42.08	85.88	16.81	15.21	32.01	19.50	19.50	38.99	533.57

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).

[2] TSF = thousand square feet

[3] Mid-day (1:00-2:00 PM) trip generation rates determined based on the ITE time of day distributions for each applicable land use.

Trip generation rates during the mid-day have been determined based on the ITE's Time of Day distribution for each applicable land use category (the timeframe of 1:00-2:00 PM has been utilized). As a result, the time-of-day distribution for the mid-day timeframe is as follows (in and out splits have been calculated using the same PM peak hour split if not available):

- Strip Retail (ITE Land Use Code 822) = 6.9% of the total daily traffic (split 50/50 for in and out)
- High Turnover (Sit-Down) Restaurant use (ITE Land Use Code 932) = 6.5% of the inbound daily, and 11.2% of the outbound daily (assuming daily is split 50/50 in and out)
- Coffee/Donut Shop with Drive-Thru Window use (ITE Land Use Code 937) = 6.3% of the inbound daily, and 5.7% of the outbound daily (assuming daily is split 50/50 in and out)

As the Project is proposed to include retail and food uses, pass-by percentages have been used but limited to 25% for the sit-down restaurant and strip retail while the coffee shop is limited to 50%. Pass-by trips account for trips that are currently on the existing roadway network that would stop by uses within the proposed Project on their way to their ultimate destination. Table 4-3 shows the resulting Project trip generation summary, which shows the Project is anticipated to generate a total of 872 two-way trips per day with 119 AM peak hour trips, 62 mid-day peak hour trips, and 73 PM peak hour trips.

TABLE 4-3: PROJECT TRIP GENERATION

			AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Land Use	Quantity	Units[1]	In	Out	Total	In	Out	Total	In	Out	Total	Daily
High Turnover Sit-Down Restaurant	2.400	TSF	13	10	23	8	14	22	13	8	21	258
Pass-By Reduction (25% MD/PM/Daily):			0	0	0	-2	-2	-4	-2	-2	-4	-66
Coffee/Donut Shop with Drive-Thru	2.000	TSF	88	84	172	34	30	64	39	39	78	1,068
Pass-By Reduction (50% AM/MD/PM/Daily):			-42	-42	-84	-15	-15	-30	-20	-20	-40	-534
Strip Retail	3.600	TSF	5	3	8	7	7	14	12	12	24	196
Pass-By Reduction (25% MD/PM/Daily):			0	0	0	-2	-2	-4	-3	-3	-6	-50
Project Buildout Total:			**64**	**55**	**119**	**30**	**32**	**62**	**39**	**34**	**73**	**872**

[1] TSF = thousand square feet

4.1.3 NET TRIP GENERATION

Table 4-4 shows the net trips generated by the Project compared to the existing use. The resulting net new trips are also identified in Table 4-4. As shown, the Project is anticipated to generate a net increase of 510 daily trips, 75 AM peak hour trips, 21 mid-day peak hour trips, and 46 PM peak hour trips in comparison to the existing uses.

TABLE 4-4: TRIP GENERATION COMPARISON

	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Project	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Existing Uses	31	13	44	18	23	41	7	20	27	362
Proposed Project	64	55	119	30	32	62	39	34	73	872
Variance (Proposed - Existing)	**33**	**42**	**75**	**12**	**9**	**21**	**32**	**14**	**46**	**510**

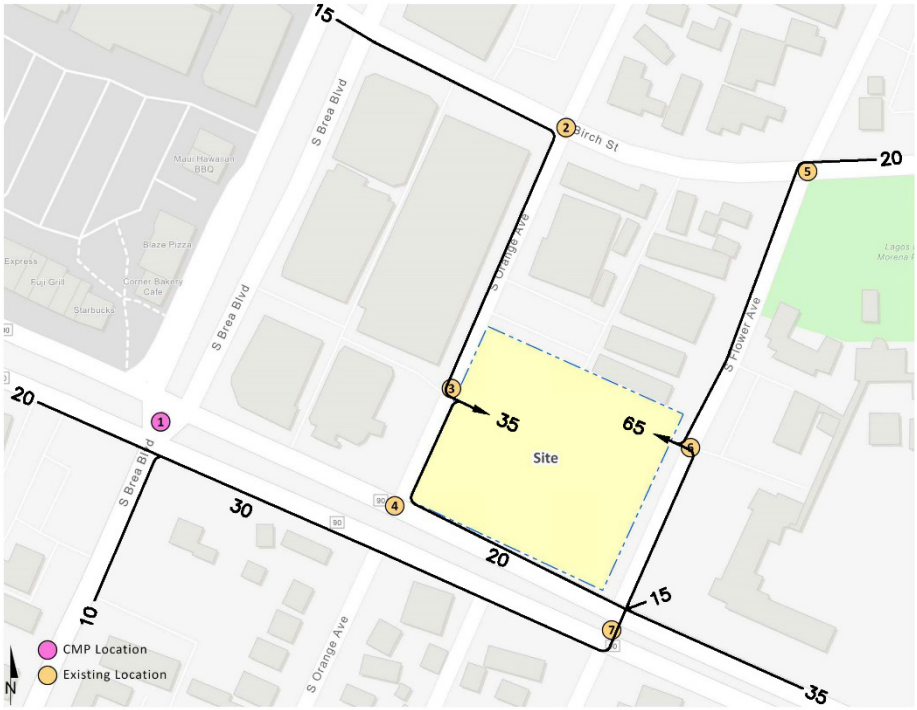
4.2 PROJECT TRIP DISTRIBUTION

The Project trip distribution represents the directional orientation of traffic to and from the Project site. Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. Exhibit 4-1 shows the Project trip distribution patterns with the Existing roadway network while Exhibit 4-2 shows the modified Project trip distribution patterns used for Without Flower Connection traffic conditions. Each of these distribution patterns was reviewed by the City of Brea as part of the traffic study scoping process (see Appendix 1.1).

4.3 MODAL SPLIT

The potential for Project trips to be reduced by the use of public transit, walking or bicycling have not been included as part of the Project's estimated trip generation. Essentially, the Project's traffic projections are "conservative" in that these alternative travel modes would reduce the forecasted traffic volumes.

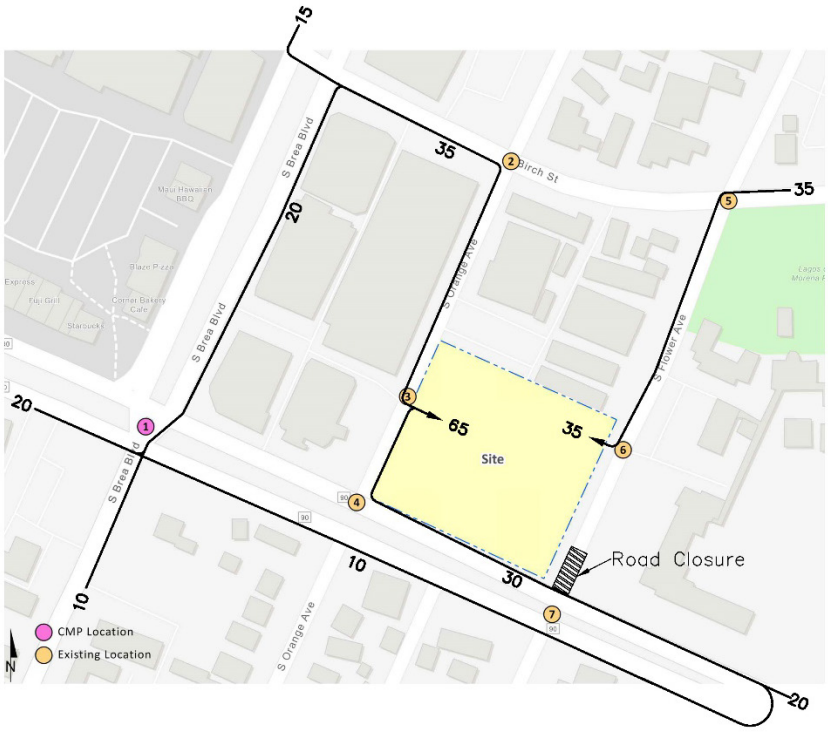
EXHIBIT 4-1: PROJECT TRIP DISTRIBUTION – WITH FLOWER CONNECTION

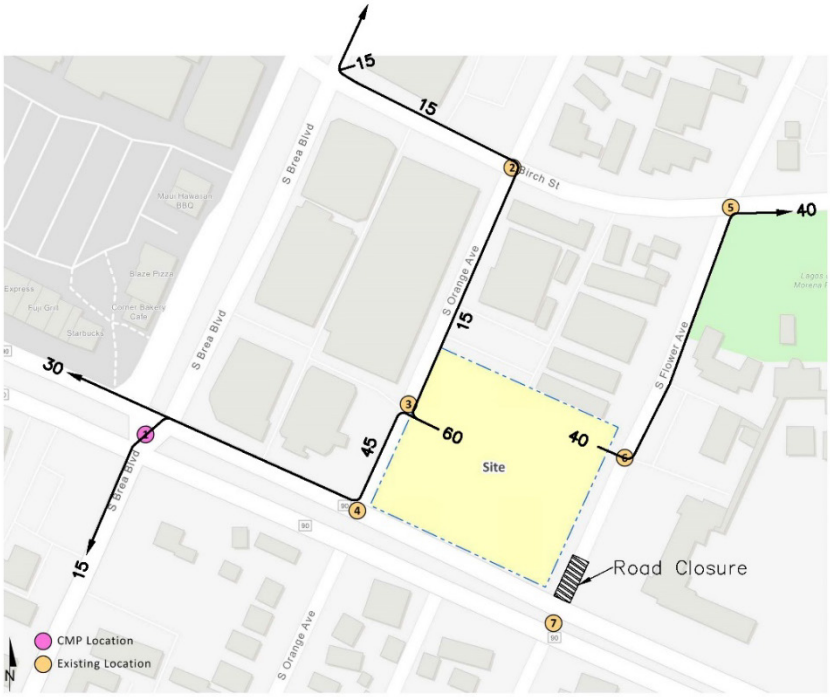




10 *= Percent From Project*

EXHIBIT 4-2: PROJECT TRIP DISTRIBUTION – WITHOUT FLOWER CONNECTION





10 = *Percent From Project*

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Pass-by weekday AM, MD, and PM peak hour intersection turning movement volumes With Flower Connection are shown on Exhibit 4-3 (MD volumes shown on second page). Pass-by weekday AM, MD, and PM peak hour intersection turning movement volumes Without Flower Connection are shown on Exhibit 4-4 (MD volumes shown on second page).

Based on the identified Project traffic generation and trip distribution patterns, Project only ADT and weekday AM, MD, and PM peak hour intersection turning movement volumes With Flower Connection are shown on Exhibit 4-5 (MD volumes shown on second page). Project only ADT and weekday AM, MD, and PM peak hour intersection turning movement volumes Without Flower Connection are shown on Exhibit 4-6 (MD volumes shown on second page). Additional Project volume development worksheets are provided in Appendix 4.1 of this report.

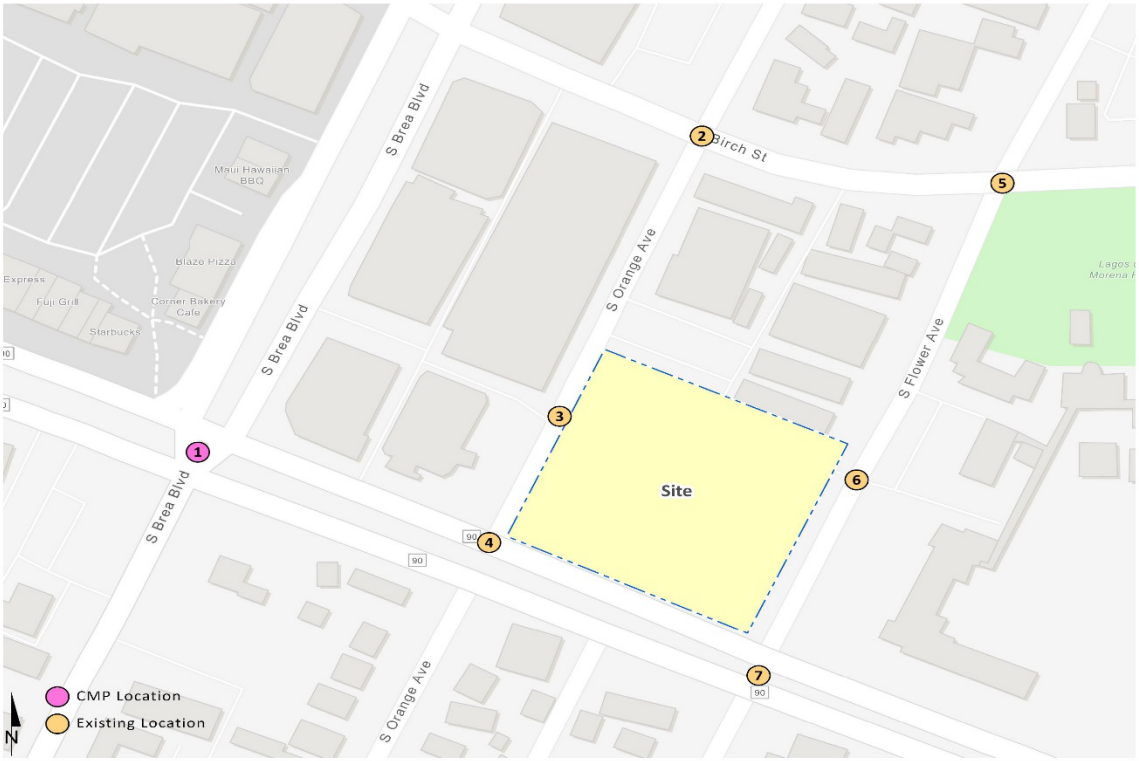
4.5 YEAR 2024 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon background (ambient) growth at 1.0% per year for 2024 traffic conditions. The ambient growth factor is intended to approximate regional traffic growth. The total ambient growth is 2.01% for 2024 traffic conditions (growth of 1.0 percent per year over 2 years). This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies. Opening Year Cumulative (2024) traffic volumes are provided in Section 6 of this report.

4.6 CUMULATIVE DEVELOPMENT TRAFFIC

A cumulative project list was developed for the purposes of this analysis through consultation with planning staff from the City of Brea. The cumulative projects listed are those that would generate traffic and would contribute traffic to study area intersections. Exhibit 4-7 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown in Table 4-5. If applicable, the traffic generated by individual cumulative projects were manually added to the Opening Year Cumulative forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-6 are reflected as part of the background traffic. In an effort to conduct a conservative analysis, the cumulative projects are added in conjunction with the ambient growth identified in Section 4.5 Background Traffic. The Cumulative ADT and weekday AM, MD, and PM peak hour intersection turning movement volumes for all cumulative development projects are shown on Exhibit 4-8 (MD volumes shown on second page). Cumulative traffic is the same for both With and Without Flower Connection as the closure of Flower Avenue at Imperial Highway (SR-90) is not anticipated to change the travel patterns of any cumulative project.

EXHIBIT 4-3: PASS-BY TRIPS – WITH FLOWER CONNECTION

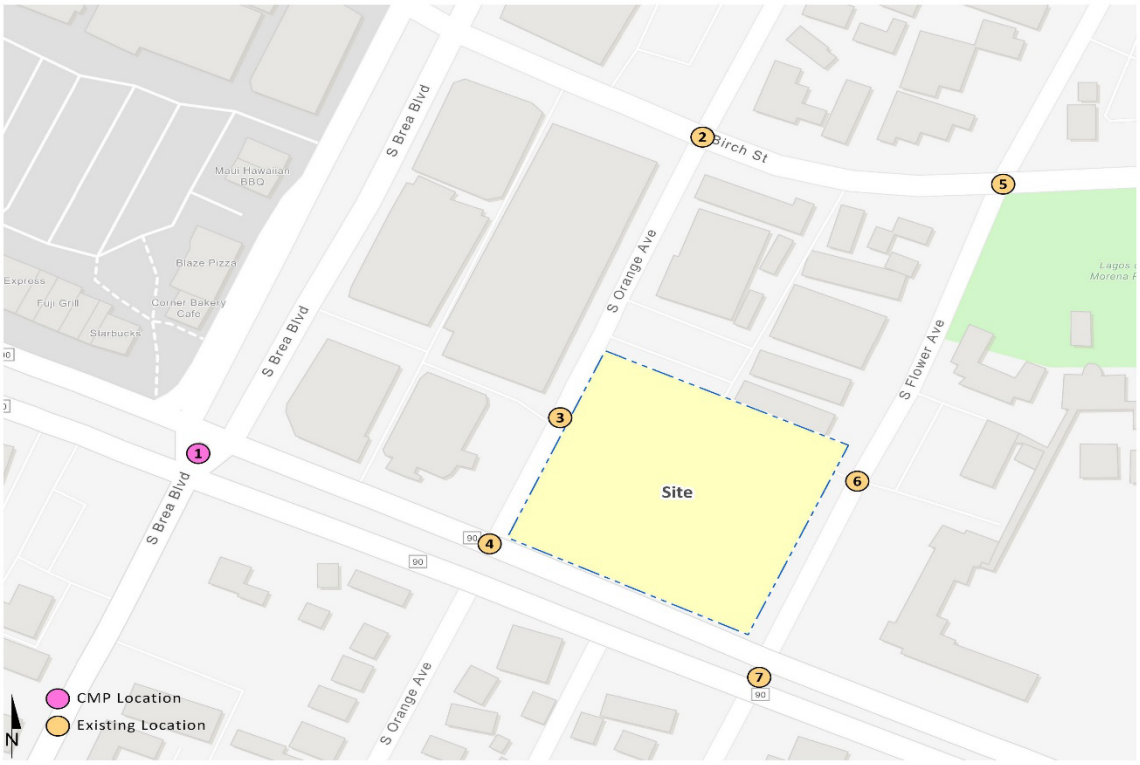


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
		← 21(12) 21(12) →	21(12) ↓ ← 21(12) ← -21(-12)

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
	21(13) → 21(13) ↓	21(13) ↓ ← 21(13) ← -21(-13)

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

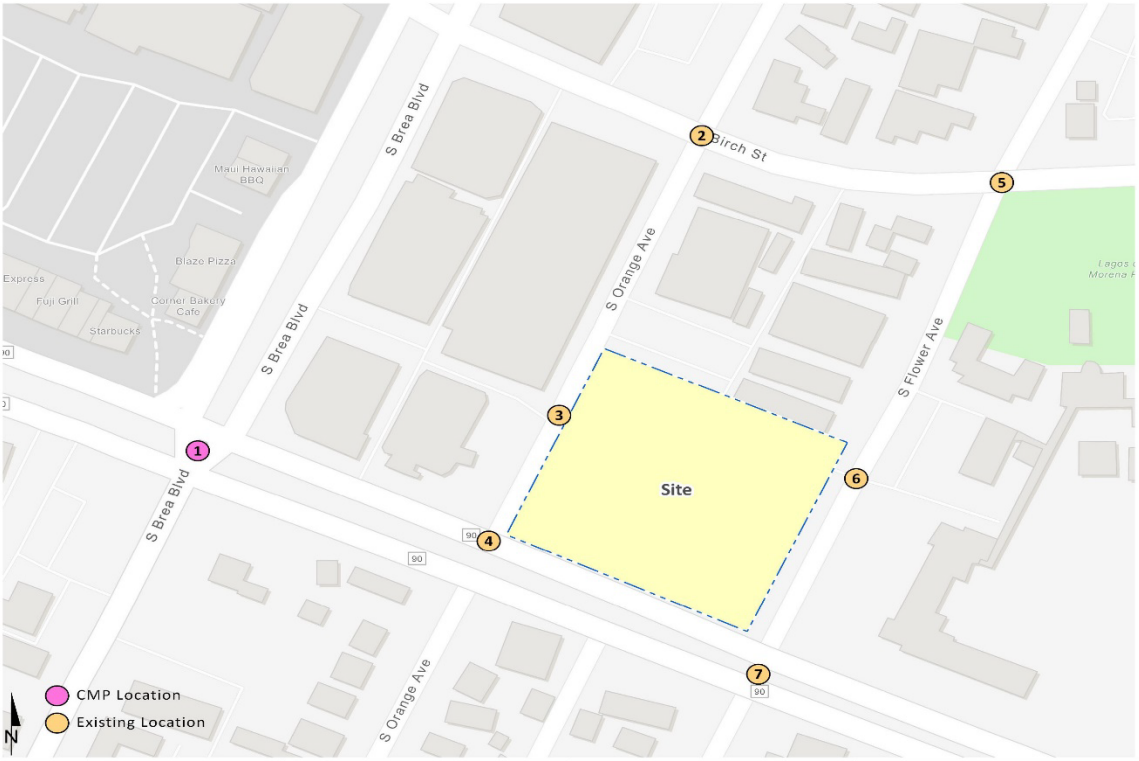


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
		← 9 9 →	9 ↓ → 9 ← -9(0)

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
	10 ↓ 10 →	10 ↓ → 10 ← -10(0)

MD Peak Hour Intersection Volumes

EXHIBIT 4-4: PASS-BY TRIPS – WITHOUT FLOWER CONNECTION

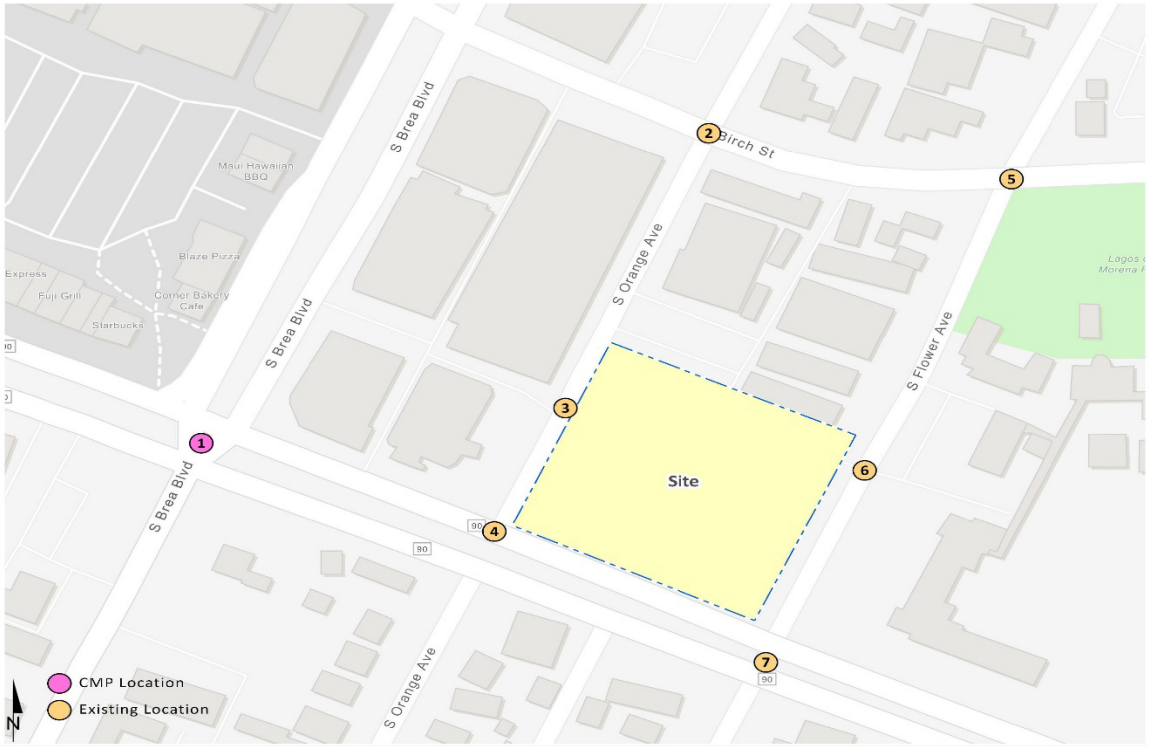


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
		← 42(25) 42(25) →	42(25) → ← 42(25) ← -42(-25)

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

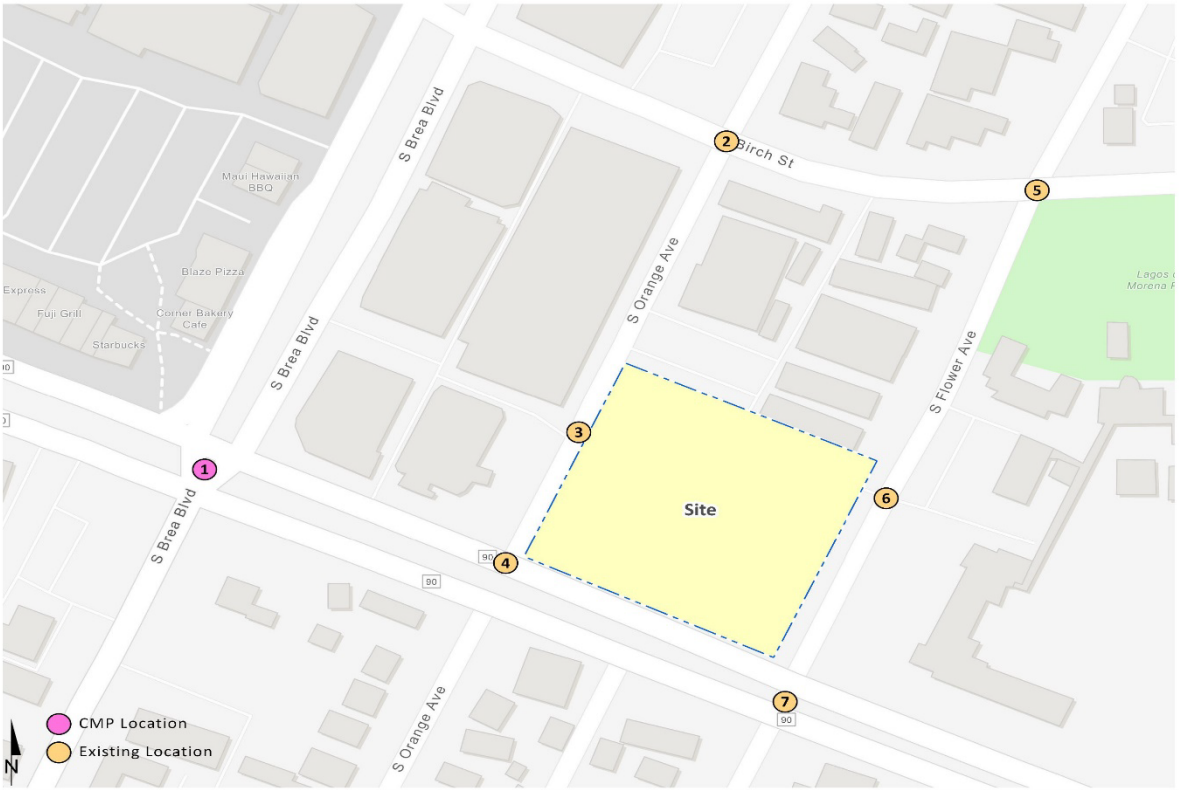


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
		↰ 19 ↱ 19	19 ↲ ↱ 19 ← -19(0)

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)

MD Peak Hour Intersection Volumes

EXHIBIT 4-5: PROJECT ONLY TRAFFIC VOLUMES – WITH FLOWER CONNECTION

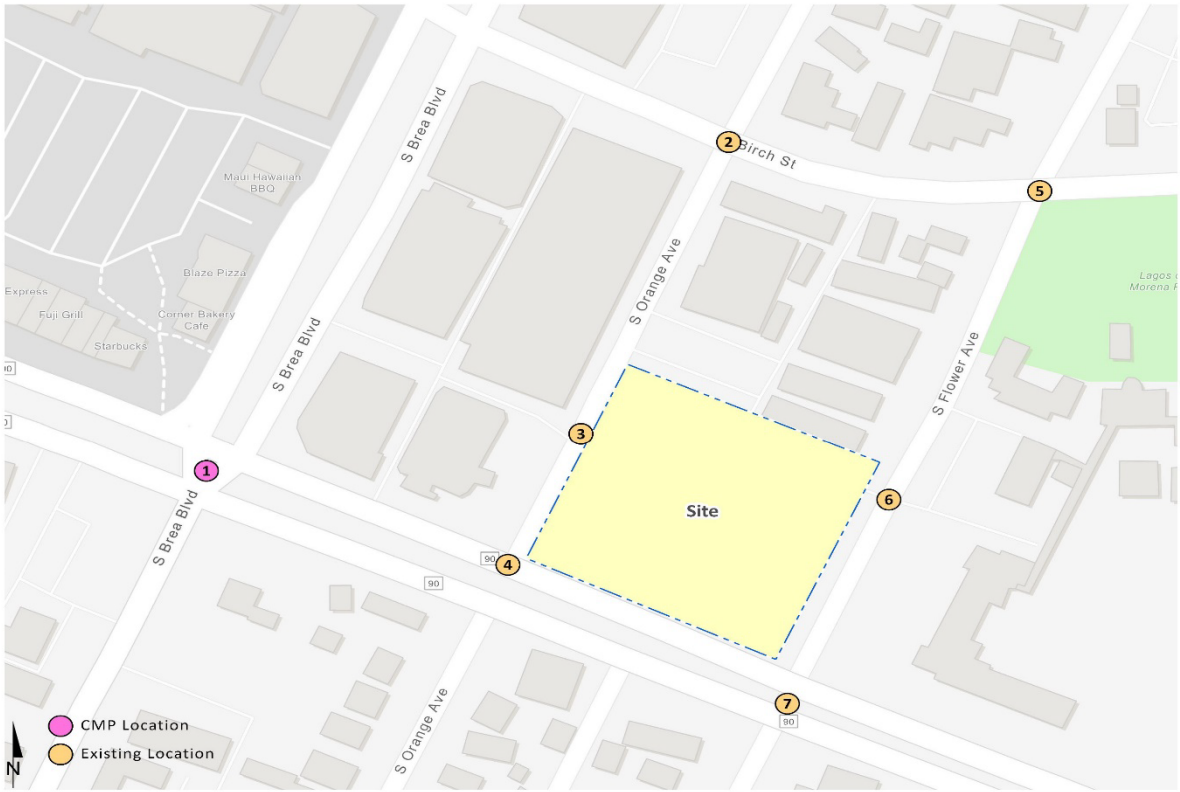


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
200 ← 13(4) ↰ 6(2) 7(6) → ↱ 3(3) 150 Nominal	5(5) ↲ ↰ 6(2) 100 100	100 5(5) ↳ 900 ↰ 6(2) ↰ 38(18) ↱ 28(18) 800	800 38(18) ↲ 150 ↰ 28(18) ← -19(-11) 10(10) → 200

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
100 ↰ 7(6) ↱ 11(4) 100	100 7(6) ↲ 11(4) ↳ 29(16) ↳ ↰ 36(27) 950 800	800 23(14) ↲ 6(2) ↳ 150 ↰ 26(18) ← -14(-7) 10(10) ↳ 150

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

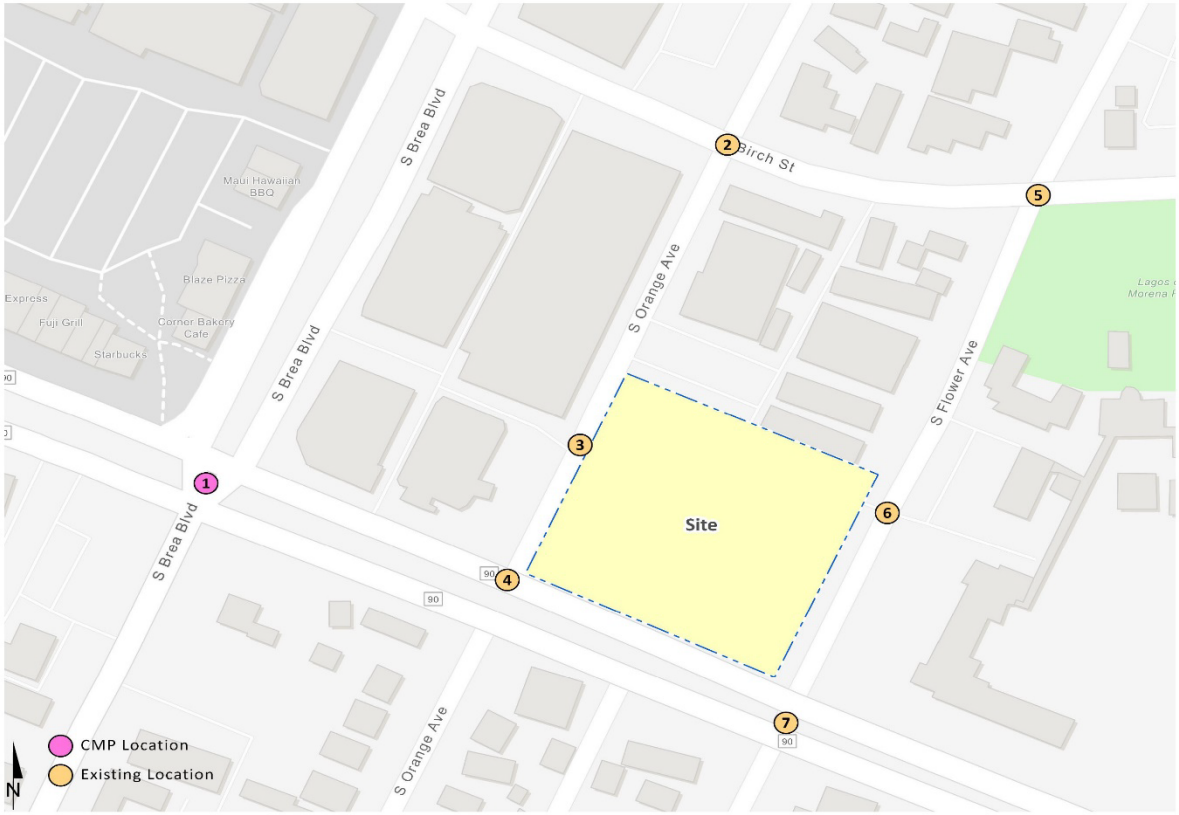


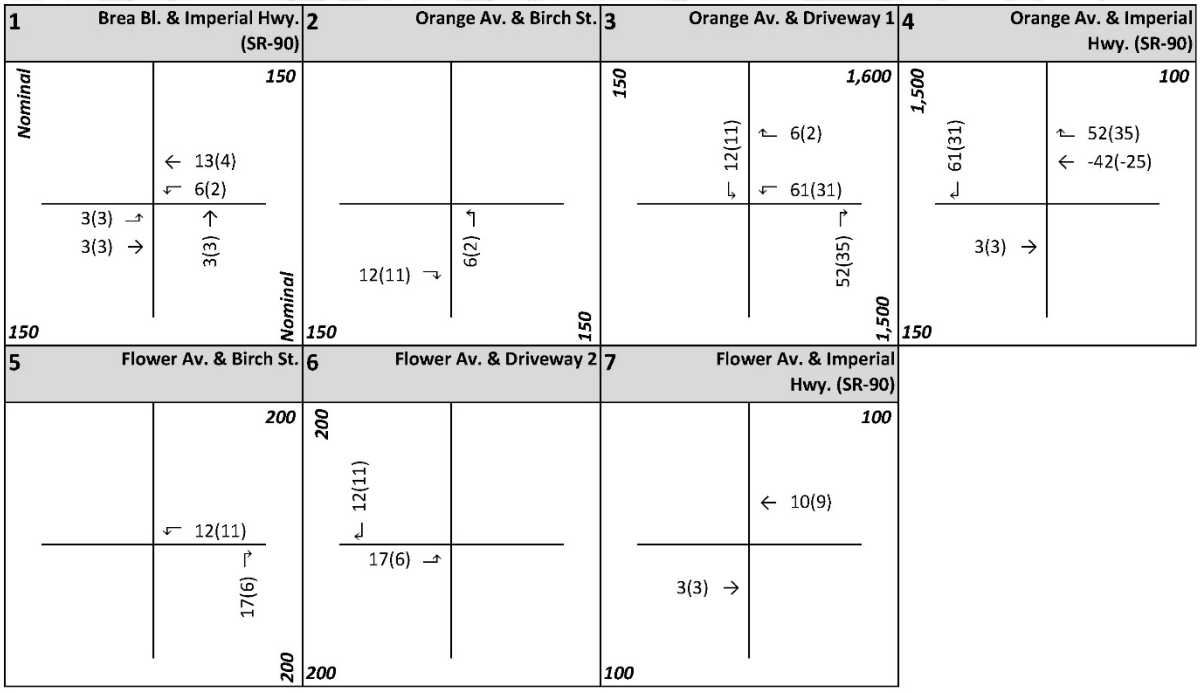
1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
← 3 ↰ 1 2 → 1 ↱	1 ↰ 2 ↲	↱ 1 2 ↳ ↰ 13 11 ↱	↱ 11 ← -9(0) ↲ 13 4 →

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↰ 2 2 ↱	↲ 2 2 ↳ 15 ↰ 12 ↲	↱ 12 ← -8(0) ↲ 10 ↳ 1 4 ↳

MD Peak Hour Intersection Volumes

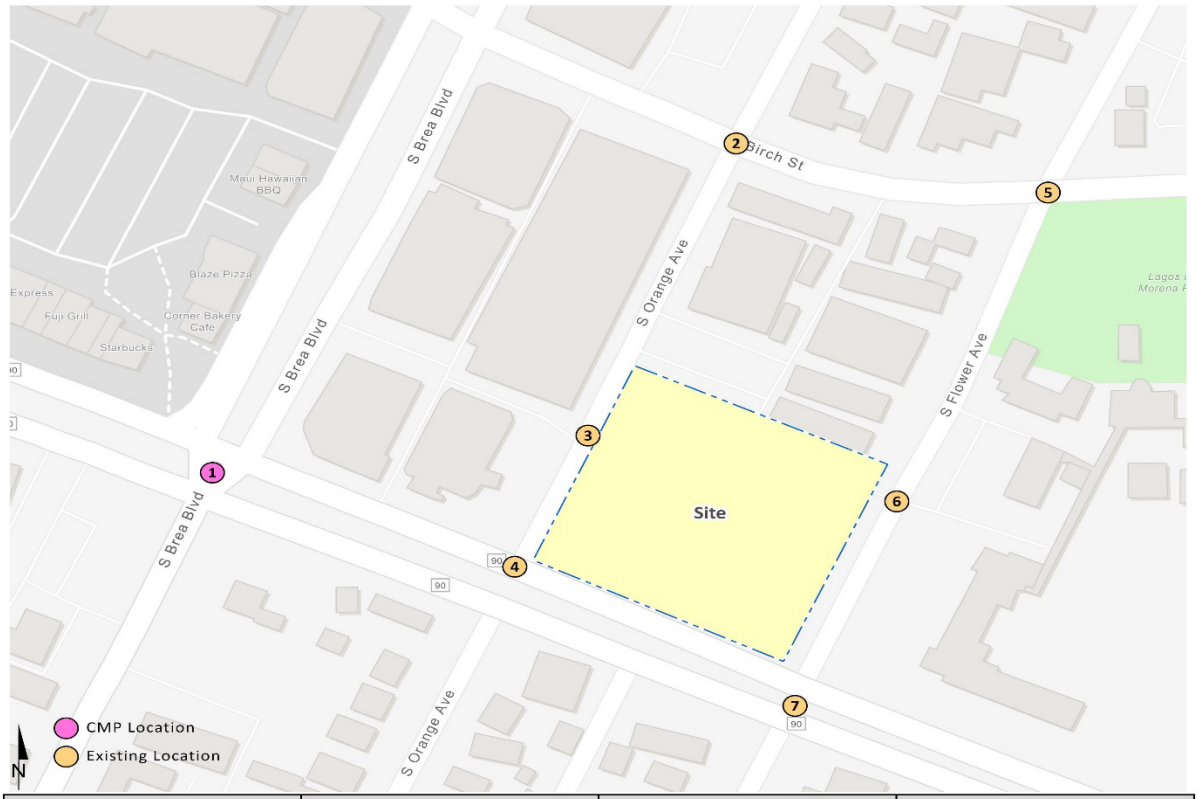
EXHIBIT 4-6: PROJECT ONLY TRAFFIC VOLUMES – WITHOUT FLOWER CONNECTION





##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
← 3 ↰ 1 1 ↳ 1 → ↑ 1	↰ 1 4 ↳	↰ 1 4 ↳ ↰ 23 ↱ 23	↰ 23 ← -19(0) 23 ↲ 1 →

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↰ 4 ↱ 4	4 ↲ 4 ↳	← 3 1 →

MD Peak Hour Intersection Volumes

CITY OF BREAEXHIBIT 4-7: CUMULATIVE DEVELOPMENT LOCATION MAP

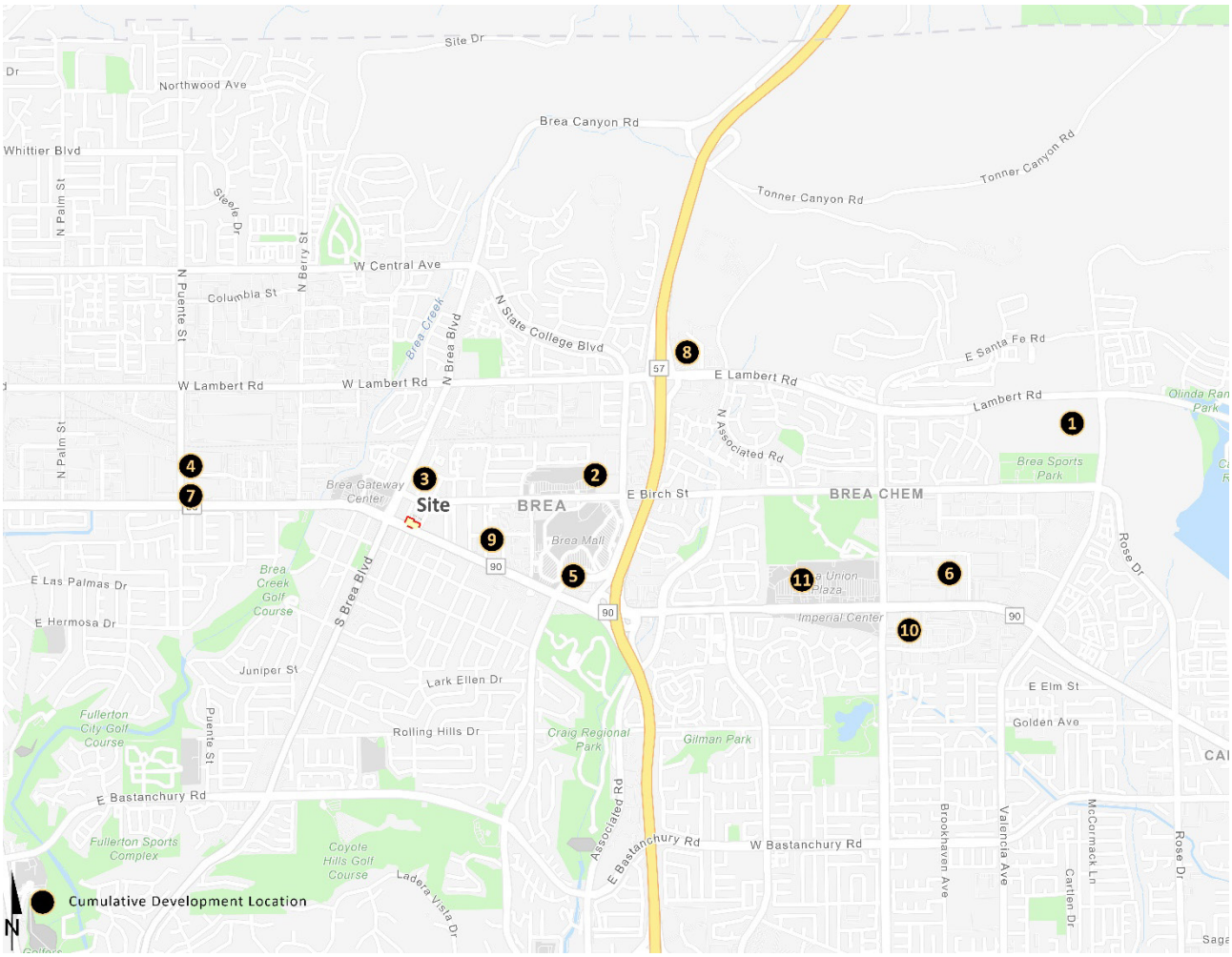
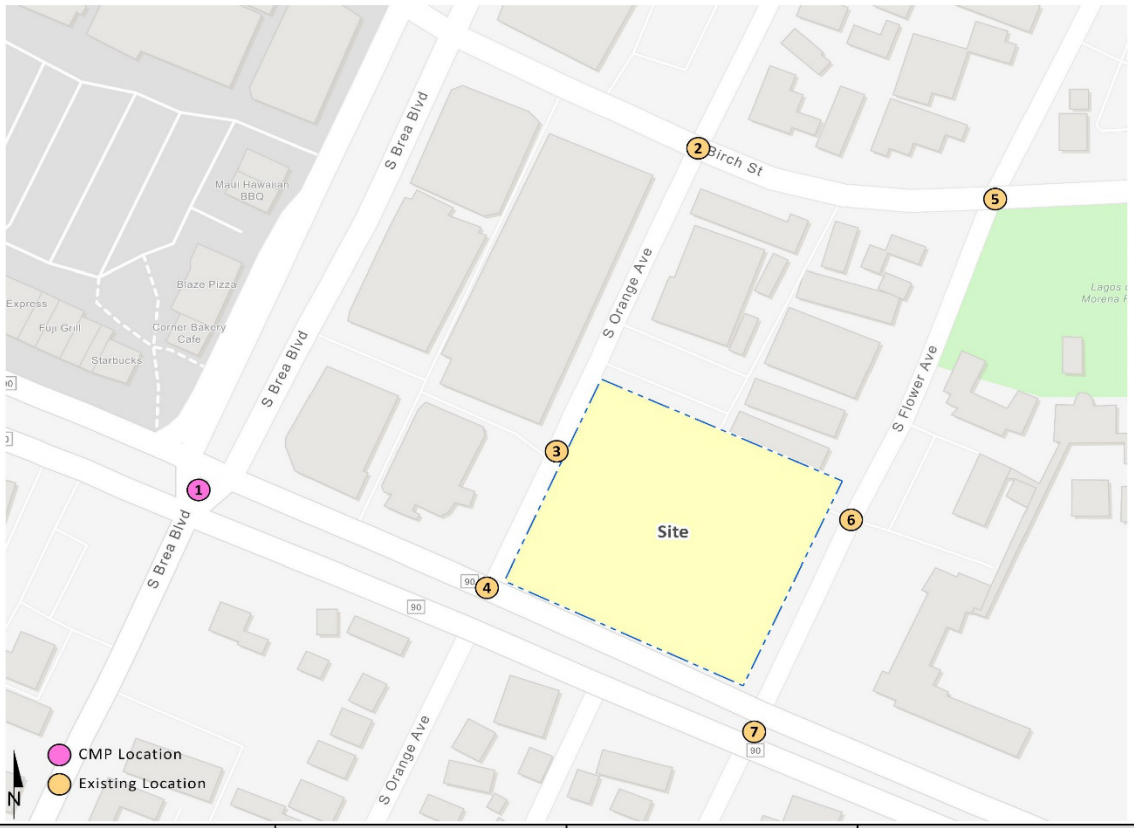


EXHIBIT 4-8: CUMULATIVE ONLY TRAFFIC VOLUMES – WITH AND WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

4,100 | *3,550*

44(33) ↲ 49(39) ↓ 40(42) ↳	↱ 23(23)
	← 239(100)
	↰ 19(19)
33(57) ⤷	↰ ↑ ↱
48(121) →	2(3) 36(56) 16(27)
2(2) ⤶	

3,450 | *1,750*

2 Orange Av. & Birch St.

2,200

	← 74(56)
49(83) →	

2,200

3 Orange Av. & Driveway 1

4 Orange Av. & Imperial Hwy. (SR-90)

3,550

	← 281(142)
104(190) →	

3,550

5 Flower Av. & Birch St.

2,200

	← 74(56)
49(83) →	

2,200

6 Flower Av. & Driveway 2

7 Flower Av. & Imperial Hwy. (SR-90)

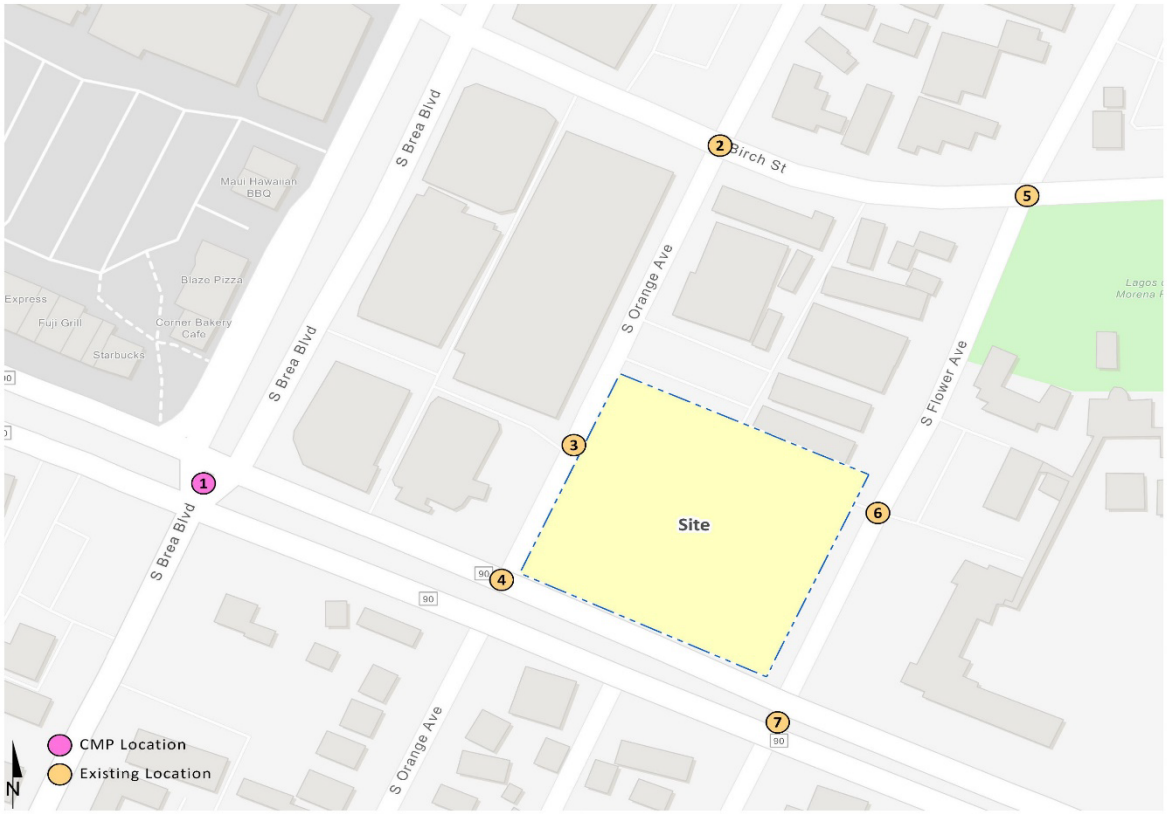
3,550

	← 281(142)
104(190) →	

3,550

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
33 ↲ 39 ↓ 42 ↳ / ↱ 23 ← 100 ↰ 19 / 57 → 121 → 2 ↴ / 3 ↰ 56 ↑ 27 ↱	← 56 / 83 →		← 142 / 190 →

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
← 56 / 83 →		← 142 / 190 →

MD Peak Hour Intersection Volumes

TABLE 4-5: CUMULATIVE DEVELOPMENT LAND USE SUMMARY

No.	Project Name (Location)	Land Use	Quantity	Units[1]
1	Brea 265 Specific Plan (Lambert at Valencia)	Single Family Detached	450	DU
		Single Family Attached	650	DU
		Sports Park	6	Fields
2	Brea Place (State College at Birch)	Multifamily Residential	653	DU
		General Office	5.000	TSF
		Hotel	150	Rooms
3	UFC Gym (220 S. Brea Bl.)	Gym	27.903	TSF
4	Mercury Apartments (580 Mercury Lane)	Multifamily Residential	114	DU
5	Brea Mall Mixed-Use (Imperial at Randolph)[2]	Retail	47.425	TSF
		Multifamily Residential	380	DU
6	Western Realco (2929 Imperial Highway)	Warehousing	131.500	TSF
7	Transwestern (285 N. Berry Street)	Warehousing	126.797	TSF
8	Starbucks (2 Pointe Dr.)	Coffee Shop with Drive-Thru	2.400	TSF
9	Alvero Assisted Living (251 S. Randolph Av.)	Assisted Living	82	Beds
10	Extra Space Self Storage (2700 E. Imperial Hwy.)	Self Storage Facility	126.546	TSF
11	Aldi Grocery Store (2395 E. Imperial Hwy.)	Grocery Store	21.106	TSF

[1] TSF = Thousand Square Feet; DU = Dwelling Units

[2] Project includes demolishing 161,990 SF of retail space.

TABLE 4-6: CUMULATIVE DEVELOPMENT TRIP GENERATION SUMMARY

	AM Peak Hour			PM Peak Hour[1]			
Cumulative Project	In	Out	Total	In	Out	Total	Daily
1. Brea 265 SP	182	452	634	542	351	893	9,351
2. Brea Place	122	271	393	300	199	499	6,364
3. Downtown Hotel	45	34	79	44	37	81	1,201
4. Mercury Apartments	11	32	43	32	21	53	653
5. Brea Mall Mixed-Use	176	172	348	303	158	461	4,487
6. Western Realco	27	7	34	10	28	38	304
7 Transwestern	15	4	19	7	18	25	222
8. Starbucks	52	51	103	35	35	70	961
9. Alvero Assisted Living	9	6	15	8	12	20	213
10. Extra Space Self Storage	6	5	11	9	10	19	183
11. Aldi Grocery Store	31	23	54	72	72	144	1,783
Total	**676**	**1,057**	**1,733**	**1,362**	**941**	**2,303**	**25,722**

[1] Conservatively have used the PM peak hour trip generation for the Mid-Day.

4.7 VOLUME DEVELOPMENT FOR GENERAL PLAN BUILDOUT CONDITIONS

Traffic projections for General Plan Buildout Without Project and With Project conditions were derived from the OCTAM Version 5.5 maintained by the OCTA. Based on the city-wide land use data and the regional socioeconomic growth projections, future trip activity is estimated and assigned to the roadway circulation system. Model output is post-processed based on established postprocessing methodologies. The post-processor applies the model's projected growth to each turning movement for both General Plan Buildout Without and With Project scenarios, forecasting a value that reflects future growth.

The traffic forecasts reflect the area-wide growth anticipated between Existing (2022) conditions and General Plan Buildout traffic conditions. In most instances the traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed. Therefore, the General Plan Buildout peak hour forecasts were refined using the model derived long range forecasts, base (validation) year model forecasts, along with existing peak hour traffic count data collected at each analysis location in September/December 2022. The OCTAM has a base (validation) year of 2016 and a horizon (future forecast) year of 2045. The difference in model volumes (2045-2016) defines the growth in traffic over the 29-year period.

The refined future peak hour approach and departure volumes obtained from the model output data are then entered into a spreadsheet program consistent with the National Cooperative Highway Research Program (NCHRP Report 765), along with initial estimates of turning movement proportions. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment forecast volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg.

The OCTAM uses an AM peak period-to-peak hour factor of 0.36 and a PM peak period-to-peak hour factor of 0.266. These factors represent the relationship of the highest single AM peak hour to the modeled 3-hour AM peak period (an even distribution would result in a factor of 0.33) and the highest single PM peak hour to the modeled 4-hour PM peak period (an even distribution would result in a factor of 0.25). Typically, the model growth is prorated and is subsequently added to the existing (base validation) traffic volumes to represent General Plan Buildout traffic conditions. In an effort to conduct a conservative analysis, reductions to traffic forecasts from either Existing traffic conditions were not assumed as part of this analysis. Future estimated peak hour traffic data was used for new intersections and intersections with an anticipated change in travel patterns to further refine the General Plan Buildout peak hour forecasts.

The future General Plan Buildout Without Project and With Project peak hour turning movements were then reviewed by Urban Crossroads, Inc. for reasonableness, and in some cases, were adjusted to achieve flow conservation, reasonable growth, and reasonable diversion between parallel routes. Flow conservation checks ensure that traffic flow between two closely spaced intersections, such as two adjacent driveway locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there is no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis. Post processing has been performed for the weekday AM and PM peak hours only as these are the only time periods where traffic model data was readily available. The post processed volumes for General Plan Buildout Without Project traffic conditions are provided in Appendix 4.2.

4.7.1 WITH FLOWER CONNECTION

Only the intersection of Brea Boulevard and Imperial Highway (SR-90) is modeled in OCTAM. All other study area intersections are not reflected in the traffic model. As such, the traffic volumes at all remaining study intersections have been calculated by applying an ambient growth factor from Existing (2022) conditions of 17% in conjunction with the traffic generated by other known or probable related projects. The total growth between existing and General Plan Buildout conditions has been determined by calculating the average growth observed at the intersection of Brea Boulevard and Imperial Highway (SR-90). The average AM and PM peak hour growth is calculated based on the growth between the final GPBO Without Project forecasted volumes (not the raw model volumes) and the 2022 existing volumes.

- Brea Boulevard & Imperial Highway (SR-90):
    - (GPBO Final Without Project forecasted AM/PM volume) / (2022 AM/PM volume) = average of 16.2% (AM) and 16.5% (PM)
    - Total Growth = 16.4% or rounded to 17%

This same total growth has been applied to develop General Plan Buildout MD peak hour volumes.

4.7.2 WITHOUT FLOWER CONNECTION

Since Flower Avenue is not a modeled roadway in the OCTAM traffic model, traffic volumes for the Without Flower Connection scenario have been developed by applying an ambient growth factor from Existing (2022) conditions of 16% in conjunction with the traffic generated by other known or probable related projects and the proposed Project under Without Flower Connection traffic conditions. Similar to With Flower Connection conditions, the average AM and PM peak hour growth is calculated based on the growth between the final GPBO Without Project forecasted volumes (not the raw model volumes) and the 2022 existing volumes. However, both the GPBO Without Project and 2022 existing volumes have been adjusted to account for the closure of Flower Avenue. Existing adjusted volumes are provided in Appendix 3.1 and Project volumes in Appendix 4.1 for Without Flower Connection conditions. As noted previously, the volumes for other related project (cumulative projects) are the same for With and Without Flower Connection conditions.

5 OPENING YEAR CUMULATIVE (2024) TRAFFIC CONDITIONS

This section discusses the traffic forecasts for Opening Year Cumulative (2024) conditions and the resulting intersection operations, traffic signal warrant, and intersection queuing analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative conditions (e.g., intersection and roadway improvements at the Project's frontage and driveways).
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for Opening Year Cumulative conditions (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).

5.2 WITH FLOWER CONNECTION TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 2.01% plus traffic from pending and approved but not yet constructed known development projects in the area. The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for Opening Year Cumulative (2024) Without Project With Flower Connection traffic conditions are shown on Exhibit 5-1 (MD volumes shown on second page).

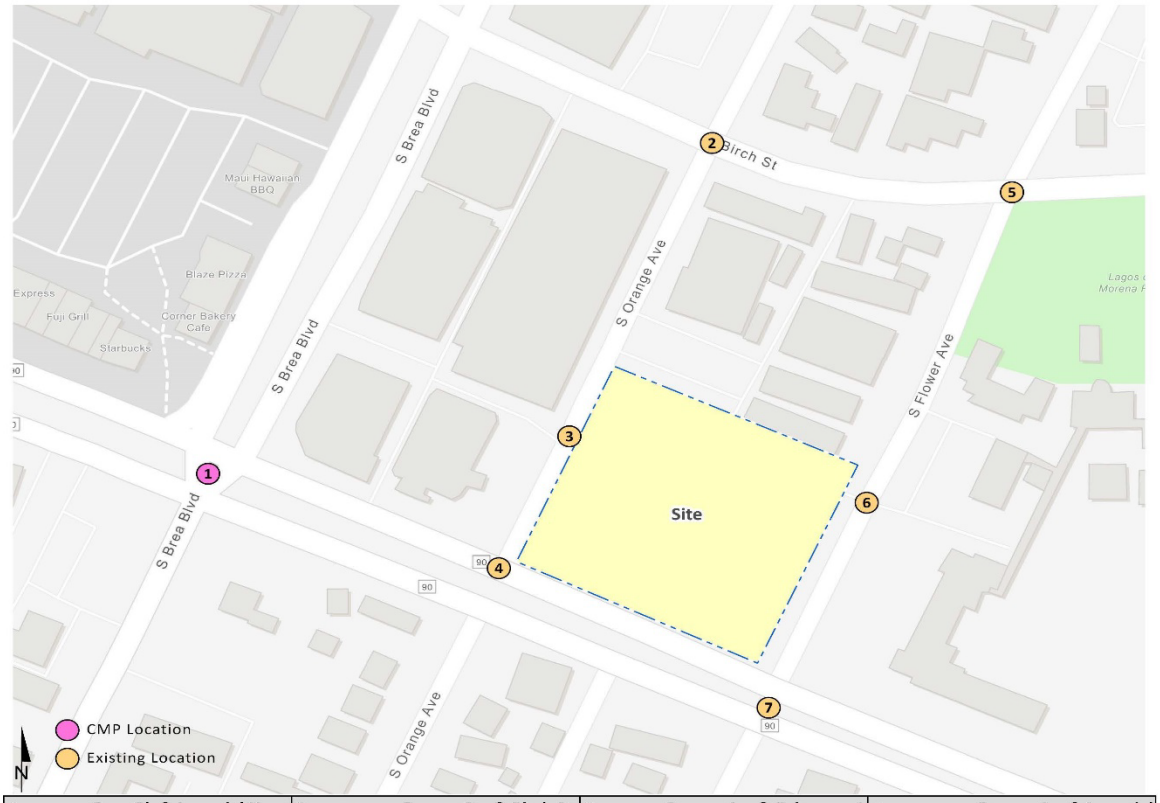
This scenario includes Opening Year Cumulative (2024) Without Project With Flower Connection volumes plus Project (With Flower Connection) traffic. The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for Opening Year Cumulative (2024) With Project With Flower connection traffic conditions are shown on Exhibit 5-2 (MD volumes shown on second page).

5.3 WITHOUT FLOWER CONNECTION TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 2.01% plus traffic from pending and approved but not yet constructed known development projects in the area. However, baseline volumes have been reallocated to account for the closure of Flower Avenue at Imperial Highway (SR-90). The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for Opening Year Cumulative (2024) Without Project Without Flower Connection traffic conditions are shown on Exhibit 5-3 (MD volumes shown on second page).

This scenario includes Opening Year Cumulative (2024) Without Project Without Flower Connection volumes plus Project (Without Flower Connection) traffic. The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for Opening Year Cumulative (2024) With Project Without Flower connection traffic conditions are shown on Exhibit 5-4 (MD volumes shown on second page).

EXHIBIT 5-1: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT TRAFFIC VOLUMES – WITH FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

30,850			54,150
193(214) ↲	627(609) ←	209(289) ↳	↱ 118(170)
			← 1511(1576)
			↰ 167(274)
176(260) ↳			
1425(1615) →			
357(441) ↲			
59,850			37,050

↰ 410(505)	↑ 476(742)	↱ 168(261)

2 Orange Av. & Birch St.

700			30,100
15(27) ↲			↱ 5(19)
			← 739(1136)
			↰ 15(31)
640(1035) →			
15(33) ↲			
29,750			1,550

↰ 6(5)	↑ 1(6)	↱ 16(42)

3 Orange Av. & Driveway 1

1,100			250
	18(37) ←	29(5) ↳	↱ 15(6)
			↰ 4(5)
			↑ 18(36)
			↱ 1(1)
			1,050

4 Orange Av. & Imperial Hwy. (SR-90)

1,050		55,350
22(42) ↲		↱ 19(37)
		← 1892(2074)
1849(2001) →		
13(18) ↲		↱ 36(27)
53,500		600

5 Flower Av. & Birch St.

1,150			31,550
13(15) ↲	10(2) ←	47(27) ↳	↱ 10(8)
			← 649(1113)
			↰ 57(89)
18(24) ↳			
653(1080) →			
14(7) ↲			
30,000			2,350

↰ 82(15)	↑ 47(10)	↱ 26(55)

6 Flower Av. & Driveway 2

2,450			100
21(19) ↲	102(64) ←	18(4) ↳	↱ 2(1)
			↰ 0(1)
16(6) ↳			
4(6) ↲			
650			2,350

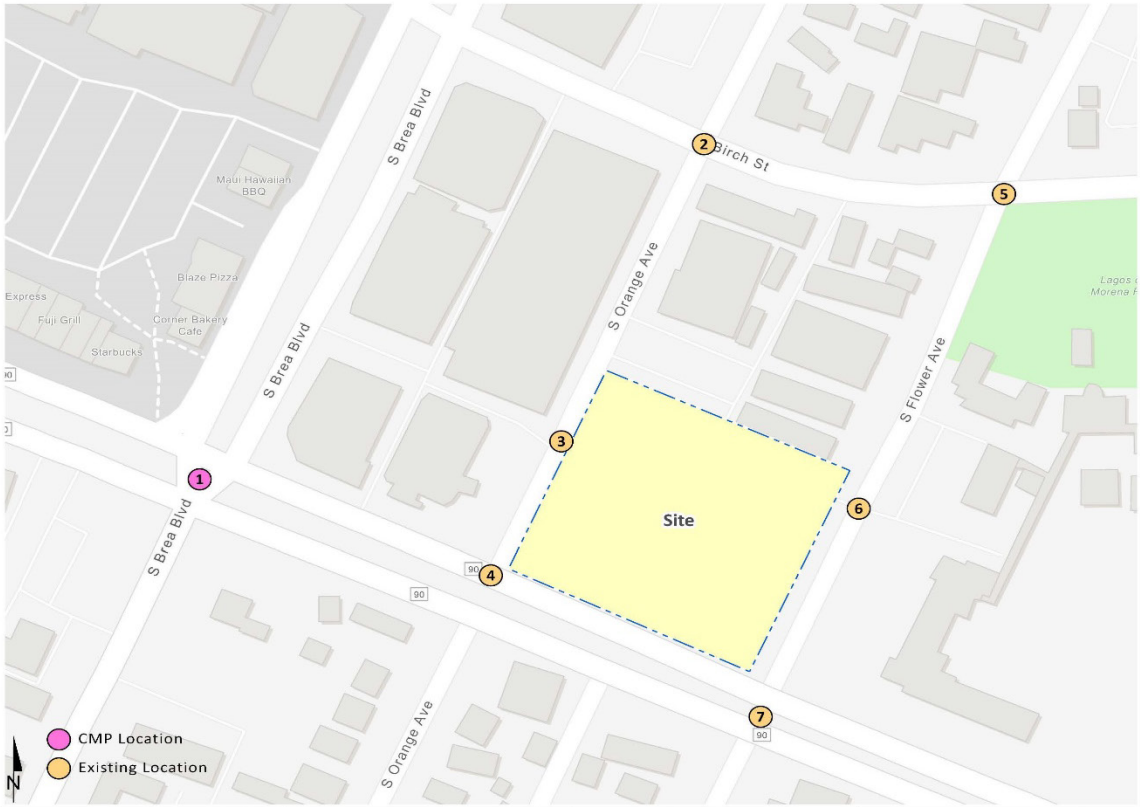
↰ 26(16)	↑ 167(90)	↱ 12(3)

7 Flower Av. & Imperial Hwy. (SR-90)

2,300			53,650
	74(57) ↲	7(14) ↳	↱ 123(66)
			← 1837(2054)
82(43) ↳			
1762(2006) →			↱ 4(7)
3(5) ↲			
55,350			150

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)

		↱ 161
↲ 244	← 563	↰ 296
	↳ 282	← 1437
260 ↳	↰ 398	
1332 →	→ 598	
338 ↲	↱ 233	

2 Orange Av. & Birch St.

		↱ 20
↲ 21		← 1011
		↰ 23
913 →	↰ 14	
37 ↲	→ 1	
	↱ 68	

3 Orange Av. & Driveway 1

		↱ 19
← 49	↳ 22	↰ 8
	→ 29	
	↱ 6	

4 Orange Av. & Imperial Hwy. (SR-90)

		↱ 35
↲ 57		← 1997
1871 →		
21 ↲	↱ 23	

5 Flower Av. & Birch St.

		↱ 19
↲ 20	← 3	← 994
	↳ 34	↰ 78
26 ↳	↰ 44	
958 →	→ 36	
19 ↲	↱ 52	

6 Flower Av. & Driveway 2

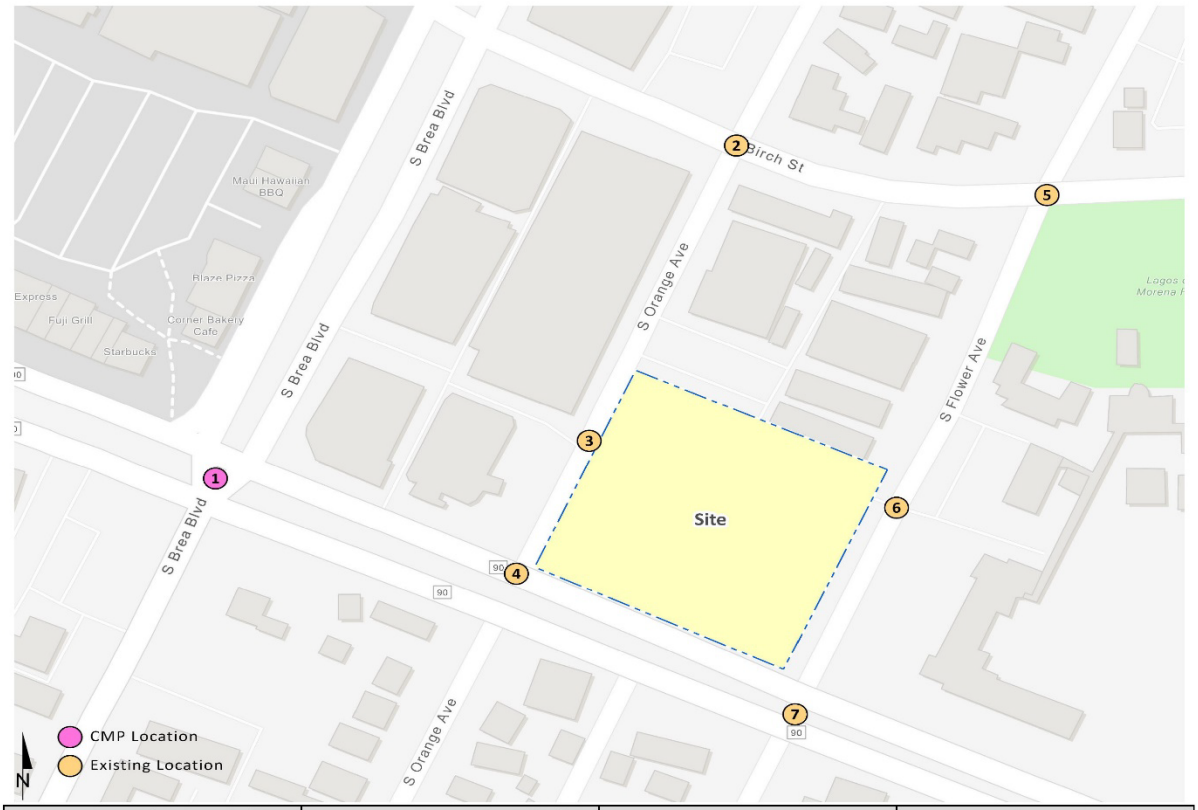
		↱ 1
↲ 3	← 72	
	↳ 10	
	↰ 3	
	→ 101	
	↱ 8	

7 Flower Av. & Imperial Hwy. (SR-90)

		↱ 65
↲ 60	← 12	← 1971
47 ↳		
1814 →		
13 ↲	↱ 3	

MD Peak Hour Intersection Volumes

EXHIBIT 5-2: OPENING YEAR CUMULATIVE (2024) WITH PROJECT TRAFFIC VOLUMES – WITH FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

30,850									54,350
	193(214)	627(609)	209(289)				↱	118(170)	
	↲	↓	↳				←	1524(1580)	
							↰	173(276)	
	176(260)	→		↰	↑	↱			
	1432(1621)	→		410(505)	476(742)	171(264)			
	357(441)	↴							37,100
60,000									

2 Orange Av. & Birch St.

700									30,100
	15(27)						↱	5(19)	
	↲						←	739(1136)	
							↰	15(31)	
	640(1035)	→		↰	↑	↱			
	20(38)	↴		12(7)	1(6)	16(42)			
29,800									1,600

3 Orange Av. & Driveway 1

1,200									1,100
	18(37)	34(10)					↱	21(8)	
	←	↳							
							↰	42(23)	
					↑	↱			
				18(36)	29(19)				
									1,850

4 Orange Av. & Imperial Hwy. (SR-90)

1,850									55,500
	60(60)						↱	47(55)	
	↲						←	1873(2063)	
						↱			
	1859(2011)	→				36(27)			
	13(18)	↴							600
53,700									

5 Flower Av. & Birch St.

1,150									31,650
	13(15)	10(2)	47(27)				↱	10(8)	
	↲	↓	↳				←	649(1113)	
							↰	64(95)	
	18(24)	→		↰	↑	↱			
	653(1080)	→		82(15)	47(10)	37(59)			
	14(7)	↴							2,450
30,000									

6 Flower Av. & Driveway 2

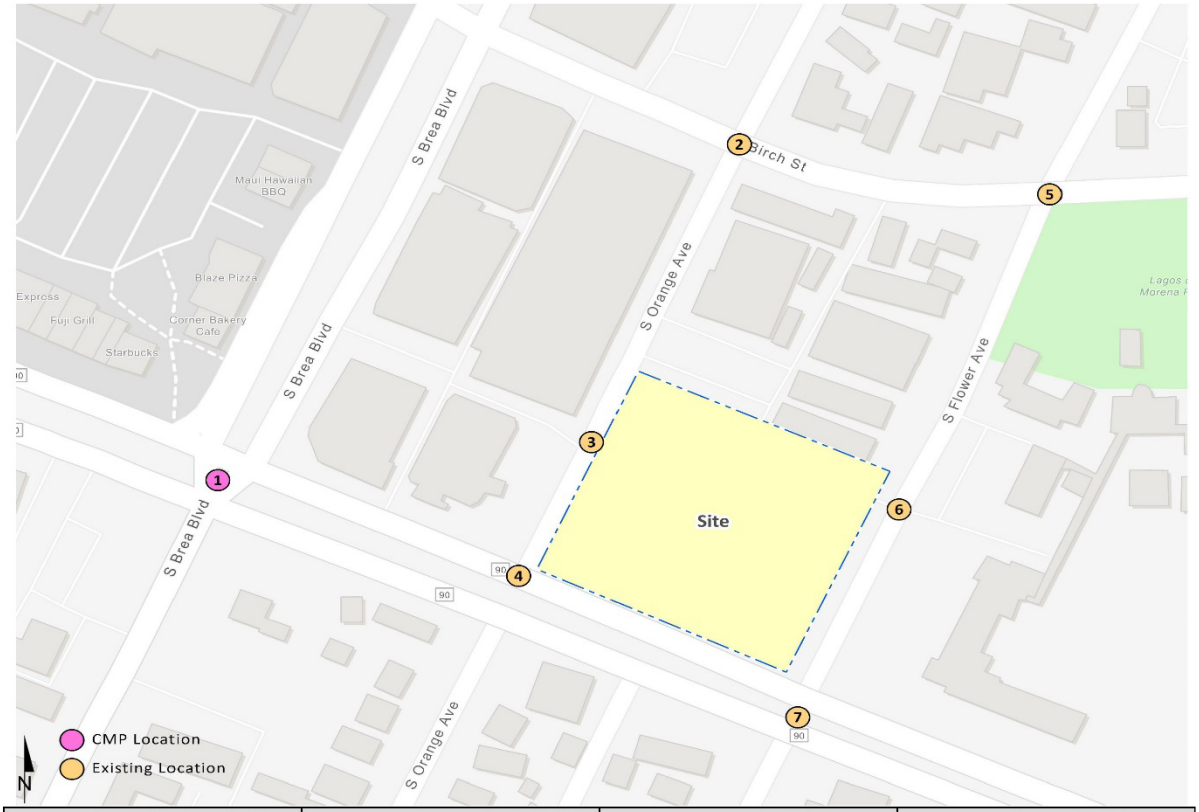
2,550									100
	28(25)	102(64)	18(4)				↱	2(1)	
	↲	↓	↳				↰	0(1)	
	27(10)	→		↰	↑	↱			
				62(43)	167(90)	12(3)			
	33(22)	↴							3,200
1,550									

7 Flower Av. & Imperial Hwy. (SR-90)

3,100									53,800
	97(71)	13(16)					↱	149(84)	
	↲	↳					←	1823(2047)	
	92(53)	→				↱			
	1762(2006)	→				4(7)			
	3(5)	↴							150
55,500									

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

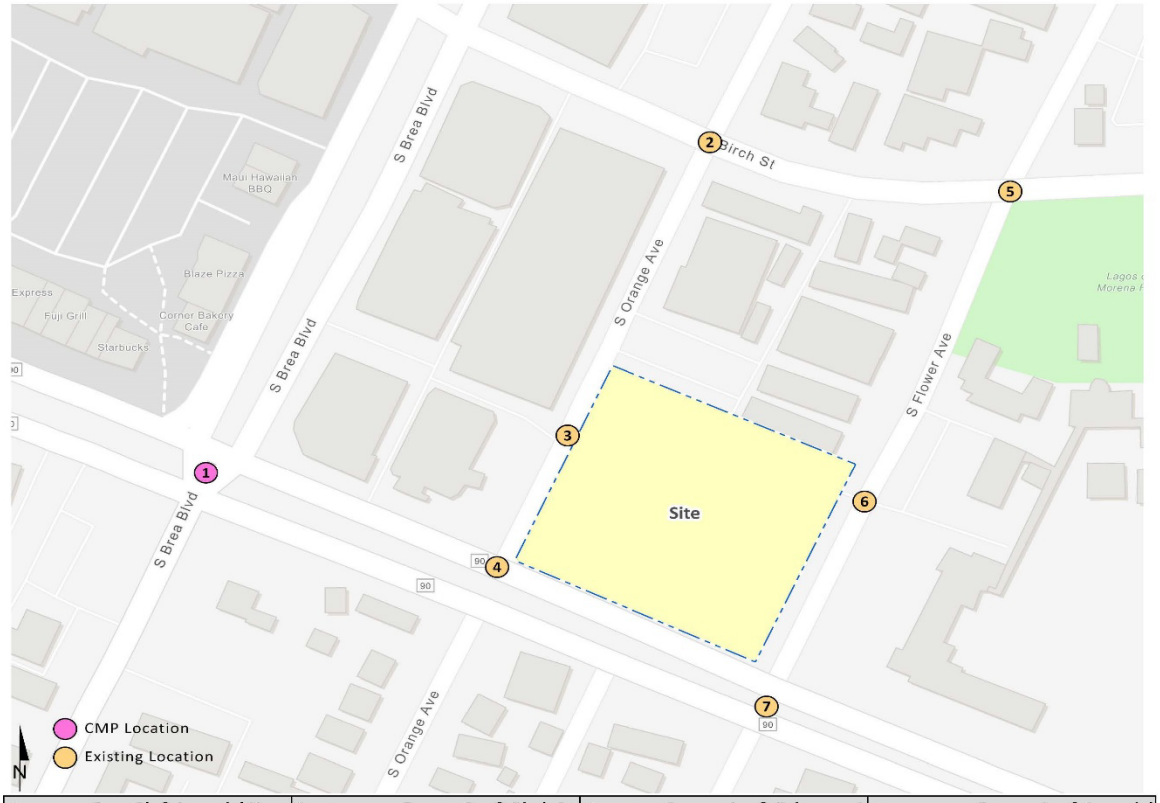


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
↲ 244 ↓ 563 ↳ 282 260 ↳ 1334 → 338 ↲ ↰ 398 ↑ 598 ↱ 234 ↱ 161 ← 1440 ↰ 297	↲ 21 913 → 39 ↲ ↰ 15 ↑ 1 ↱ 68 ↱ 20 ← 1011 ↰ 23	← 49 ↳ 24 ↰ 29 ↱ 17 ↱ 20 ↰ 21	↲ 70 1875 → 21 ↲ ↱ 23 ↱ 46 ← 1988

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↲ 20 ↓ 3 ↳ 34 26 ↳ 958 → 19 ↲ ↰ 44 ↑ 36 ↱ 54 ↱ 19 ← 994 ↰ 80	↲ 5 ↓ 72 ↳ 10 2 ↳ 12 ↲ ↰ 18 ↑ 101 ↱ 8 ↱ 1	↲ 70 ↳ 13 51 ↳ 1814 → 13 ↲ ↱ 3 ↱ 77 ← 1963

MD Peak Hour Intersection Volumes

EXHIBIT 5-3: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT TRAFFIC VOLUMES – WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

			52,650
32,050	267(271) ↲	627(609) ↓	209(289) ↳
			↱ 118(170)
			← 1437(1519)
			↰ 167(274)
257(303) ↳			
1344(1573) →			
357(441) ↲			
	410(505) ↰	476(742) ↑	168(261) ↱
59,650			36,900

2 Orange Av. & Birch St.

700			31,300
	15(27) ↲		↱ 5(19)
			← 814(1193)
			↰ 15(31)
721(1078) →			
15(33) ↲			
	6(5) ↰	1(6) ↑	16(42) ↱
30,950			1,500

3 Orange Av. & Driveway 1

1,100			250
	18(37) ↓	29(5) ↳	↰ 4(5)
			↱ 15(6)
		18(36) ↑	1(1) ↱
1,050			

4 Orange Av. & Imperial Hwy. (SR-90)

1,050			52,400
	22(42) ↲		↱ 19(37)
			← 1817(2017)
1768(1958) →			
13(18) ↲			
			36(27) ↱
52,000			600

5 Flower Av. & Birch St.

1,150			32,450
	13(15) ↲	10(2) ↓	47(27) ↳
			↱ 10(8)
			← 649(1113)
			↰ 181(155)
18(24) ↳			
653(1080) →			
96(50) ↲			
	156(72) ↰	47(10) ↑	33(69) ↱
31,200			4,700

6 Flower Av. & Driveway 2

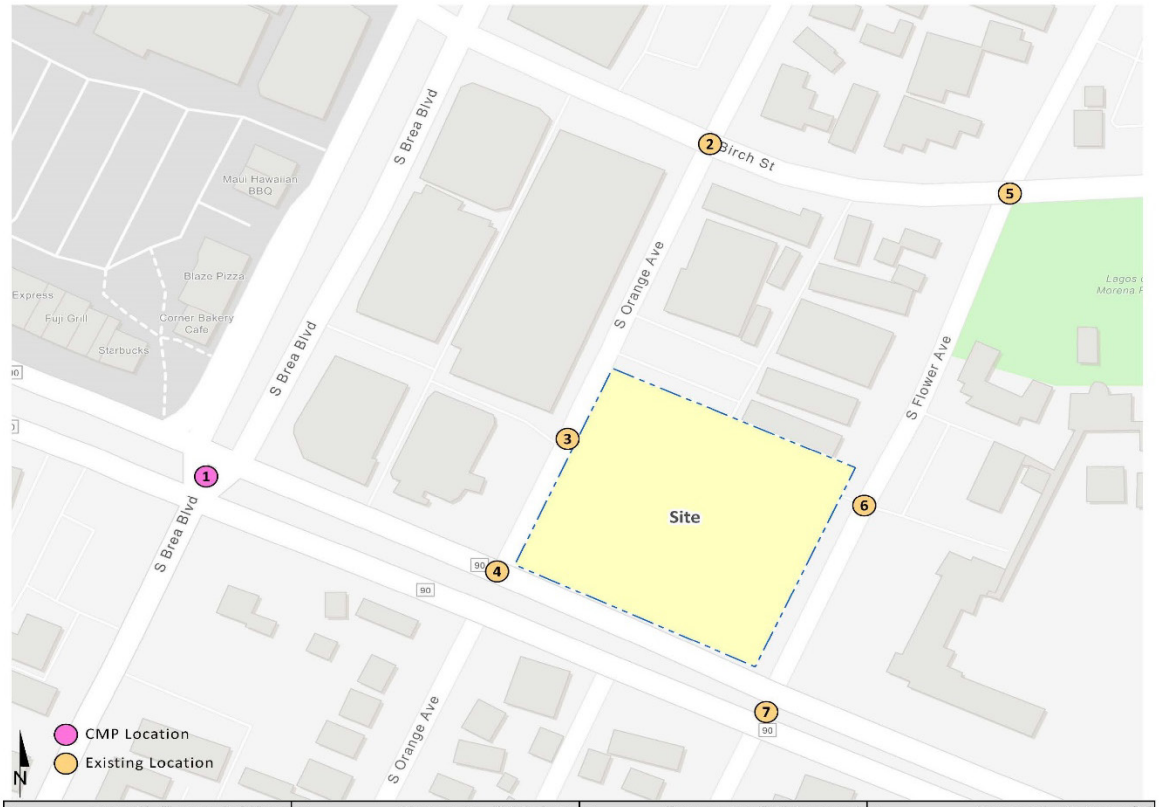
750			100
	47(36) ↲	31(7) ↳	↱ 2(2)
20(12) ↳			
650			

7 Flower Av. & Imperial Hwy. (SR-90)

			52,400
			← 1837(2054)
1762(2006) →			
3(5) ↲			
			4(7) ↱
52,400			150

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)

		↱ 161
		← 1377
↲ 304	↓ 563	↰ 296
307 ↳	↰ 398	
1285 →	↑ 598	
338 ↲	↱ 233	

2 Orange Av. & Birch St.

		↱ 20
		← 1071
↲ 21		↰ 23
960 →	↰ 14	
37 ↲	↑ 1	
	↱ 68	

3 Orange Av. & Driveway 1

		↱ 19
← 49	↳ 22	↰ 8
	↑ 29	
	↱ 6	

4 Orange Av. & Imperial Hwy. (SR-90)

		↱ 35
		← 1936
↲ 57		
1824 →		
21 ↲	↱ 23	

5 Flower Av. & Birch St.

		↱ 19
		← 994
↲ 20	↓ 3	↰ 143
26 ↳	↰ 104	
958 →	↑ 36	
66 ↲	↱ 64	

6 Flower Av. & Driveway 2

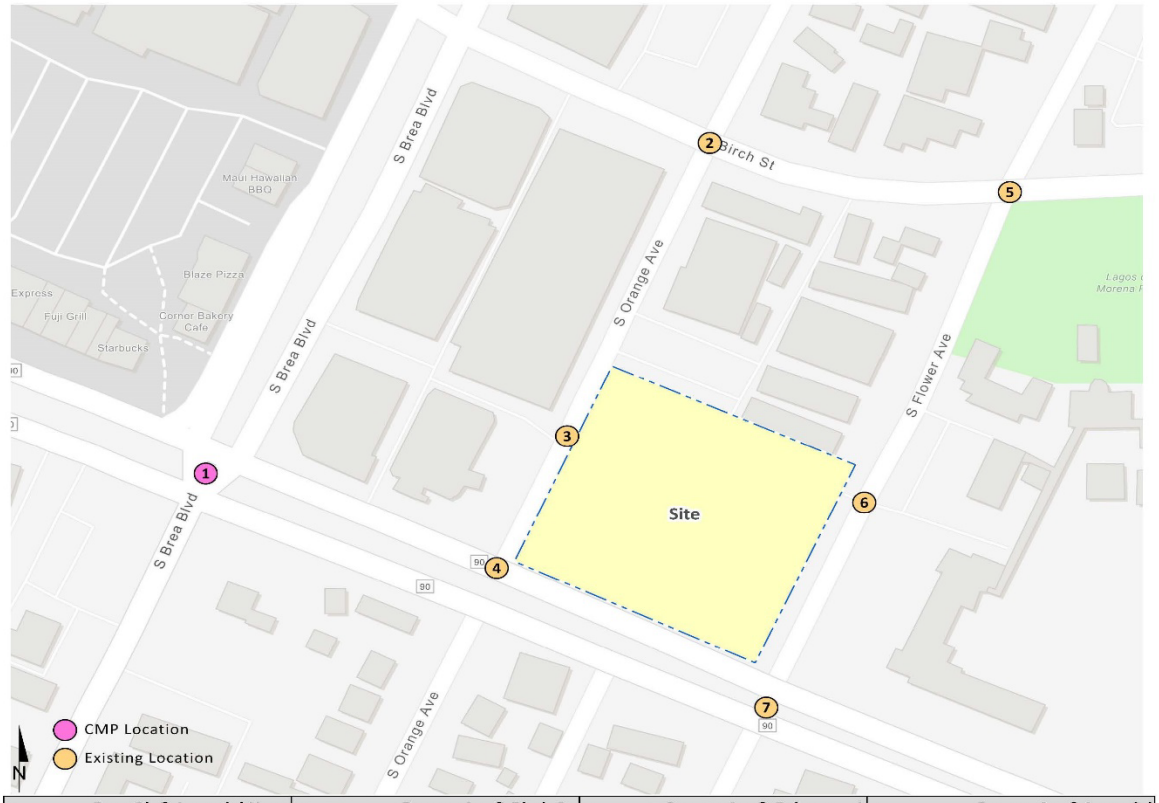
		↱ 1
↲ 6	↳ 18	

7 Flower Av. & Imperial Hwy. (SR-90)

		← 1971
		↱ 3
1814 →		
13 ↲		

MD Peak Hour Intersection Volumes

EXHIBIT 5-4: OPENING YEAR CUMULATIVE (2024) WITH PROJECT TRAFFIC VOLUMES – WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

	267(271) ↲	627(609) ↓	209(289) ↳
260(306) ↳			
1347(1576) →			
357(441) ↴			

	↰ 118(170)	↑ 1450(1523)	↱ 173(276)
↰ 410(505)			
↑ 479(745)			
↱ 168(261)			

32,100 — 52,800 — 59,750 — 36,950

2 Orange Av. & Birch St.

	15(27) ↲		
721(1078) →			
27(44) ↴			

	↰ 5(19)	↑ 814(1193)	↱ 15(31)
↰ 12(7)			
↑ 1(6)			
↱ 16(42)			

700 — 31,300 — 31,050 — 1,650

3 Orange Av. & Driveway 1

	18(37) ↓	41(16) ↳	

		↰ 21(8)	
	↑ 18(36)	↱ 53(36)	↰ 65(36)

1,200 — 1,850 — 2,500

4 Orange Av. & Imperial Hwy. (SR-90)

	83(73) ↲		
1771(1961) →			
13(18) ↴			

	↰ 71(72)	↑ 1775(1992)	
		↱ 36(27)	

2,500 — 52,500 — 52,150 — 600

5 Flower Av. & Birch St.

	13(15) ↲	10(2) ↓	47(27) ↳
18(24) ↳			
653(1080) →			
96(50) ↴			

	↰ 10(8)	↑ 649(1113)	↱ 193(166)
↰ 156(72)			
↑ 47(10)			
↱ 50(75)			

1,150 — 32,650 — 31,200 — 4,900

6 Flower Av. & Driveway 2

	59(47) ↲	31(7) ↳	
37(18) ↳			

	↰ 2(2)		

950 — 100 — 800

7 Flower Av. & Imperial Hwy. (SR-90)

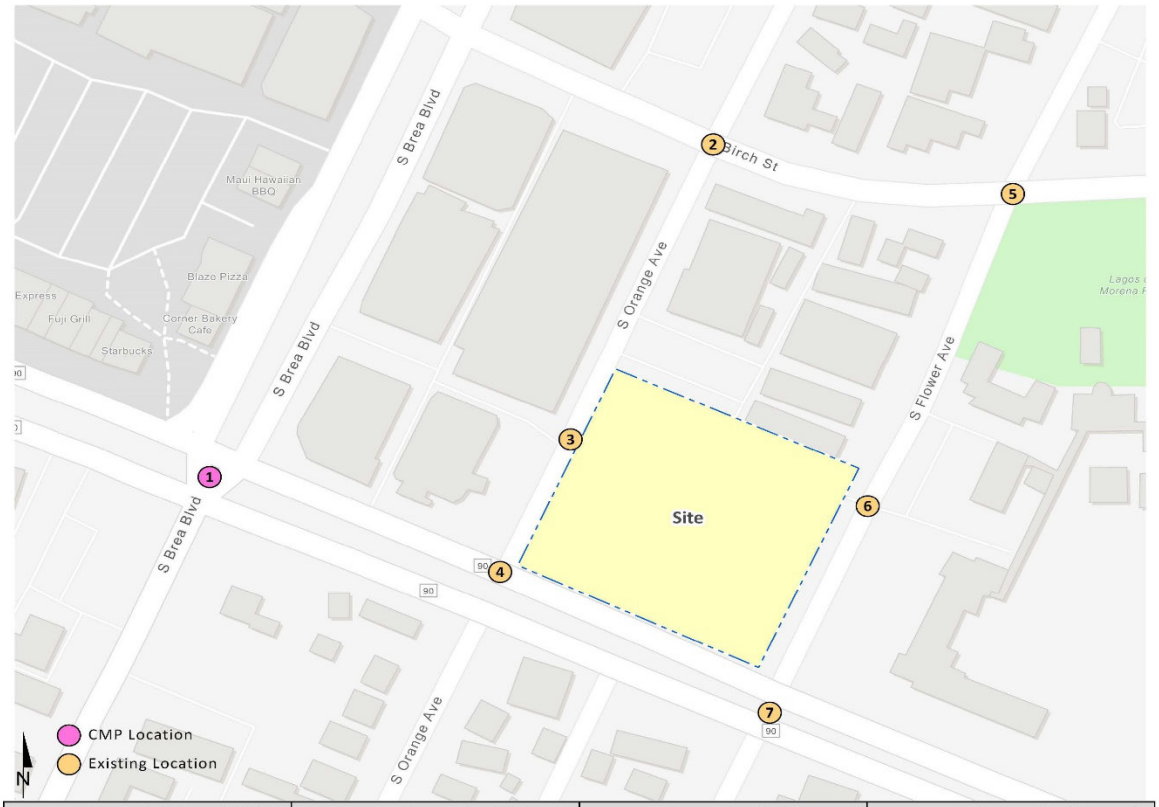
1765(2009) →			
3(5) ↴			

		← 1847(2063)	
		↱ 4(7)	

52,500 — 52,450 — 150

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
↲ 304 ↓ 563 ↳ 282 ↱ 161 ↑ 1380 ↰ 297 308 ↳ 1286 → 338 ↴ ↰ ↑ ↱ 398 599 233	↲ 21 ↱ 20 ↑ 1071 ↰ 23 960 → 41 ↴ ↰ ↑ ↱ 15 1 68	↓ 49 ↳ 26 ↱ 20 ↰ 31 ↑ ↱ 29 29	↲ 80 ↱ 58 ← 1917 1825 → 21 ↴ ↱ 23
5 Flower Av. & Birch St.	**6 Flower Av. & Driveway 2**	**7 Flower Av. & Imperial Hwy. (SR-90)**	
↲ 20 ↓ 3 ↳ 34 ↱ 19 ↑ 994 ↰ 147 26 ↳ 958 → 66 ↴ ↰ ↑ ↱ 104 36 68	↲ 10 ↳ 18 ↱ 1 4 ↳	← 1974 1815 → 13 ↴ ↱ 3	

MD Peak Hour Intersection Volumes

5.4 INTERSECTION OPERATIONS ANALYSIS

Opening Year Cumulative peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 Methodologies of this TA.

5.4.1 WITH FLOWER CONNECTION

The intersection analysis results are summarized in Table 5-1 for Opening Year Cumulative With Flower Connection traffic conditions, which indicates that the following study area intersection is anticipated to continue to operate at an unacceptable LOS during the peak hours under Opening Year Cumulative (2024) Without Project traffic conditions With Flower Connection (consistent with Existing traffic conditions):

- Flower Av. & Imperial Hwy. (SR-90) (#7) – LOS F AM, MD, and PM peak hours

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic, in addition to the locations identified for Opening Year Cumulative (2024) Without Project traffic conditions. However, the addition of Project traffic is anticipated to exceed the City's deficiency criteria for LOS at the intersection of Flower Avenue and Imperial Highway (SR-90) (by adding 2.0 seconds or more), requiring improvements to bring the intersection back to an acceptable LOS or make other improvements to the intersection comparable to the deficiency. The intersection operations analysis worksheets for Opening Year Cumulative (2024) Without and With Project With Flower Connection traffic conditions are included in Appendix 5.1 and Appendix 5.2 of this TA, respectively.

5.4.2 WITHOUT FLOWER CONNECTION

The following study area intersection is anticipated to operate at an unacceptable LOS during the peak hours under Opening Year Cumulative (2024) Without Project Without Flower Connection traffic conditions (see Table 5-2):

- Brea Bl. & Imperial Hwy. (SR-90) (#1) – LOS E AM peak hour only

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic, in addition to the locations identified for Opening Year Cumulative (2024) Without Project traffic conditions. However, the addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) under Opening Year Cumulative (2024) With Project Without Flower Connection conditions falls below the City's threshold for deficient LOS (increase of less than 4.0 seconds with Project traffic added). As such, the Project would not have an unacceptable effect on traffic operations under Opening Year Cumulative (2024) With Project Without Flower Connection conditions and no improvements are necessary. The intersection operations analysis worksheets for Opening Year Cumulative (2024) Without and With Project Without Flower Connection traffic conditions are included in Appendix 5.3 and Appendix 5.4 of this TA, respectively.

TABLE 5-1: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2024) CONDITIONS – WITH FLOWER CONNECTION

#	Intersection	Traffic Control[2]	2024 Without Project Delay[1] (secs.) AM	MD	PM	2024 Without Project Level of Service AM	MD	PM	2024 With Project Delay[1] (secs.) AM	MD	PM	2024 With Project Level of Service AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	TS	49.7	44.9	50.7	D	D	D	50.2	45.0	51.0	D	D	D
	- ICU Analysis (CMP) [3]		*0.70*	*0.69*	*0.78*	*C*	*B*	*C*	*0.71*	*0.69*	*0.78*	*C*	*B*	*C*
2	Orange Av. & Birch St.	CSS	13.8	18.6	19.6	B	C	C	15.3	19.0	20.5	C	C	C
3	Orange Av. & Driveway 1	CSS	8.9	9.1	8.9	A	A	A	10.2	9.5	9.3	B	A	A
4	Orange Av. & Imperial Hwy. (SR-90)	CSS	24.8	21.3	22.3	C	C	C	29.0	22.5	24.0	D	C	C
5	Flower Av. & Birch St.	TS	9.3	11.1	5.1	A	B	A	9.3	11.1	5.2	A	B	A
6	Flower Av. & Driveway 2	CSS	16.3	8.9	9.8	C	A	A	17.6	9.1	10.3	C	A	B
7	Flower Av. & Imperial Hwy. (SR-90)	CSS	**<200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**	**>200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

[3] ICU is reported in volume-to-capacity (v/c). ICU analysis conducted for signalized CMP intersections.

TABLE 5-2: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2024) CONDITIONS – WITHOUT FLOWER CONNECTION

#	Intersection	Traffic Control[2]	2024 Without Project - Without Flower Delay[1] (secs.) AM	MD	PM	2024 Without Project - Without Flower Level of Service AM	MD	PM	2024 With Project - Without Flower Delay[1] (secs.) AM	MD	PM	2024 With Project - Without Flower Level of Service AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	TS	**57.9**	48.1	52.3	**E**	D	D	**58.8**	48.3	52.8	**E**	D	D
	- ICU Analysis (CMP) [3]		*0.71*	*0.70*	*0.77*	*C*	*B*	*C*	*0.71*	*0.70*	*0.78*	*C*	*B*	*C*
2	Orange Av. & Birch St.	CSS	14.8	19.7	20.7	B	C	C	16.6	20.1	21.7	C	C	C
3	Orange Av. & Driveway 1	CSS	8.9	9.1	8.9	A	A	A	11.1	9.8	9.7	B	A	A
4	Orange Av. & Imperial Hwy. (SR-90)	CSS	23.4	20.6	21.6	C	C	C	30.9	22.6	24.5	D	C	C
5	Flower Av. & Birch St.	TS	10.7	12.6	7.1	B	B	A	11.3	12.7	7.3	B	B	A
6	Flower Av. & Driveway 2	CSS	10.4	0.0	0.0	B	A	A	10.8	0.0	7.3	B	A	A
7	Flower Av. & Imperial Hwy. (SR-90)	CSS	21.4	23.0	24.3	C	C	C	21.5	23.1	24.3	C	C	C

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

[3] ICU is reported in volume-to-capacity (v/c). ICU analysis conducted for signalized CMP intersections.

5.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no study area intersections anticipated to warrant a peak hour or planning-level (ADT) based traffic signal warrant under Opening Year Cumulative (2024) Without Project traffic conditions. However, the intersection of Flower Avenue at Imperial Highway (SR-90) is anticipated to meet peak hour volume-based traffic signal warrant for Opening Year Cumulative (2024) With Project traffic conditions. The traffic signal warrant analysis worksheets for Opening Year Cumulative (2024) Without and With Project With Flower Connection traffic conditions are included in Appendix 5.5 and Appendix 5.6 of this TA, respectively.

There are no study area intersections anticipated to meet peak hour or planning-level (ADT) based warrant under Opening Year Cumulative (2024) Without and With Project Without Flower Connection traffic conditions. The traffic signal warrant analysis worksheets for Opening Year Cumulative (2024) Without and With Project Without Flower Connection traffic conditions are included in Appendix 5.7 and Appendix 5.8 of this TA, respectively.

5.6 INTERSECTION QUEUING ANALYSIS

5.6.1 WITH FLOWER CONNECTION

A queuing analysis was performed at the study area intersections to determine if any peak hour queues would spill out of the left turn pockets into the adjacent through lanes. Queuing analysis findings are presented in Table 5-3 for With Flower Connection traffic conditions. As shown in Table 5-3, the following movement is anticipated to experience queuing issues during the weekday AM, MD, or PM peak 95th percentile traffic flows under Opening Year Cumulative (2024) Without Project With Flower Connection traffic conditions (* includes Project driveways evaluated in Section 1.6 Queuing Analysis):

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, MD and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD, and PM peak hours
- Orange Av. & Driveway 1 (#3) – southbound left-through turn lane, PM peak hour only *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – southbound right turn lane, PM peak hour only *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – westbound through-right turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – southbound left turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – southbound right turn lane, PM peak hour only *

There are no additional study area intersections or movements anticipated to experience queuing issues during the peak hours with the addition of Project traffic, in addition to the movements identified for Opening Year Cumulative (2024) Without Project With Flower Connection traffic conditions. Worksheets for Opening Year Cumulative (2024) Without and With Project With Flower Connection traffic conditions queuing analyses are provided in Appendix 5.9 and Appendix 5.10, respectively.

TABLE 5-3: QUEUING SUMMARY FOR OPENING YEAR CUMULATIVE (2024) CONDITIONS – WITH FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance	2024 Without Project 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	2024 Without Project Acceptable? [1] AM	MD	PM	2024 With Project 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	2024 With Project Acceptable? [1] AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	NBL[3]	140	**500**	**285**	**378**	**No**	**No**	**No**	**500**	**285**	**378**	**No**	**No**	**No**
		NBR	125	133 [2]	130 [2]	143 [2]	Yes	Yes	Yes	135 [2]	133 [2]	145 [2]	Yes	Yes	Yes
		SBL	200	123	193	173	Yes	Yes	Yes	123	193	173	Yes	Yes	Yes
		SBR	545	148	195	170	Yes	Yes	Yes	148	195	170	Yes	Yes	Yes
		EBL	200	170	**245**	**235**	Yes	**No**	**No**	170	**245**	**235**	Yes	**No**	**No**
		EBR	140	**263**	**185**	**230**	**No**	**No**	**No**	**263**	**185**	**230**	**No**	**No**	**No**
		WBL	170	155	**245**	**250**	Yes	**No**	**No**	168	**248**	**253**	Yes	**No**	**No**
		WBR	170	70	88	85	Yes	Yes	Yes	73	88	85	Yes	Yes	Yes
2	Orange Av. & Birch St.	NBL/T/R	180	5	25	18	Yes	Yes	Yes	8	28	20	Yes	Yes	Yes
		SBR	100	3	5	5	Yes	Yes	Yes	3	5	5	Yes	Yes	Yes
		EBR	75	0	0	0	Yes	Yes	Yes	0	0	0	Yes	Yes	Yes
		WBL	140	3	3	5	Yes	Yes	Yes	3	3	5	Yes	Yes	Yes
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	15	8	8	Yes	Yes	Yes	15	8	10	Yes	Yes	Yes
		SBR	120	10	23	15	Yes	Yes	Yes	30	28	25	Yes	Yes	Yes
5	Flower Av. & Birch St.	NBL/T/R	60	38	38	13	Yes	Yes	Yes	43	40	15	Yes	Yes	Yes
		SBL/T/R	60	15	15	10	Yes	Yes	Yes	18	15	10	Yes	Yes	Yes
		EBL	125	5	10	3	Yes	Yes	Yes	5	10	5	Yes	Yes	Yes
		WBL	125	18	35	13	Yes	Yes	Yes	20	35	15	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	3	3	3	Yes	Yes	Yes	3	3	3	Yes	Yes	Yes
		SBL	100	45	63	58	Yes	Yes	Yes	78	68	70	Yes	Yes	Yes
		SBR	230	48	43	35	Yes	Yes	Yes	73	55	48	Yes	Yes	Yes
		EBL	125	115	65	48	Yes	Yes	Yes	140 [2]	73	63	Yes	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Although 95th percentile queue is anticipated to exceed the available storage provided by the formally striped turn lane, the turn lane has sufficient unstriped storage area to accommodate the excess queue without spilling back and affecting the adjacent through lane.

[3] Queue reported for the Number 2 Northbound Left turn lane which has approximately 140-feet of storage.

TABLE 5-4: QUEUING SUMMARY FOR OPENING YEAR CUMULATIVE (2024) CONDITIONS – WITHOUT FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance	2024 Without Project - Without Flower 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM	2024 With Project - Without Flower 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	NBL[3]	140	**495**	**283**	**378**	**No**	**No**	**No**	**495**	**283**	**378**	**No**	**No**	**No**
		NBR	125	130 [2]	130 [2]	143 [2]	Yes	Yes	Yes	130 [2]	130 [2]	143 [2]	Yes	Yes	Yes
		SBL	200	120	193	173	Yes	Yes	Yes	120	193	173	Yes	Yes	Yes
		SBR	545	215	253	225	Yes	Yes	Yes	215	253	225	Yes	Yes	Yes
		EBL	200	**358**	**340**	**320**	**No**	**No**	**No**	**365**	**343**	**328**	**No**	**No**	**No**
		EBR	140	**263**	**185**	**230**	**No**	**No**	**No**	**263**	**185**	**230**	**No**	**No**	**No**
		WBL	170	153	**245**	**250**	Yes	**No**	**No**	165	**245**	**253**	Yes	**No**	**No**
		WBR	170	73	88	85	Yes	Yes	Yes	73	88	85	Yes	Yes	Yes
2	Orange Av. & Birch St.	NBL/T/R	180	5	28	18	Yes	Yes	Yes	8	30	20	Yes	Yes	Yes
		SBR	100	3	5	5	Yes	Yes	Yes	3	5	5	Yes	Yes	Yes
		EBR	75	0	0	0	Yes	Yes	Yes	0	0	0	Yes	Yes	Yes
		WBL	140	3	3	5	Yes	Yes	Yes	3	3	5	Yes	Yes	Yes
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	15	8	8	Yes	Yes	Yes	15	8	8	Yes	Yes	Yes
		SBR	120	8	20	15	Yes	Yes	Yes	43	33	30	Yes	Yes	Yes
5	Flower Av. & Birch St.	NBL/T/R	60	**98** [4]	**73** [4]	43	**No**	**No**	Yes	**108** [4]	**75** [4]	45	**No**	**No**	Yes
		SBL/T/R	60	25	15	13	Yes	Yes	Yes	25	15	13	Yes	Yes	Yes
		EBL	125	8	13	5	Yes	Yes	Yes	8	13	5	Yes	Yes	Yes
		WBL	125	105	95	48	Yes	Yes	Yes	128	98	55	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	3	3	3	Yes	Yes	Yes	3	3	3	Yes	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Although 95th percentile queue is anticipated to exceed the available storage provided by the formally striped turn lane, the turn lane has sufficient unstriped storage area to accommodate the excess queue without spilling back and affecting the adjacent through lane.

[3] Queue reported for the Number 2 Northbound Left turn lane which has approximately 140-feet of storage.

[4] Although the available storage space has been conservatively assumed to end at the first private driveway along Flower Avenue, the queue will be adequately accommodated by the single northbound travel lane on Flower Avenue.

5.6.2 WITHOUT FLOWER CONNECTION

A queuing analysis was performed at the study area intersections to determine if any peak hour queues would spill out of the left turn pockets into the adjacent through lanes. Queuing analysis findings are presented in Table 5-4 for Without Flower Connection traffic conditions. As shown in Table 5-4, the following movements are anticipated to experience queuing issues during the weekday AM, MD, or PM peak 95th percentile traffic flows under Opening Year Cumulative (2024) Without Project Without Flower Connection traffic conditions:

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD, and PM peak hours
- Flower Av. & Birch St. (#5) – northbound left-through-right turn lane, AM and MD peak hours

There are no additional study area intersections or movements anticipated to experience queuing issues during the peak hours with the addition of Project traffic, in addition to the movements identified for Opening Year Cumulative (2024) Without Project Without Flower Connection traffic conditions. Worksheets for Opening Year Cumulative (2024) Without and With Project Without Flower Connection traffic conditions queuing analyses are provided in Appendix 5.11 and Appendix 5.12, respectively.

5.7 DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

This section provides a summary of deficiencies and recommended improvements for Opening Year Cumulative (2024) traffic conditions. Based on deficiency criteria discussed in Section 2.6 Level of Service (LOS) Criteria, the following intersections were found to be deficient.

5.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvements necessary to improve these traffic deficiencies back to acceptable levels are presented below. The intersection of Flower Avenue at Imperial Highway (SR-90) under With Flower Connection traffic conditions is anticipated to exceed the City's deficiency criteria for LOS, requiring improvements to bring the intersection back to an acceptable LOS or make other improvements to the intersection comparable to the deficiency. The intersection operations analysis worksheets for Opening Year Cumulative (2024) With Project With Flower Connection traffic conditions, with improvements, are included in Appendix 5.13 of this TA.

The addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) under Opening Year Cumulative (2024) With Project Without Flower Connection conditions falls below the City's threshold for deficient LOS. As such, no improvements at the Brea Boulevard and Imperial Highway (SR-90) intersection were identified for Opening Year Cumulative (2024) With Project Without Flower Connection traffic conditions.

Alternative 1: Signalization of Flower Avenue at Imperial Highway (SR-90)

The first alternative considered and evaluated assumes the intersection of Flower Avenue at Imperial Highway (SR-90) would maintain its current access but would be improved to signalize the intersection (right-in/right-out for the southern leg and full access for the northern leg of Flower Avenue). Based on peak hour volumes, the intersection is anticipated to meet a peak hour volume-based traffic signal warrant under Opening Year Cumulative (2024) With Project traffic conditions. The installation of a traffic signal at the intersection of Flower Avenue at Imperial Highway (SR-90) would improve the

intersections operations back to acceptable LOS (see Table 5-5). Although the intersection of Flower Avenue at Imperial Highway (SR-90) meets the peak hour volume-based warrant, additional warrants should be evaluated to determine if other warrants are met (such as the warrants based on 4-hour volumes, 8-hour volumes, collision history, pedestrian volume, etc.). Additional evaluation may also be necessary to determine the effects signalization has on existing school pedestrian traffic and pick-up/drop-off vehicular traffic flows for the adjacent Laurel Elementary School.

TABLE 5-5: INTERSECTION ANALYSIS FOR OPENING YEAR CUMULATIVE (2024) CONDITIONS WITH IMPROVEMENTS

			Intersection Approach Lanes[1]												Delay[2] (secs.)			Level of Service		
		Traffic	Northbound			Southbound			Eastbound			Westbound								
#	Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	AM	MD	PM	AM	MD	PM
7	Flower Av. & Imperial Hwy. (SR-90)																			
	- Without Improvements	CSS	0	0	1	1	0	1	1	3	0	0	3	0	**>200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**
	- With Improvements (Signal)[4]	**TS**	0	0	1	1	0	1	1	3	0	0	3	0	9.8	8.8	8.5	A	A	A
	- With Improvements (RIRO)[5]	CSS	0	0	1	**0**	0	1	**0**	3	0	0	3	0	**46.1**	**43.3**	**39.3**	**E**	**E**	**E**
	- With Improvements (No Connection)[6]	CSS	0	0	1	**0**	0	**0**	**0**	3	0	0	3	0	21.5	23.1	24.3	C	C	C

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; **1** = Improvement/Change in Lanes

[2] Per the Highway Capacity Manual 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal; **CSS** = Improvement

[4] This potential improvement consists of maintaining the existing allowable turning movements along with the installation of a traffic signal.

[5] This potential improvement consists of modifying the intersection to extend the median and restrict access to right-in/right-out only for the north leg.

[6] This potential improvement consists of closing off Flower Avenue north of Imperial Highway (SR-90). See Table 5-2.

Alternative 2: Right-in/Right-out at Flower Avenue and Imperial Highway (SR-90)

The second alternative considered and evaluated assumes the intersection of Flower Avenue at Imperial Highway (SR-90) would maintain its current access for the southern leg but also assumes modifications to the existing median needed to restrict the northern leg also to right-in/right-out access only. Restriping would also need to occur on the north leg of Flower Avenue in order to eliminate the existing southbound left turn lane. Restricting the access at Flower Avenue north of Imperial Highway (SR-90) to right-in/right-out access only would improve the peak hour operations to LOS E. Although this improvement would not achieve the City standard of LOS D, the turn restriction would result in LOS improvements in comparison to the LOS F and high delays anticipated to occur without the improvement (see Table 5-5).

The right-in/right-out access restriction for the northern leg of Flower Avenue at Imperial Highway (SR-90) would alter the existing travel patterns for vehicles in the area, including pick-up/drop-off circulation associated with the adjacent Laurel Elementary School. Due to the re-routing of traffic to adjacent intersections, there may be increased delays for adjacent intersections. However, similar to the Without Flower Connection alternative (see Alternative 3), the reallocation of these trips should not result in any project-related deficiencies. Should this alternative be selected, additional engineering studies are recommended to determine the viability of the proposed access restriction. Reconfiguration of the intersection to restrict access will need to ensure that CA MUTCD, City of Brea design standards, Caltrans design standards, and ADA standards are all met.

Alternative 3: Full Closure of Flower Avenue North of Imperial Highway (SR-90)

Lastly, the third alternative considered and evaluated assumes the intersection of Flower Avenue north of Imperial Highway (SR-90) would be fully closed and the southern terminus of Flower Avenue would become a cul-de-sac just north of Imperial Highway (SR-90). However, access for the southern leg would remain with its current right-in/right-out access. The cul-de-sac should meet the guidelines identified in the City's Municipal Code Section 18.92.120 Cul-de-sac Streets and Alleys. The City Standard Plans should be used in the design of the proposed off-set cul-de-sac (or the County of Orange Standard Plans if the City does not have standards). It is anticipated that the design would require right-of-way acquisition from the adjacent Laurel Elementary School in addition to the existing pedestrian connections/walkways that would need to be redesigned. The median along Imperial Highway (SR-90) would also need to be closed. By implementing a cul-de-sac at the southern terminus of Flower Avenue, north of Imperial Highway (SR-90), the intersection operations are anticipated to improve back to acceptable LOS (LOS C) during the peak hours (see Table 5-5).

Similar to the right-in/right-out access restriction, the closure of Flower Avenue north of Imperial Highway (SR-90) would also alter the existing travel patterns for vehicles in the area, including pick-up/drop-off circulation associated with the adjacent Laurel Elementary School (both vehicular traffic and pedestrian routes). Due to the re-routing of traffic to adjacent intersections, there may be increased delays for adjacent intersections, however, the reallocation of these trips should not result in any project-related deficiencies (see Table 5-2). Should this alternative be selected, additional engineering studies are recommended to determine the viability of the proposed closure of Flower Avenue. Closure of Flower Avenue north of Imperial Highway (SR-90) will need to ensure that CA MUTCD, City of Brea design standards, Caltrans design standards, and ADA standards are all met.

5.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS QUEUING DEFICIENCIES

With Flower Connection

As shown previously in Table 5-3, the queuing analysis results identify a potential queuing issues for the northbound left, eastbound left, eastbound right, and westbound left turn lanes at Brea Boulevard and Imperial Highway (SR-90) under Opening Year Cumulative (2024) With Flower Connection traffic conditions. It should be noted that the addition of Project traffic has a nominal effect on the peak hour queuing results (a net change of 10-feet or less, which is less than the length of a passenger car). Although Table 5-5 identifies improvements needed to address intersection LOS, there are no additional recommendations to address off-site queuing deficiencies since the Project's effect to the peak hour queuing issues is negligible.

Without Flower Connection

As shown previously in Table 5-4, the queuing analysis results identify a potential queuing issues for the northbound left, eastbound left, eastbound right, and westbound left turn lanes at Brea Boulevard and Imperial Highway (SR-90) and the northbound left-through-right turn lane at the intersection of Flower Avenue and Birch Street during one or more peak hours under Opening Year Cumulative (2024) Without Flower Connection traffic conditions. It should be noted that the addition of Project traffic has a nominal effect on the peak hour queuing results (a net change of 10-feet or less, which is less than the length of a passenger car). Although Table 5-5 identifies improvements needed to address intersection LOS, there are no additional recommendations to address off-site queuing deficiencies since the Project's effect to the peak hour queuing issues is negligible.

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6 GENERAL PLAN BUILDOUT TRAFFIC CONDITIONS

This section discusses the traffic forecasts for General Plan Buildout conditions and the resulting intersection operations, traffic signal warrant, and intersection queuing analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for General Plan Buildout conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the following:

- Project driveways and those facilities assumed to be constructed by the Project to provide site access are also assumed to be in place for General Plan Buildout conditions (e.g., intersection and roadway improvements at the Project's frontage and driveways).
- Driveways and those facilities assumed to be constructed by cumulative developments to provide site access are also assumed to be in place for General Plan Buildout conditions (e.g., intersection and roadway improvements along the cumulative development's frontages and driveways).

6.2 WITH FLOWER CONNECTION TRAFFIC VOLUME FORECASTS

For the intersection of Brea Boulevard at Imperial Highway (SR-90) the General Plan Buildout Without Project weekday AM and PM peak hour volumes are based on the OCTAM traffic model. For the remaining study intersections (along with MD peak hour volumes), the scenario includes Existing traffic volumes plus an ambient growth factor of 17% plus traffic from pending and approved but not yet constructed known development projects in the area (see Section 4.7 for additional discussion on volume development). The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for General Plan Buildout Without Project With Flower Connection traffic conditions are shown on Exhibit 6-1 (MD volumes shown on second page).

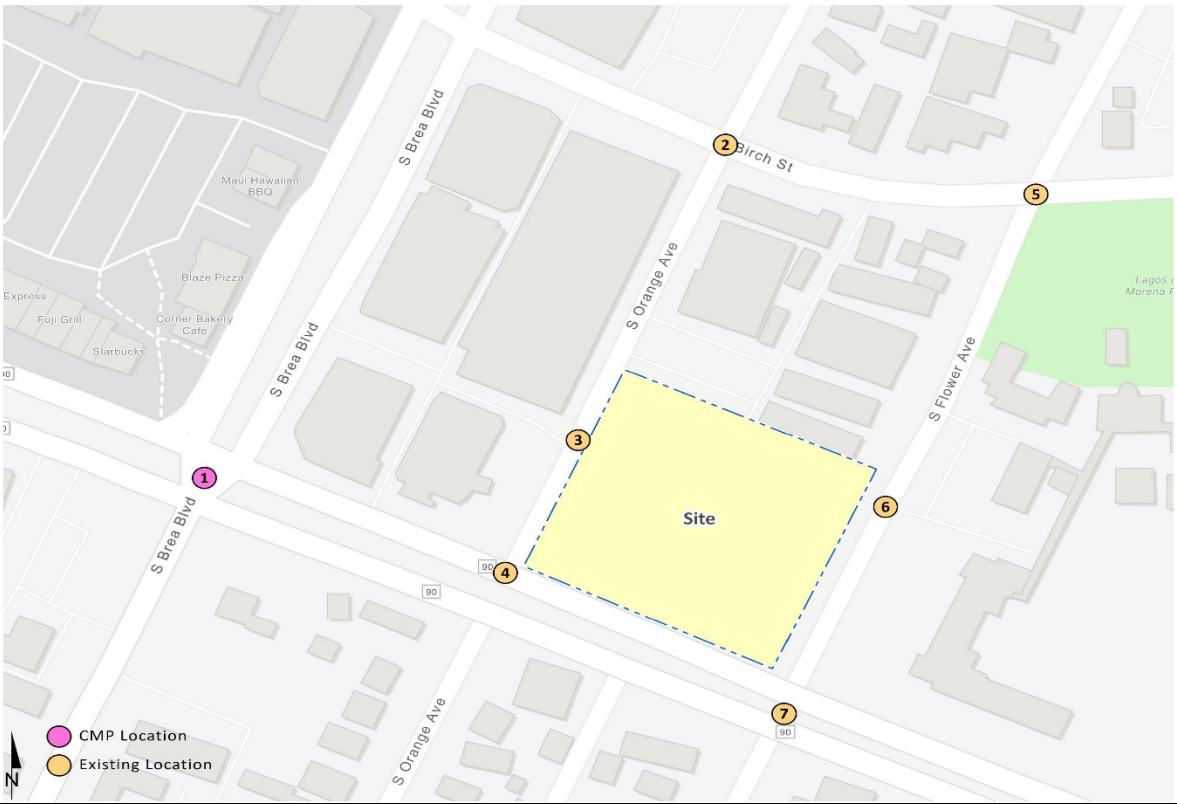
This scenario includes General Plan Buildout Without Project With Flower Connection volumes plus Project (With Flower Connection) traffic. The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for General Plan Buildout With Project With Flower connection traffic conditions are shown on Exhibit 6-2 (MD volumes shown on second page).

6.3 WITHOUT FLOWER CONNECTION TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes (adjusted to account for the closure of Flower Avenue at Imperial Highway (SR-90)) plus an ambient growth factor of 16% plus traffic from pending and approved but not yet constructed known development projects in the area (see Section 4.7 for additional discussion on volume development). The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for General Plan Buildout Without Project Without Flower Connection traffic conditions are shown on Exhibit 6-3 (MD volumes shown on second page).

This scenario includes General Plan Buildout Without Project Without Flower Connection volumes plus Project (Without Flower Connection) traffic. The weekday ADT and weekday AM, MD, and PM peak hour volumes which can be expected for General Plan Buildout With Project Without Flower connection traffic conditions are shown on Exhibit 6-4 (MD volumes shown on second page).

EXHIBIT 6-1: GENERAL PLAN BUILDOUT WITHOUT PROJECT TRAFFIC VOLUMES – WITH FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

33,500			56,000
170(243) ↲	720(787) ↓	200(310) ↳	↱ 112(174)
			← 1372(1592)
			↰ 164(275)
172(242) →			
1485(1612) →			
399(475) ↴			
466(545) ↰	585(839) ↑	179(252) ↱	
63,250			41,100

2 Orange Av. & Birch St.

800			34,200
18(30) ↲			↱ 6(22)
			← 837(1295)
			↰ 18(35)
726(1175) →			
18(37) ↴			
7(6) ↰	1(7) ↑	19(48) ↱	
33,800			1,750

3 Orange Av. & Driveway 1

1,250			250
	21(42) ←	33(6) ↳	↱ 18(7)
			↰ 5(6)
			21(41) ↑
			1(1) ↱
60,850			1,200

4 Orange Av. & Imperial Hwy. (SR-90)

1,200			62,950
26(48) ↲			↱ 22(42)
			← 2128(2358)
2106(2267) →			
15(21) ↴			
			41(30) ↱
60,850			700

5 Flower Av. & Birch St.

1,300			35,850
15(18) ↲	12(2) ↓	54(30) ↳	↱ 12(9)
			← 734(1268)
			↰ 66(102)
21(28) →			
742(1226) →			
16(8) ↴			
94(18) ↰	54(12) ↑	29(63) ↱	
34,100			2,700

6 Flower Av. & Driveway 2

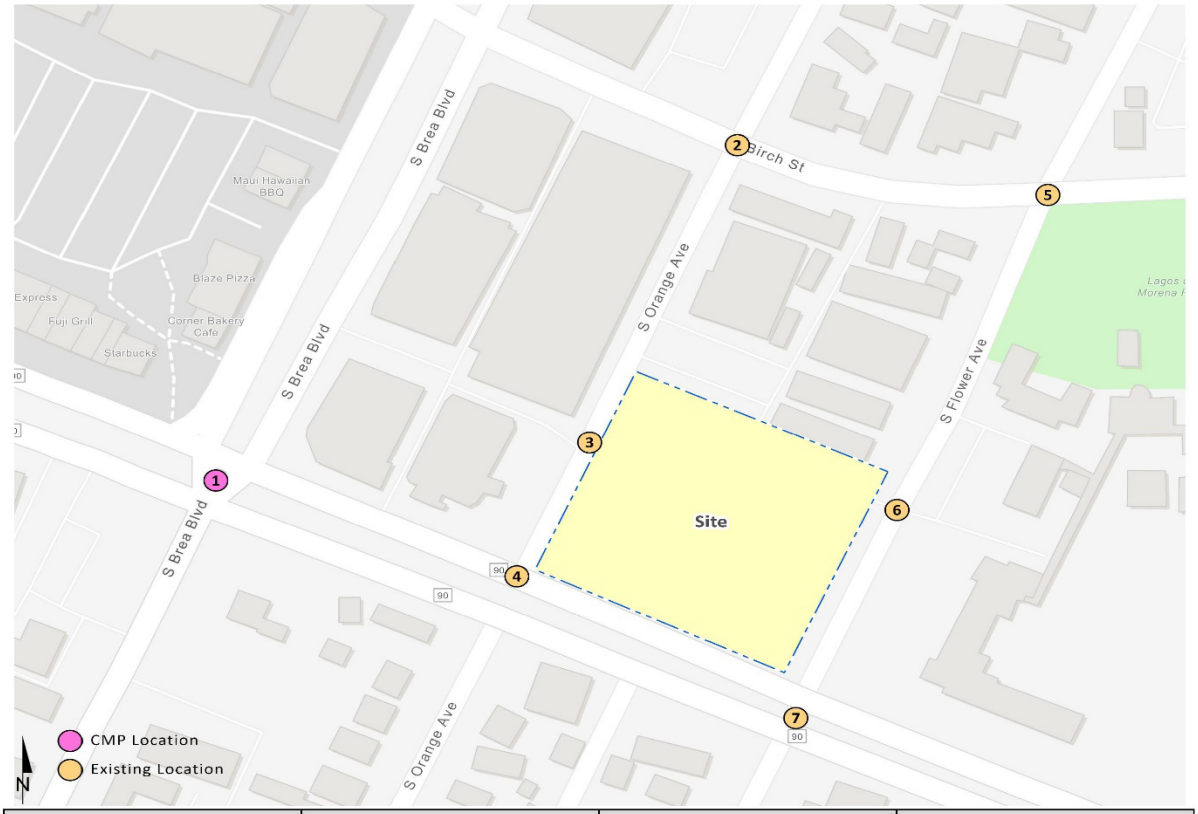
2,800			150
25(22) ↲	117(74) ↓	21(5) ↳	↱ 2(1)
			↰ 0(1)
19(7) ↳			
5(7) ↴			
29(19) ↰	192(103) ↑	14(4) ↱	
700			2,700

7 Flower Av. & Imperial Hwy. (SR-90)

2,650			61,050
85(66) ↲		8(16) ↳	↱ 142(76)
			← 2065(2335)
94(49) ↳			
2005(2273) →			
4(6) ↴			
			5(8) ↱
62,950			200

##(##) AM(PM) Peak Hour Intersection Volumes

***Average Daily Trips***

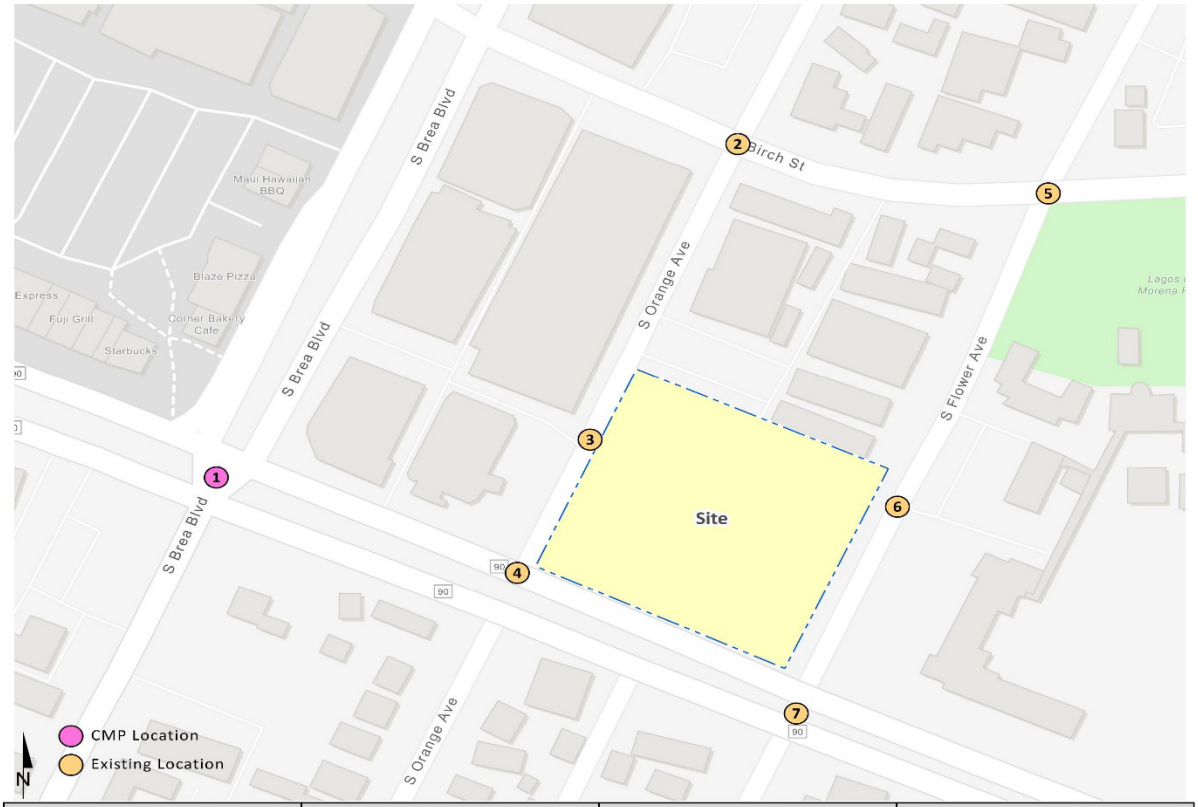


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
↲ 275 ↓ 640 ↳ 317 290 ↳ 1510 → 387 ↲ ↱ 181 ← 1634 ↰ 337 456 ↰ 677 → 263 ↱	↲ 25 1035 → 42 ↲ ↱ 23 ← 1151 ↰ 27 16 ↰ 1 → 78 ↱	← 56 ↳ 26 ↱ 22 ↰ 9 33 → 7 ↱	↲ 66 2118 → 25 ↲ ↱ 40 ← 2269 27 ↱

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↲ 23 ↓ 4 ↳ 39 29 ↳ 1087 → 22 ↲ ↱ 22 ← 1132 ↰ 89 50 ↰ 41 → 60 ↱	↲ 4 ← 83 ↳ 12 ↱ 1 4 ↰ 116 → 9 ↱	↲ 69 ↳ 14 54 ↳ 2053 → 15 ↲ ↱ 75 ← 2240 4 ↱

MD Peak Hour Intersection Volumes

EXHIBIT 6-2: GENERAL PLAN BUILDOUT WITH PROJECT TRAFFIC VOLUMES – WITH FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

	170(243) ↲	720(787) ↓	200(310) ↳
172(242) →	466(545) ↰	585(839) ↑	182(255) ↱
1492(1618) →			
399(475) ↴			

33,500 | 56,200 | 63,350 | 41,150

	112(174) ↱	
	1385(1596) ←	
	170(277) ↰	

2 Orange Av. & Birch St.

	18(30) ↲	
726(1175) →		13(8) ↰
23(42) ↴		

800 | 34,200 | 33,850 | 1,850

	6(22) ↱	
	837(1295) ←	
	18(35) ↰	

		1(7) ↑
		19(48) ↱

3 Orange Av. & Driveway 1

	21(42) ↓	38(11) ↳

1,350 | 1,150 | 2,000

	24(9) ↱	
	43(24) ↰	

		21(41) ↑
		29(19) ↱

4 Orange Av. & Imperial Hwy. (SR-90)

	64(66) ↲	
2116(2277) →		
15(21) ↴		

2,000 | 63,100 | 61,050 | 700

	50(60) ↱	
	2109(2347) ←	

		41(30) ↱

5 Flower Av. & Birch St.

	15(18) ↲	12(2) ↓
21(28) →	94(18) ↰	54(12) ↑
742(1226) →		
16(8) ↴		

1,300 | 35,950 | 34,100 | 2,800

	12(9) ↱	
	734(1268) ←	
	73(108) ↰	

		40(67) ↱

6 Flower Av. & Driveway 2

	32(28) ↲	117(74) ↓
30(11) →	65(46) ↰	192(103) ↑
34(23) ↴		

2,900 | 150 | 1,650 | 3,550

	2(1) ↱	
	0(1) ↰	

		14(4) ↱

7 Flower Av. & Imperial Hwy. (SR-90)

	108(80) ↲	14(18) ↳
104(59) →		
2005(2273) →		
4(6) ↴		

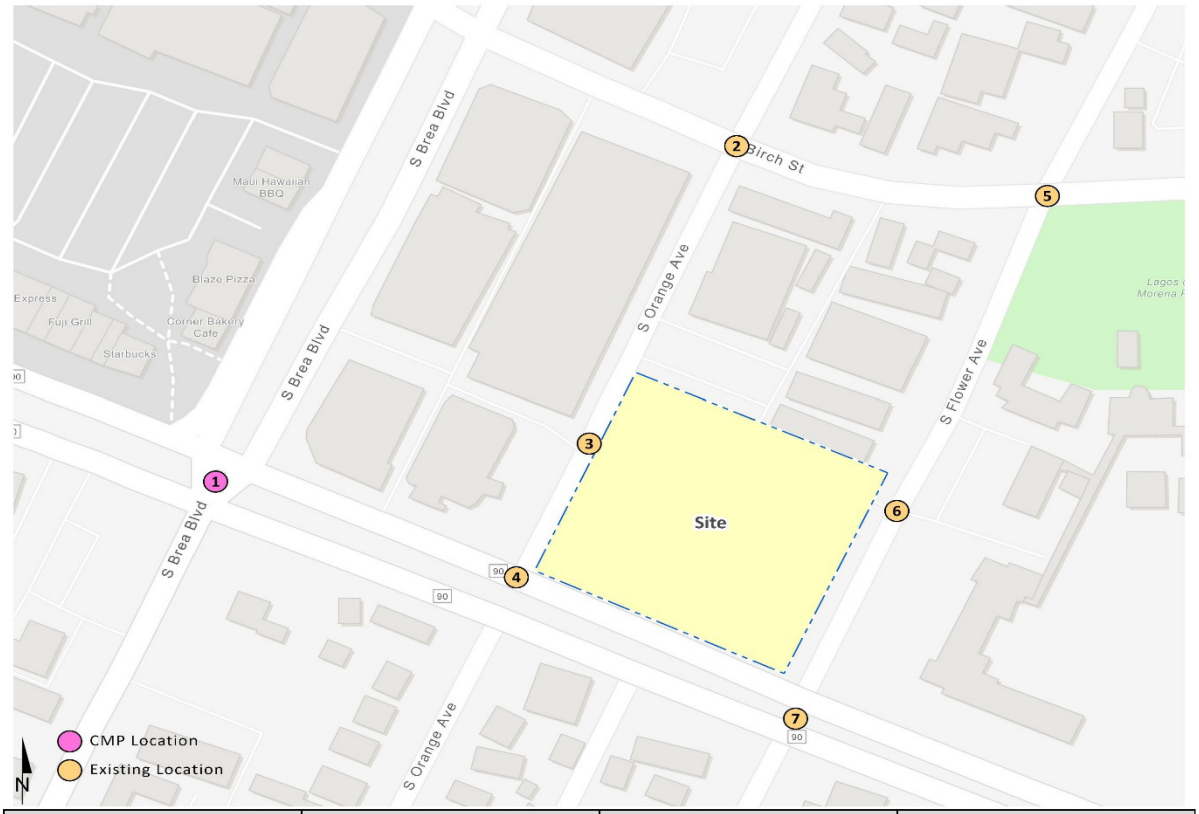
3,450 | 61,150 | 63,100 | 200

	168(94) ↱	
	2051(2328) ←	

		5(8) ↱

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

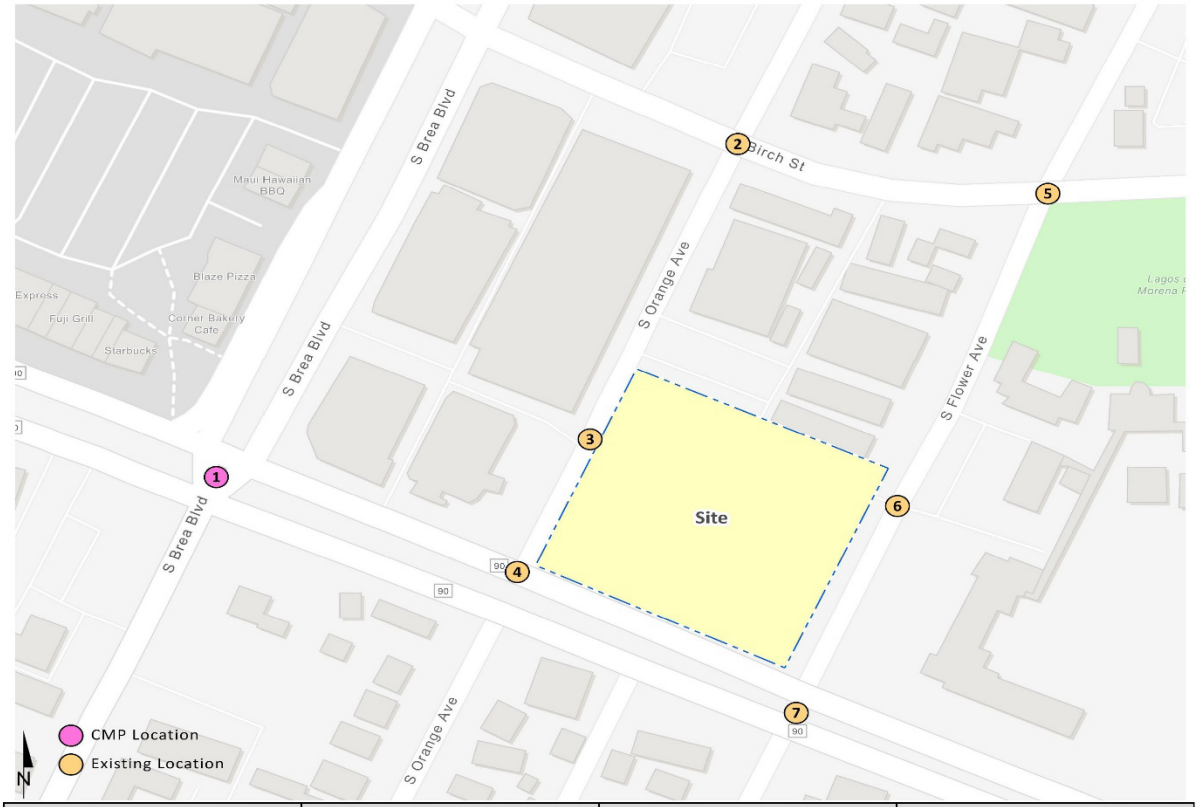


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
↲ 275 ↓ 640 ↳ 317 290 ↳ 1512 → 387 ↲ ↱ 181 ← 1637 ↰ 338 ↰ → ↱ 456 677 264	↲ 25 1035 → 44 ↲ ↱ 23 ← 1151 ↰ 27 ↰ → ↱ 17 1 78	← 56 ↳ 28 ↱ 23 ↰ 22 → ↱ 33 18	↲ 79 2122 → 25 ↲ ↱ 51 ← 2260 ↱ 27

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↲ 23 ↓ 4 ↳ 39 29 ↳ 1087 → 22 ↲ ↱ 22 ← 1132 ↰ 91 ↰ → ↱ 50 41 62	↲ 6 ↓ 83 ↳ 12 2 ↳ 12 ↲ ↱ 1 ↰ → ↱ 19 116 9	↲ 79 ↳ 15 58 ↳ 2053 → 15 ↲ ↱ 87 ← 2232 ↱ 4

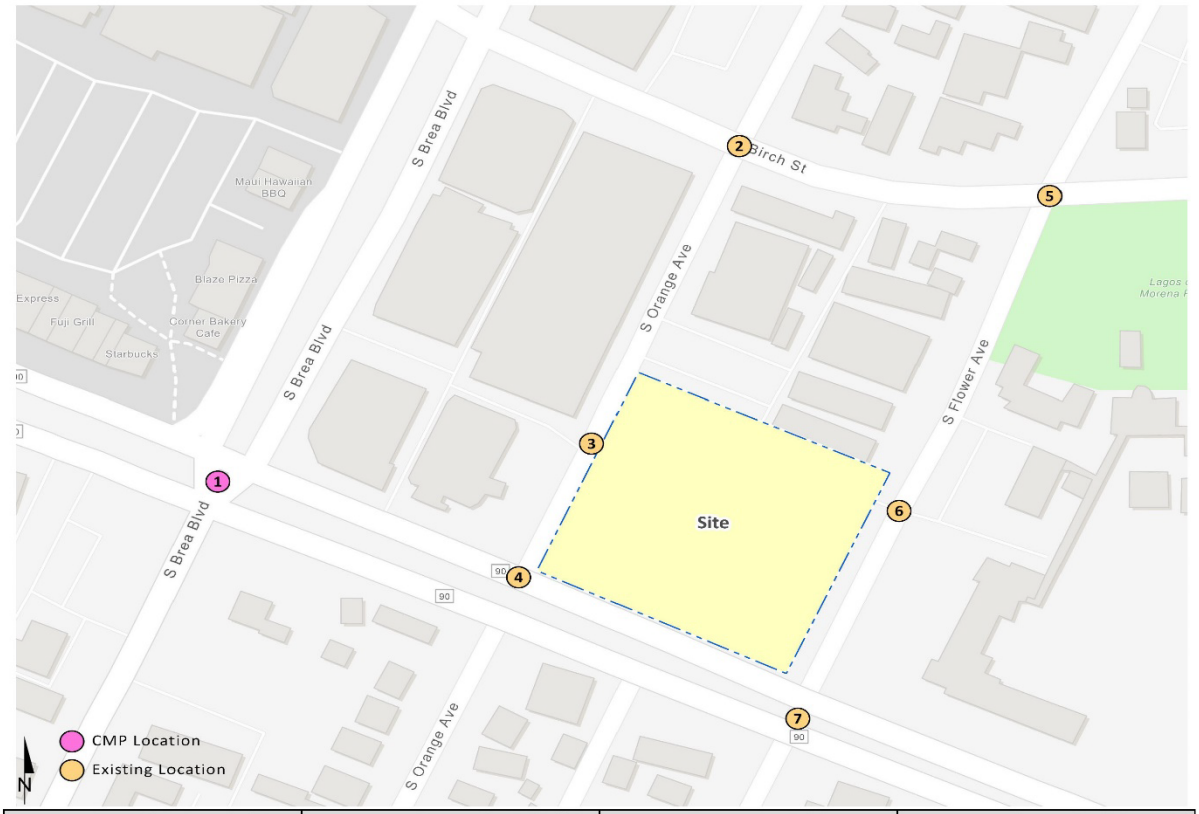
MD Peak Hour Intersection Volumes

EXHIBIT 6-3: GENERAL PLAN BUILDOUT WITHOUT PROJECT TRAFFIC VOLUMES – WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

											56,000
										↱ 112(174)	
										← 1293(1552)	
										↰ 164(275)	
33,500											
↲ 241(256)											
↓ 720(787)											
↳ 200(310)											
242(265) →											
1469(1565) →											
399(475) ↴											



1 Brea Bl. & Imperial Hwy. (SR-90)

						↱ 180		
						← 1552		
						↰ 335		
			342 ↲	635 ↓	315 ↳			
341 ↳						↰ 452	→ 672	↱ 261
1445 →								
384 ↲								

2 Orange Av. & Birch St.

						↱ 23		
						← 1210		
						↰ 27		
			24 ↲					
1081 →						↰ 16	→ 1	↱ 78
42 ↲								

3 Orange Av. & Driveway 1

						↱ 22		
						↰ 9		
			← 56		↳ 26			
							→ 32	↱ 7

4 Orange Av. & Imperial Hwy. (SR-90)

						↱ 39		
						← 2182		
			65 ↲					
2048 →								↱ 27
24 ↲								

5 Flower Av. & Birch St.

						↱ 22		
						← 1123		
						↰ 162		
			23 ↲	3 ↓	38 ↳			
29 ↳						↰ 118	→ 41	↱ 73
1078 →								
75 ↲								

6 Flower Av. & Driveway 2

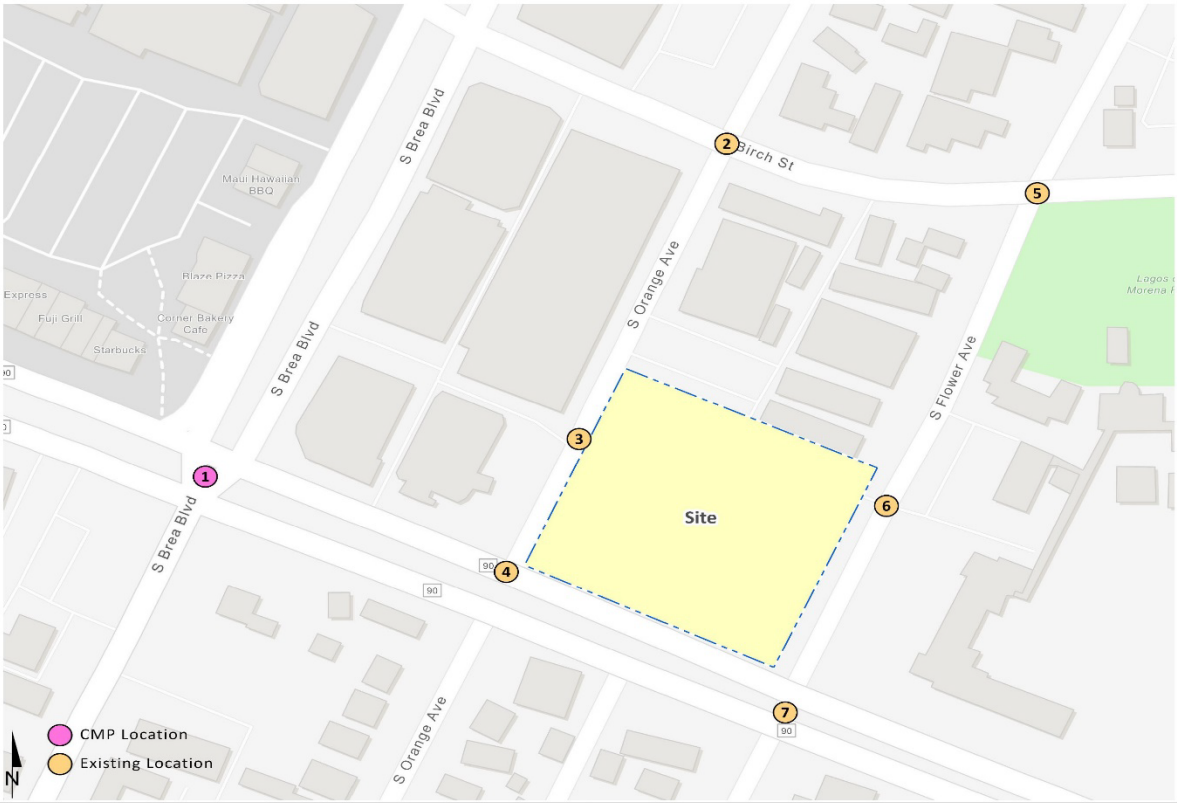
						↱ 1		
			7 ↲		↳ 21			

7 Flower Av. & Imperial Hwy. (SR-90)

						← 2222		
								↱ 3
2037 →								
15 ↲								

MD Peak Hour Intersection Volumes

EXHIBIT 6-4: GENERAL PLAN BUILDOUT WITH PROJECT TRAFFIC VOLUMES – WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)

33,550			56,150
241(256) ↲	720(787) ↓	200(310) ↳	↱ 112(174)
			← 1306(1556)
			↰ 170(277)
245(268) →			↰
1472(1568) →			↑
399(475) ↴			↱
	466(545)	588(842)	179(252)
63,400			41,150

2 Orange Av. & Birch St.

750			35,300
17(30) ↲			↱ 6(22)
			← 915(1349)
			↰ 17(35)
813(1214) →			↰
29(48) ↴			↑
			↱
	13(8)	1(7)	19(48)
35,000			1,850

3 Orange Av. & Driveway 1

1,350			1,900
21(42) ←	44(17) ↳		↱ 23(9)
			↰ 66(37)
			↰
			↑
			↱
		21(41)	53(36)
			2,650

4 Orange Av. & Imperial Hwy. (SR-90)

2,650			59,200
87(79) ↲			↱ 74(77)
			← 1986(2249)
			↰
1999(2203) →			↰
15(21) ↴			↑
			↱
			41(30)
58,800			650

5 Flower Av. & Birch St.

1,300			36,800
15(17) ↲	12(2) ↓	53(30) ↳	↱ 12(9)
			← 728(1258)
			↰ 217(187)
21(28) →			↰
736(1216) →			↑
109(57) ↴			↱
	177(82)	53(12)	54(85)
35,200			5,550

6 Flower Av. & Driveway 2

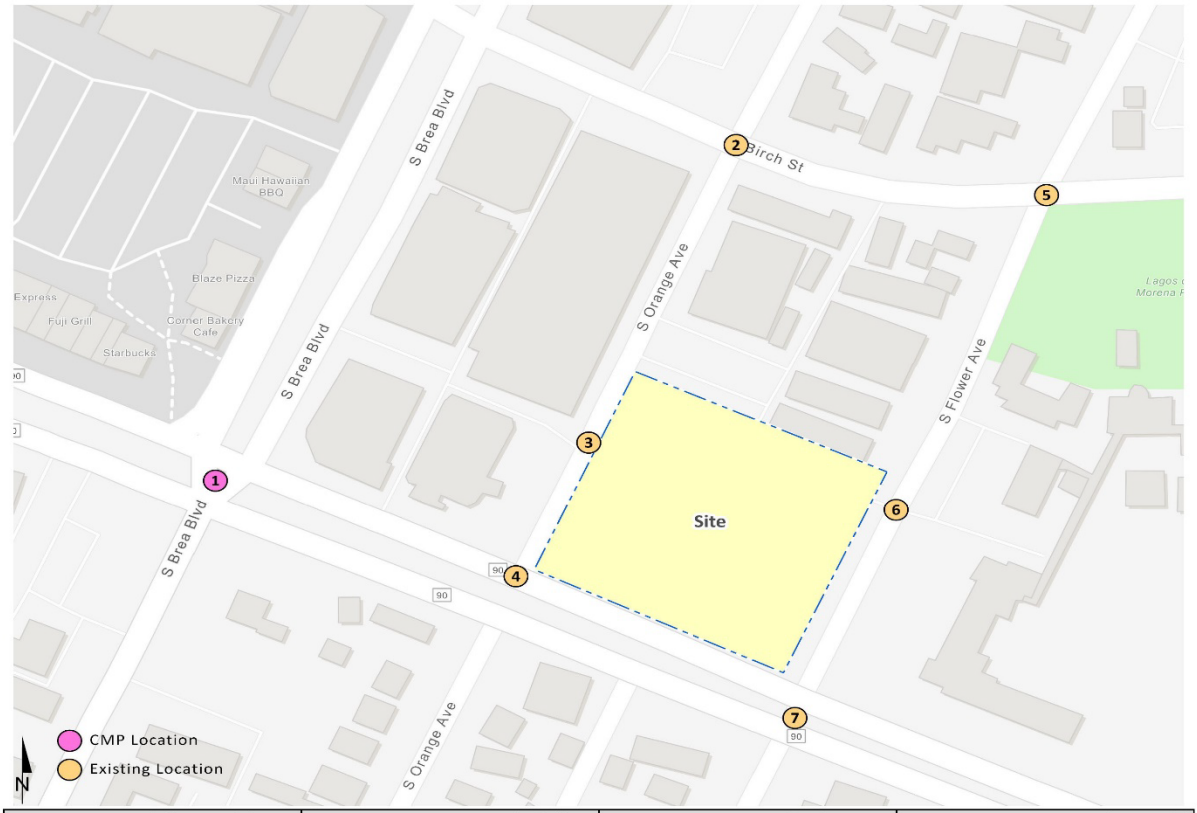
1,050			150
65(52) ↲	35(8) ↳		↱ 2(2)
40(20) →			
900			

7 Flower Av. & Imperial Hwy. (SR-90)

			59,200
			← 2060(2325)
1992(2258) →			↱ 5(8)
3(6) ↴			
59,150			200

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)

	↱ 180	
↲ 342	↑ 1555	
↓ 635	↰ 336	
↳ 315		
342 ↳	↰ ↑ ↱	
1446 →	452 673 261	
384 ↲		

2 Orange Av. & Birch St.

	↱ 23	
↲ 24	↑ 1210	
	↰ 27	
	↰ ↑ ↱	
1081 →	17 1 78	
46 ↲		

3 Orange Av. & Driveway 1

	↱ 23	
↓ 56		
↳ 30	↰ 32	
	↑ ↱	
	32 30	

4 Orange Av. & Imperial Hwy. (SR-90)

	↱ 62	
88 ↲	↑ 2163	
	↱	
2049 →	27	
24 ↲		

5 Flower Av. & Birch St.

	↱ 22	
↲ 23	↑ 1123	
↓ 3	↰ 166	
↳ 38		
29 ↳	↰ ↑ ↱	
1078 →	118 41 77	
75 ↲		

6 Flower Av. & Driveway 2

	↱ 1	
↲ 11		
↳ 21		
4 ↳		

7 Flower Av. & Imperial Hwy. (SR-90)

	↑ 2225	
	↱	
2038 →	3	
15 ↲		

MD Peak Hour Intersection Volumes

6.4 INTERSECTION OPERATIONS ANALYSIS

General Plan Buildout peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TA.

6.4.1 WITH FLOWER CONNECTION

The intersection analysis results are summarized in Table 6-1 for General Plan Buildout With Flower Connection traffic conditions, which indicates that the following study area intersections are anticipated to operate at an unacceptable LOS during the peak hours under General Plan Buildout Without Project traffic conditions With Flower Connection:

- Brea Bl. & Imperial Hwy. (SR-90) (#1) – LOS E AM and PM peak hours, LOS F MD peak hour only
- Flower Av. & Imperial Hwy. (SR-90) (#7) – LOS F AM, MD, and PM peak hours

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic, in addition to the locations identified for General Plan Buildout Without Project traffic conditions. The addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) under General Plan Buildout With Project With Flower Connection conditions falls below the City's threshold for deficient LOS (increase of less than 4.0 seconds with Project traffic added). As such, the Project would not have an unacceptable effect on traffic operations under General Plan Buildout With Project With Flower Connection conditions and no improvements are necessary. However, the addition of Project traffic is anticipated to exceed the City's deficiency criteria for LOS at the intersection of Flower Avenue and Imperial Highway (SR-90) (by adding 2.0 seconds or more), requiring improvements to bring the intersection back to an acceptable LOS or make other improvements to the intersection comparable to the deficiency. The intersection operations analysis worksheets for General Plan Buildout Without and With Project With Flower Connection traffic conditions are included in Appendix 6.1 and Appendix 6.2 of this TA, respectively.

6.4.2 WITHOUT FLOWER CONNECTION

The following study area intersection is anticipated to operate at an unacceptable LOS during the peak hours under General Plan Buildout Without Project Without Flower Connection traffic conditions (see Table 6-2):

- Brea Bl. & Imperial Hwy. (SR-90) (#1) – LOS E AM, MD, and PM peak hours

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours with the addition of Project traffic, in addition to the locations identified for General Plan Buildout Without Project traffic conditions. However, the addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) under General Plan Buildout With Project Without Flower Connection conditions falls below the City's threshold for deficient LOS (increase of less than 4.0 seconds with Project traffic added). As such, the Project would not have an unacceptable effect on traffic operations under General Plan Buildout With Project Without Flower Connection conditions and no improvements are necessary. The intersection operations analysis worksheets for General Plan Buildout Without and With Project Without Flower Connection traffic conditions are included in Appendix 6.3 and Appendix 6.4 of this TA, respectively.

TABLE 6-1: INTERSECTION ANALYSIS FOR GENERAL PLAN BUILDOUT CONDITIONS – WITH FLOWER CONNECTION

			GPBO Without Project						GPBO With Project					
			Delay[1] (secs.)			Level of Service			Delay[1] (secs.)			Level of Service		
#	Intersection	Traffic Control[2]	AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	TS	**61.1**	**65.5**	**63.4**	**E**	**E**	**E**	**61.4**	**65.8**	**63.9**	**E**	**E**	**E**
	- ICU Analysis (CMP) [3]		*0.74*	*0.78*	*0.84*	*C*	*C*	*D*	*0.74*	*0.78*	*0.84*	*C*	*C*	*D*
2	Orange Av. & Birch St.	CSS	15.0	22.8	24.2	C	C	C	16.7	23.2	25.4	C	C	D
3	Orange Av. & Driveway 1	CSS	9.0	9.2	8.9	A	A	A	10.4	9.6	9.4	B	A	A
4	Orange Av. & Imperial Hwy. (SR-90)	CSS	25.7	26.6	27.6	D	D	D	29.5	28.7	29.3	D	D	D
5	Flower Av. & Birch St.	TS	9.7	13.2	5.9	A	B	A	9.7	13.2	6.0	A	B	A
6	Flower Av. & Driveway 2	CSS	18.5	9.0	10.0	C	A	B	20.9	9.2	10.6	C	A	B
7	Flower Av. & Imperial Hwy. (SR-90)	CSS	**<200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**	**>200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

[3] ICU is reported in volume-to-capacity (v/c). ICU analysis conducted for signalized CMP intersections.

TABLE 6-2: INTERSECTION ANALYSIS FOR GENERAL PLAN BUILDOUT CONDITIONS – WITHOUT FLOWER CONNECTION

			GPBO Without Project - Without Flower						GPBO With Project - Without Flower					
			Delay[1] (secs.)			Level of Service			Delay[1] (secs.)			Level of Service		
#	Intersection	Traffic Control[2]	AM	MD	PM	AM	MD	PM	AM	MD	PM	AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	TS	**68.1**	**66.6**	**61.7**	**E**	**E**	**E**	**68.8**	**66.9**	**62.3**	**E**	**E**	**E**
	- ICU Analysis (CMP) [3]		*0.74*	*0.79*	*0.83*	*C*	*C*	*D*	*0.74*	*0.79*	*0.83*	*C*	*C*	*D*
2	Orange Av. & Birch St.	CSS	16.2	24.4	25.6	C	C	D	18.3	24.9	27.0	C	C	D
3	Orange Av. & Driveway 1	CSS	9.0	9.2	8.9	A	A	A	11.3	10.0	9.8	B	B	A
4	Orange Av. & Imperial Hwy. (SR-90)	CSS	23.7	24.8	26.0	C	C	D	29.5	28.3	28.4	D	D	D
5	Flower Av. & Birch St.	TS	13.2	15.8	8.5	B	B	A	14.8	16.1	8.8	B	B	A
6	Flower Av. & Driveway 2	CSS	10.6	0.0	0.0	B	A	A	11.0	0.0	0.0	B	A	A
7	Flower Av. & Imperial Hwy. (SR-90)	CSS	25.0	27.0	28.7	D	D	D	25.0	27.0	28.7	D	D	D

* **BOLD** = Level of Service (LOS) does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the Highway Capacity Manual (6th Edition), overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; TS = Traffic Signal

[3] ICU is reported in volume-to-capacity (v/c). ICU analysis conducted for signalized CMP intersections.

6.5 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no additional study area intersections anticipated to meet peak hour volume-based traffic signal warrants under General Plan Buildout Without and With Project traffic conditions in addition to the intersection of Flower Avenue and Imperial Highway (SR-90) which was previously warranted under Opening Year Cumulative With Project traffic conditions (for With Flower Connection). The traffic signal warrant analysis worksheets for General Plan Buildout Without and With Project With Flower Connection traffic conditions are included in Appendix 6.5 and Appendix 6.6 of this TA, respectively. The traffic signal warrant analysis worksheets for General Plan Buildout Without and With Project Without Flower Connection traffic conditions are included in Appendix 6.7 and Appendix 6.8 of this TA, respectively.

6.6 INTERSECTION QUEUING ANALYSIS

6.6.1 WITH FLOWER CONNECTION

A queuing analysis was performed at the study area intersections to determine if any peak hour queues would spill out of the left turn pockets into the adjacent through lanes. Queuing analysis findings are presented in Table 6-3 for With Flower Connection traffic conditions. As shown in Table 6-3, the following movement is anticipated to experience queuing issues during the weekday peak 95th percentile traffic flows under General Plan Buildout Without Project With Flower Connection traffic conditions:

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – southbound left turn lane, MD peak hour only
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, MD and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD, and PM peak hours
- Orange Av. & Driveway 1 (#3) – southbound left-through turn lane, MD and PM peak hours *
- Orange Av. & Driveway 1 (#3) – westbound left-right lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – southbound right turn lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – westbound through-right turn lane, MD and PM peak hours *
- Flower Av. & Driveway 2 (#6) – southbound through-right turn lane, PM peak hour only *
- Flower Av. & Driveway 2 (#6) – eastbound left-right turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – southbound left turn lane, AM, MD, and PM peak hours *
- Flower Av. & Imperial Hwy. (#7) – southbound right turn lane, PM peak hour only *
- Flower Av. & Imperial Hwy. (#7) – eastbound left turn lane, AM peak hour only
- Flower Av. & Imperial Hwy. (#7) – westbound through-right turn lane, PM peak hour only *

There are no additional study area intersections or movements anticipated to experience queuing issues during the peak hours with the addition of Project traffic, in addition to the movements identified for General Plan Buildout Without Project With Flower Connection traffic conditions. However, the southbound left turn queue at Flower Avenue and Imperial Highway (SR-90) is anticipated to be deficient in the MD peak hours with the addition of Project traffic. Worksheets for General Plan Buildout Without and With Project With Flower Connection traffic conditions queuing analyses are provided in Appendix 6.9 and Appendix 6.10, respectively.

6.6.2 WITHOUT FLOWER CONNECTION

A queuing analysis was performed at the study area intersections to determine if any peak hour queues would spill out of the left turn pockets into the adjacent through lanes. Queuing analysis findings are presented in Table 6-4 for Without Flower Connection traffic conditions.

TABLE 6-3: QUEUING SUMMARY FOR GENERAL PLAN BUILDOUT CONDITIONS – WITH FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance	General Plan Buildout Without Project 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM	General Plan Buildout With Project 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	NBL[3]	140	**663**	**418**	**510**	**No**	**No**	**No**	**663**	**418**	**510**	**No**	**No**	**No**
		NBR	125	140 [2]	165 [2]	135 [2]	Yes	Yes	Yes	145 [2]	165 [2]	138 [2]	Yes	Yes	Yes
		SBL	200	120	**248**	200	Yes	**No**	Yes	120	**248**	200	Yes	**No**	Yes
		SBR	545	125	225	198	Yes	Yes	Yes	128	225	198	Yes	Yes	Yes
		EBL	200	173	**323**	**228**	Yes	**No**	**No**	173	**323**	**228**	Yes	**No**	**No**
		EBR	140	**320**	**238**	**285**	**No**	**No**	**No**	**320**	**238**	**285**	**No**	**No**	**No**
		WBL	170	160	**343**	**275**	Yes	**No**	**No**	170	**345**	**280**	Yes	**No**	**No**
		WBR	170	73	110	98	Yes	Yes	Yes	73	110	98	Yes	Yes	Yes
2	Orange Av. & Birch St.	NBL/T/R	180	8	38	25	Yes	Yes	Yes	10	40	28	Yes	Yes	Yes
		SBR	100	3	5	8	Yes	Yes	Yes	3	5	8	Yes	Yes	Yes
		EBR	75	0	0	0	Yes	Yes	Yes	0	0	0	Yes	Yes	Yes
		WBL	140	3	5	5	Yes	Yes	Yes	3	5	5	Yes	Yes	Yes
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	18	10	13	Yes	Yes	Yes	18	10	13	Yes	Yes	Yes
		SBR	120	10	33	23	Yes	Yes	Yes	33	43	33	Yes	Yes	Yes
5	Flower Av. & Birch St.	NBL/T/R	60	55	48	20	Yes	Yes	Yes	60	50	20	Yes	Yes	Yes
		SBL/T/R	60	23	20	15	Yes	Yes	Yes	23	20	15	Yes	Yes	Yes
		EBL	125	8	15	5	Yes	Yes	Yes	8	15	5	Yes	Yes	Yes
		WBL	125	25	48	23	Yes	Yes	Yes	28	50	25	Yes	Yes	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	3	3	5	Yes	Yes	Yes	3	3	5	Yes	Yes	Yes
		SBL	100	**--[4]**	88	85	**No**	Yes	Yes	**--[4]**	**--[4]**	98	**No**	**No**	Yes
		SBR	230	80	73	58	Yes	Yes	Yes	118	90	78	Yes	Yes	Yes
		EBL	125	**190**	113	83	**No**	Yes	Yes	**220**	125	108	**No**	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Although 95th percentile queue is anticipated to exceed the available storage provided by the formally striped turn lane, the turn lane has sufficient unstriped storage area to accommodate the excess queue without spilling back and affecting the adjacent through lane.

[3] Queue reported for the Number 2 Northbound Left turn lane which has approximately 140-feet of storage.

[4] Queue is not reported and is considered infinite. Additional queuing analysis provided in Section 1.7.

TABLE 6-4: QUEUING SUMMARY FOR GENERAL PLAN BUILDOUT CONDITIONS – WITHOUT FLOWER CONNECTION

#	Intersection	Movement	Available Stacking Distance	General Plan Buildout Without Project - Without Flower 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM	General Plan Buildout With Project - Without Flower 95th Percentile Queue (Feet) AM Peak Hour	MD Peak Hour	PM Peak Hour	Acceptable? [1] AM	MD	PM
1	Brea Bl. & Imperial Hwy. (SR-90)	NBL[3]	140	**663**	**413**	**510**	**No**	**No**	**No**	**665**	**413**	**510**	**No**	**No**	**No**
		NBR	125	140 [2]	163 [2]	135 [2]	Yes	Yes	Yes	140 [2]	163 [2]	135 [2]	Yes	Yes	Yes
		SBL	200	120	**248**	200	Yes	**No**	Yes	120	**248**	200	Yes	**No**	Yes
		SBR	545	195	305	210	Yes	Yes	Yes	195	305	210	Yes	Yes	Yes
		EBL	200	**335**	**450**	**268**	**No**	**No**	**No**	**343**	**453**	**275**	**No**	**No**	**No**
		EBR	140	**323**	**238**	**285**	**No**	**No**	**No**	**323**	**238**	**285**	**No**	**No**	**No**
		WBL	170	160	**343**	**275**	Yes	**No**	**No**	173 [2]	**345**	**280**	Yes	**No**	**No**
		WBR	170	73	110	98	Yes	Yes	Yes	73	110	98	Yes	Yes	Yes
2	Orange Av. & Birch St.	NBL/T/R	180	8	40	28	Yes	Yes	Yes	10	43	30	Yes	Yes	Yes
		SBR	100	3	5	8	Yes	Yes	Yes	3	5	8	Yes	Yes	Yes
		EBR	75	0	0	0	Yes	Yes	Yes	0	0	0	Yes	Yes	Yes
		WBL	140	3	5	5	Yes	Yes	Yes	3	5	5	Yes	Yes	Yes
4	Orange Av. & Imperial Hwy. (SR-90)	NBR	115	15	10	13	Yes	Yes	Yes	15	10	10	Yes	Yes	Yes
		SBR	120	10	30	20	Yes	Yes	Yes	43	45	38	Yes	Yes	Yes
5	Flower Av. & Birch St.	NBL/T/R	60	**115** [4]	**88** [4]	50	**No**	**No**	Yes	**125** [4]	**90** [4]	53	**No**	**No**	Yes
		SBL/T/R	60	28	18	15	Yes	Yes	Yes	28	18	15	Yes	Yes	Yes
		EBL	125	8	15	8	Yes	Yes	Yes	8	15	8	Yes	Yes	Yes
		WBL	125	**178**	**150**	80	**No**	**No**	Yes	**215**	**163**	90	**No**	**No**	Yes
7	Flower Av. & Imperial Hwy. (SR-90)	NBR	100	3	3	5	Yes	Yes	Yes	3	3	5	Yes	Yes	Yes

* NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, L = Left, T = Through, R = Right

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 25 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Although 95th percentile queue is anticipated to exceed the available storage provided by the formally striped turn lane, the turn lane has sufficient unstriped storage area to accommodate the excess queue without spilling back and affecting the adjacent through lane.

[3] Queue reported for the Number 2 Northbound Left turn lane which has approximately 140-feet of storage.

[4] Although the available storage space has been conservatively assumed to end at the first private driveway along Flower Avenue, the queue will be adequately accommodated by the single northbound travel lane on Flower Avenue.

As shown in Table 6-4, the following movements are anticipated to experience queuing issues during the weekday peak 95th percentile traffic flows under General Plan Buildout Without Project Without Flower Connection traffic conditions:

- Brea Av. & Imperial Hwy. (SR-90) (#1) – northbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – southbound left turn lane, MD peak hour only
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound left turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – eastbound right turn lane, AM, MD, and PM peak hours
- Brea Av. & Imperial Hwy. (SR-90) (#1) – westbound left turn lane, MD and PM peak hours
- Orange Av. & Driveway 1 (#3) – southbound left-through turn lane, MD and PM peak hours *
- Orange Av. & Driveway 1 (#3) – westbound left-right lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – southbound right turn lane, MD and PM peak hours *
- Orange Av. & Imperial Hwy. (SR-90) (#4) – westbound through-right turn lane, MD and PM peak hours *
- Flower Av. & Birch St. (#5) – northbound left-through-right turn lane, AM and MD peak hours
- Flower Av. & Birch St. (#5) – westbound left turn lane, AM and MD peak hours

There are no additional study area intersections or movements anticipated to experience queuing issues during the peak hours with the addition of Project traffic, in addition to the movements identified for General Plan Buildout Without Project Without Flower Connection traffic conditions, with the exception of the following:

- Flower Av. & Imperial Hwy. (#7) – southbound left turn lane, MD peak hour only

Worksheets for General Plan Buildout Without and With Project Without Flower Connection traffic conditions queuing analyses are provided in Appendix 6.11 and Appendix 6.12, respectively.

6.7 DEFICIENCIES AND RECOMMENDED IMPROVEMENTS

This section provides a summary of deficiencies and recommended improvements for General Plan Buildout traffic conditions. Based on deficiency criteria discussed in Section 2.6 *Level of Service (LOS) Criteria*, the following intersections were found to be deficient.

6.7.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvements necessary to address these traffic deficiencies back to acceptable levels of service are presented below. The intersection of Flower Avenue at Imperial Highway (SR-90) under With Flower Connection traffic conditions is anticipated to exceed the City's deficiency criteria for LOS, requiring improvements to bring the intersection back to an acceptable LOS or make other improvements to the intersection comparable to the deficiency. The intersection operations analysis worksheets for General Plan Buildout With Project With Flower Connection traffic conditions, with improvements, are included in Appendix 6.13 of this TA.

The addition of Project traffic to the deficient intersection of Brea Boulevard at Imperial Highway (SR-90) under General Plan Buildout With Project Without Flower Connection conditions falls below the City's threshold for deficient LOS. As such, no improvements were identified for General Plan Buildout With Project Without Flower Connection traffic conditions.

Alternative 1: Signalization of Flower Avenue at Imperial Highway (SR-90)

The first alternative considered and evaluated assumes the intersection of Flower Avenue at Imperial Highway (SR-90) would maintain its current access but would be improved to signalize the intersection (right-in/right-out for the southern leg and full access for the northern leg of Flower Avenue). The installation of a traffic signal at the intersection of Flower Avenue at Imperial Highway (SR-90) would improve the intersections operations back to acceptable LOS (see Table 6-5). Although the intersection

of Flower Avenue at Imperial Highway (SR-90) is anticipated to meet a peak hour volume-based warrant under Opening Year Cumulative (2024) With Project traffic conditions, additional warrants should be evaluated to determine if other warrants are met (such as the warrants based on 4-hour volumes, 8-hour volumes, collision history, pedestrian volume, etc.). Additional evaluation may also be necessary to determine the effects signalization has on existing school pedestrian traffic and pick-up/drop-off vehicular traffic flows for the adjacent Laurel Elementary School.

TABLE 6-5: INTERSECTION ANALYSIS FOR GENERAL PLAN BUILDOUT CONDITIONS WITH IMPROVEMENTS

			Intersection Approach Lanes[1]												Delay[2] (secs.)			Level of Service		
		Traffic	Northbound			Southbound			Eastbound			Westbound								
#	Intersection	Control[3]	L	T	R	L	T	R	L	T	R	L	T	R	AM	MD	PM	AM	MD	PM
7	Flower Av. & Imperial Hwy. (SR-90)																			
	- Without Improvements	CSS	0	0	1	1	0	1	1	3	0	0	3	0	**>200.0**	**>200.0**	**>200.0**	**F**	**F**	**F**
	- With Improvements (Signal)[4]	**TS**	0	0	1	1	0	1	1	3	0	0	3	0	10.2	8.8	8.5	B	A	A
	- With Improvements (RIRO)[5]	CSS	0	0	1	**0**	0	1	**0**	3	0	0	3	0	**80.3**	**73.4**	**63.0**	**F**	**F**	**F**
	- With Improvements (No Connection)[6]	CSS	0	0	1	**0**	0	**0**	**0**	3	0	0	3	0	25.0	27.0	28.7	D	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; **1** = Improvement/Change in Lanes

[2] Per the Highway Capacity Manual 6th Edition, overall average intersection delay and level of service are shown for intersections with a traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; TS = Traffic Signal; **CSS** = Improvement

[4] This potential improvement consists of maintaining the existing allowable turning movements along with the installation of a traffic signal.

[5] This potential improvement consists of modifying the intersection to extend the median and restrict access to right-in/right-out only for the north leg.

[6] This potential improvement consists of closing off Flower Avenue north of Imperial Highway (SR-90). See Table 6-2.

Alternative 2: Right-in/Right-out at Flower Avenue and Imperial Highway (SR-90)

The second alternative considered and evaluated assumes the intersection of Flower Avenue at Imperial Highway (SR-90) would maintain its current access for the southern leg but also assumes modifications to the existing median needed to restrict the northern leg also to right-in/right-out access only. Restriping would also need to occur on the north leg of Flower Avenue in order to eliminate the existing southbound left turn lane. Restricting the access at Flower Avenue north of Imperial Highway (SR-90) to right-in/right-out access only would improve the peak hour operations to LOS F. Although this improvement would not achieve the City standard of LOS D, the turn restriction would result in LOS improvements in comparison to the LOS F and high delays anticipated to occur without the improvement (see Table 6-5).

The right-in/right-out access restriction for the northern leg of Flower Avenue at Imperial Highway (SR-90) would alter the existing travel patterns for vehicles in the area, including pick-up/drop-off circulation associated with the adjacent Laurel Elementary School. Due to the re-routing of traffic to adjacent intersections, there may be increased delays for adjacent intersections. However, similar to the Without Flower Connection alternative (see Alternative 3), the reallocation of these trips should not result in any project-related deficiencies. Should this alternative be selected, additional engineering studies are recommended to determine the viability of the proposed access restriction. Reconfiguration of the intersection to restrict access will need to ensure that CA MUTCD, City of Brea design standards, Caltrans design standards, and ADA standards are all met.

Alternative 3: Full Closure of Flower Avenue North of Imperial Highway (SR-90)

Lastly, the third alternative considered and evaluated assumes the intersection of Flower Avenue north of Imperial Highway (SR-90) would be fully closed and the southern terminus of Flower Avenue would become a cul-de-sac just north of Imperial Highway (SR-90). However, access for the southern leg would remain with its current right-in/right-out access. The cul-de-sac should meet the guidelines identified in the City's Municipal Code Section 18.92.120 Cul-de-sac Streets and Alleys. The City Standard Plans should be used in the design of the proposed off-set cul-de-sac (or the County of Orange Standard Plans if the City does not have standards). It is anticipated that the design would require right-of-way acquisition from the adjacent Laurel Elementary School in addition to the existing pedestrian connections/walkways that would need to be redesigned. The median along Imperial Highway (SR-90) would also need to be closed. By implementing a cul-de-sac at the southern terminus of Flower Avenue, north of Imperial Highway (SR-90), the intersection operations are anticipated to improve back to acceptable LOS (LOS D) during the peak hours (see Table 6-5).

Similar to the right-in/right-out access restriction, the closure of Flower Avenue north of Imperial Highway (SR-90) would also alter the existing travel patterns for vehicles in the area, including pick-up/drop-off circulation associated with the adjacent Laurel Elementary School (both vehicular traffic and pedestrian routes). Due to the re-routing of traffic to adjacent intersections, there may be increased delays for adjacent intersections, however, the reallocation of these trips should not result in any project-related deficiencies (see Table 6-2). Should this alternative be selected, additional engineering studies are recommended to determine the viability of the proposed closure of Flower Avenue. Closure of Flower Avenue north of Imperial Highway (SR-90) will need to ensure that CA MUTCD, City of Brea design standards, Caltrans design standards, and ADA standards are all met.

6.7.2 RECOMMENDED IMPROVEMENTS TO ADDRESS QUEUING DEFICIENCIES

With Flower Connection

As shown previously in Table 6-3, the queuing analysis results identify a potential queuing issues for the northbound left, southbound left, eastbound left, eastbound right, and westbound left turn lanes at Brea Boulevard and Imperial Highway (SR-90) and the southbound left and eastbound left turn lanes at the intersection of Flower Avenue and Imperial Highway (SR-90) during one or more peak hours under General Plan Buildout With Flower Connection traffic conditions.

It should be noted that the addition of Project traffic has a nominal effect on the peak hour queuing results. Although Table 6-5 identifies improvements needed to address intersection LOS, there are no additional recommendations to address off-site queuing deficiencies since the Project's effect to the peak hour queuing issues is negligible, with the exception of the southbound left turn lane on Flower Avenue at Imperial Highway (SR-90) during the MD peak hour where the addition of Project traffic would result in a new queuing deficiency and the eastbound left turn lane on Flower Avenue at Imperial Highway (SR-90) during the AM peak hour where the addition of Project traffic is anticipated to increase the queue by approximately 30-feet. The intersection improvement recommendation discussed in Section 6.7.1 would resolve the southbound left turn queuing issue at Flower Avenue and Imperial Highway (SR-90) (see Section 1.7 of the report). Similarly, the eastbound left turn queue at the intersection of Flower Avenue and Imperial Highway (SR-90) could be resolved with the implementation of a right-in/right-out access restriction for the north leg of Flower Avenue or full closure of Flower Avenue north of Imperial Highway (SR-90) as discussed in Section 1.6.

Without Flower Connection

As shown previously in Table 6-4, the queuing analysis results identify a potential queuing issues for the northbound left, southbound left, eastbound left, eastbound right, and westbound left turn lanes at Brea Boulevard and Imperial Highway (SR-90) and the northbound left-through-right and westbound left turn lanes at the intersection of Flower Avenue and Birch Street during one or more peak hours under General Plan Buildout Without Flower Connection traffic conditions.

It should be noted that the addition of Project traffic has a nominal effect on the peak hour queuing results with the exception of the westbound left turn lane at Flower Avenue and Birch Street. The westbound left turn lane requires 215-feet of storage in order to accommodate the 95th percentile AM peak hour queues under General Plan Buildout Without Flower Connection traffic conditions; however, the existing left turn lane accommodates up to 210-feet of storage within the striped left turn pocket and the opening/transition area which leads into a painted two-way-left turn lane east of the eastbound left turn pocket at Flower Avenue. As such, the additional peak hour vehicles could be accommodated within the existing left turn lane, storage/transition area, and painted median without restriping as there is sufficient space. There are no additional recommendations for General Plan Buildout Without Flower Connection conditions to address off-site queuing deficiencies since the Project's effect to the peak hour queuing issues is negligible.

7 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements within the City of Brea are funded through a combination of improvements constructed by the Project and payment into pre-existing development impact fee programs. Fee programs applicable to the Project are described below.

7.1 CITY OF BREA TRAFFIC IMPACT FEE (TIF) PROGRAM

The City of Brea has created its own local TIF program in July 1995 (Ordinance 966) to impose and collect fees from new residential, commercial, and industrial development for the purpose of funding roadways and intersections necessary to accommodate City growth as identified in the City's General Plan Circulation Element. These fees are required in part by Orange County's Measure M (a transportation initiative passed by voters in 1990). The City's TIF program provides a funding and implementation plan to ensure an adequate and interconnected transportation system and offset or mitigate the traffic impacts caused by new development.

All new development projects are subject to the Traffic Impact Fees, except:

- Alterations to an existing building
- Reconstruction (within two years), when a building has been destroyed by fire, wind, earthquakes, vandalism, or other natural or man-made disasters
- Additions to a single-family or multiple-family residence
- Construction of public schools

The required TIF fees must be paid prior to the issuance of any building permits (as a one-time fee). The City's TIF fee schedule was adopted and effective February 4, 2012 (City Council Resolution 2011-096). The cost for commercial, general, mixed-use is $2.53 per gross square foot. As such, the Project's TIF obligation is $20,240 (8,000 square feet x $2.53 per gross square foot).

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8 REFERENCES

1. **City of Brea.** Transportation Impact Analysis (TIA) Guidelines. City of Brea : s.n., September 2020.
2. **Institute of Transportation Engineers.** Trip Generation Manual. 11th Edition. 2021.
3. **City of Brea.** General Plan. City of Brea : s.n., Adopted August 19, 2003.
4. **Orange County Transportation Authority.** 2021 Orange County Congestion Management Program Report. County of Orange : OCTA, November 2021.
5. **Transportation Research Board.** Highway Capacity Manual (HCM). 6th Edition. s.l. : National Academy of Sciences, 2016.
6. **Caltrans.** Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. California Manual on Uniform Traffic Control Devices (CAMUTCD). 2014.
7. **City of Brea.** Connecting the Core: Brea Active Transportation Plan. City of Brea : s.n., Adopted January 21, 2020.

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APPENDIX 1.1: APPROVED TRAFFIC STUDY SCOPING AGREEMENT

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URBAN | CROSSROADS

January 3, 2023

Mr. David Roseman
City of Brea
1 Civic Center Circle
Brea, CA 92821

BREA GASLIGHT SQUARE TRAFFIC ANALYSIS SCOPING AGREEMENT

Mr. David Roseman,

The firm of Urban Crossroads, Inc. is pleased to submit this scoping letter regarding the traffic analysis for Brea Gaslight Square development (**Project**), which is located between Orange Avenue and Flower Avenue and north of Imperial Highway at 255 Imperial Highway in the City of Brea. This letter describes the proposed Project trip generation, trip distribution, and analysis methodology, which have been used to establish the draft proposed Project study area and analysis locations.

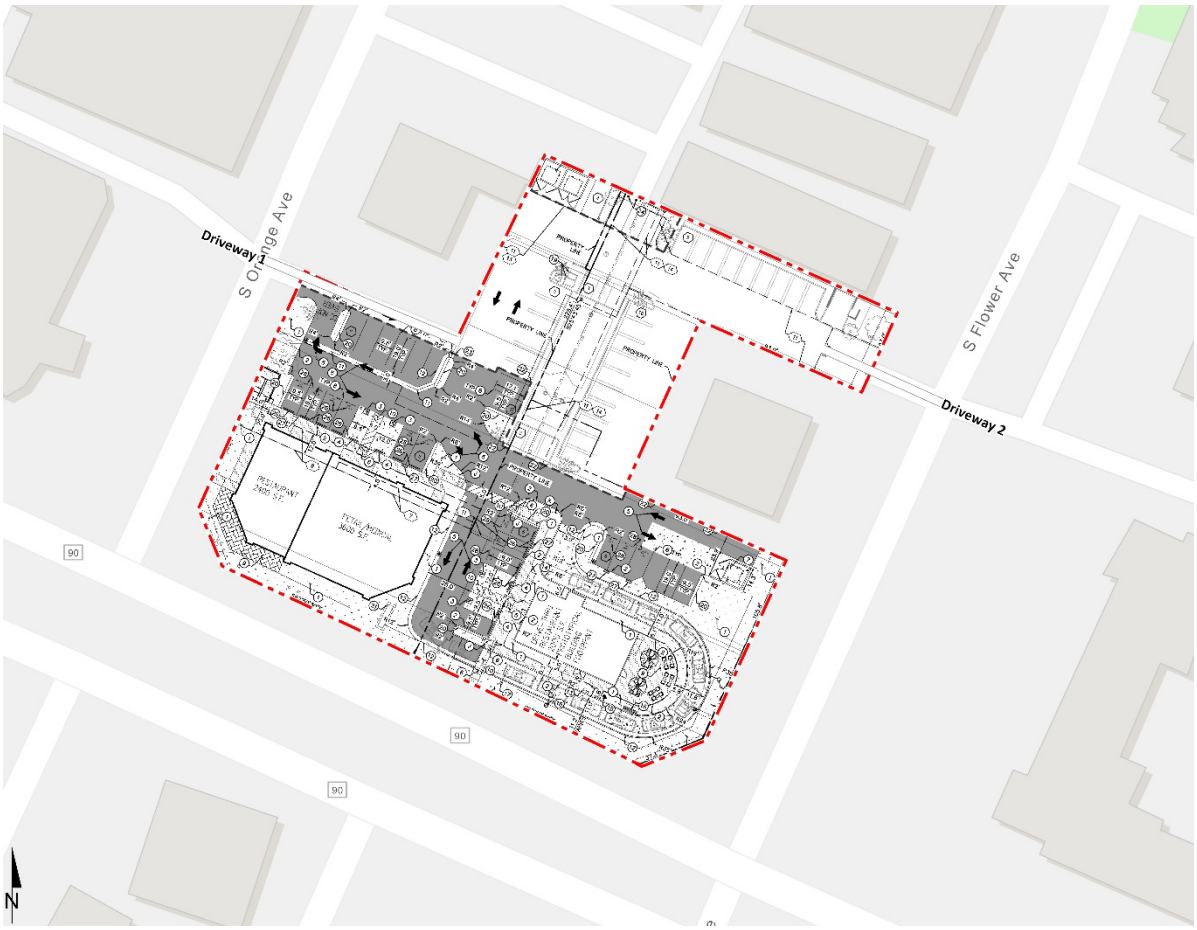
PROPOSED PROJECT

The redevelopment of the site requires demolition of the following 4 existing buildings:

- Two 2,799 square foot office uses fronting Orange Avenue
- One 3,166 square foot office use adjacent to Imperial Highway
- One two-story 10,109 square foot office building at the northwest corner of Flower Avenue and Imperial Highway

The Project consists of the development of a new 6,000 square foot building located on the northeast corner of Orange Avenue and Imperial Highway that includes a 2,400 square foot restaurant and 3,600 square foot retail/medial office use. A 2,000 square foot coffee shop with drive-through window is proposed on the northwest corner of Flower Avenue and Imperial Highway (see Exhibit 1). The proposed Project is anticipated to have an opening year of 2024. The existing site currently has access to Orange Avenue and Flower Avenue (both access points allow for full turning movements, with no access restrictions). Both access points will be maintained although it is anticipated the Project will reconstruct the driveways to meet the current City of Brea commercial driveway standards.

EXHIBIT 1: PRELIMINARY SITE PLAN



TRIP GENERATION

Trip generation represents the amount of traffic that is attracted and produced by a development and is based upon the specific land uses planned for a given project.

EXISTING TRAFFIC

As noted previously, the Project includes the demolition of 4 existing buildings. These 4 buildings are currently occupied and generating traffic. In an effort to understand the existing traffic associated with the current uses, traffic counts were collected at the driveways on September 20 and 21, 2022 (Tuesday and Wednesday). Laurel Elementary was in session on these dates, although Wednesday is an early release day where school still starts at 8:00 AM but releases at 1:25 PM (regular release is at 2:10 PM). A summary of the count data collected is shown on Table A-1 of Attachment A. Table A-1 provides a detailed summary of the counts collected at all driveway locations, by day. It should be noted that the site also includes two other buildings that will remain on the site and traffic associated with these uses have not been included in the driveway data collected. The two buildings that are to remain are located on Assessor's Parcel

Number (APN) 319-292-31 and APN 319-292-33. See Attachment A for driveway count data worksheets.

Table 1 summarizes the average existing trip generation based on the count data collected over two consecutive days. The existing site currently generates an average of 362 two-way trips per day, with 44 trips during the AM peak hour, 41 trips during the mid-day peak hour, and 27 trips during the PM peak hour.

TABLE 1: EXISTING TRIP GENERATION

	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Land Use	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Actual Vehicles:										
Existing Use										
Passenger Cars:	31	13	44	18	23	41	7	20	27	356
2-axle Trucks:	0	0	0	0	0	0	0	0	0	6
3-axle Trucks:	0	0	0	0	0	0	0	0	0	0
4+-axle Trucks:	0	0	0	0	0	0	0	0	0	0
Total Trucks:	0	0	0	0	0	0	0	0	0	6
Total Trips	**31**	**13**	**44**	**18**	**23**	**41**	**7**	**20**	**27**	**362**

PROPOSED PROJECT

In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published in the ITE Trip Generation Manual (11th Edition, 2021) for the proposed land uses was utilized. For purposes of this assessment, the following ITE land use codes have been evaluated for the Project (see Table 2 for the trip generation rates):

- 3,600 square feet of Strip Retail (ITE Land Use Code 822) (more conservative than medical/dental office)
- 2,400 square foot High Turnover (Sit-Down) Restaurant use (ITE Land Use Code 932)
- 2,000 square foot Coffee/Donut Shop with Drive-Thru Window use (ITE Land Use Code 937)

TABLE 2: TRIP GENERATION RATES

	ITE		AM Peak Hour			Mid-Day Peak Hour[3]			PM Peak Hour			Weekday
Land Use[1]	Code	Units[2]	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Strip Retail	822	TSF	1.42	0.94	2.36	1.88	1.88	3.76	3.30	3.29	6.59	54.45
High Turnover Sit-Down Restaurant	932	TSF	5.26	4.31	9.57	3.48	6.00	9.49	5.52	3.53	9.05	107.20
Coffee/Donut Shop with Drive-Thru	937	TSF	43.80	42.08	85.88	16.81	15.21	32.01	19.50	19.50	38.99	533.57

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation Manual, Eleventh Edition (2021).

[2] TSF = thousand square feet

[3] Mid-day (1:00-2:00 PM) trip generation rates determined based on the ITE time of day distributions for each applicable land use.

Trip generation rates during the mid-day have been determined based on the ITE's Time of Day distribution for each applicable land use category (the timeframe of 1:00-2:00 PM has been utilized). As a result, the time-of-day distribution for the mid-day timeframe is as follows (in and out splits have been calculated using the same PM peak hour split if not available):

- Strip Retail (ITE Land Use Code 822) = 6.9% of the total daily traffic (split 50/50 for in and out)
- High Turnover (Sit-Down) Restaurant use (ITE Land Use Code 932) = 6.5% of the inbound daily, and 11.2% of the outbound daily (assuming daily is split 50/50 in and out)
- Coffee/Donut Shop with Drive-Thru Window use (ITE Land Use Code 937) = 6.3% of the inbound daily, and 5.7% of the outbound daily (assuming daily is split 50/50 in and out)

ITE time-of-day distribution tables are provided in Attachment B.

As the Project is proposed to include retail and food uses, pass-by percentages have been used but limited to 25% for the sit-down restaurant and strip retail while the coffee shop is limited to 50%. Pass-by trips account for trips that are currently on the existing roadway network that would stop by uses within the proposed Project on their way to their ultimate destination. Table 3 shows the resulting Project trip generation summary, which shows the Project is anticipated to generate a total of 872 two-way trips per day with 119 AM peak hour trips, 62 mid-day peak hour trips, and 73 PM peak hour trips.

TABLE 3: PROJECT TRIP GENERATION

			AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Land Use	Quantity	Units[1]	In	Out	Total	In	Out	Total	In	Out	Total	Daily
High Turnover Sit-Down Restaurant	2.400	TSF	13	10	23	8	14	22	13	8	21	258
Pass-By Reduction (25% MD/PM/Daily):			0	0	0	-2	-2	-4	-2	-2	-4	-66
Coffee/Donut Shop with Drive-Thru	2.000	TSF	88	84	172	34	30	64	39	39	78	1,068
Pass-By Reduction (50% AM/MD/PM/Daily):			-42	-42	-84	-15	-15	-30	-20	-20	-40	-534
Strip Retail	3.600	TSF	5	3	8	7	7	14	12	12	24	196
Pass-By Reduction (25% MD/PM/Daily):			0	0	0	-2	-2	-4	-3	-3	-6	-50
Project Buildout Total:			**64**	**55**	**119**	**30**	**32**	**62**	**39**	**34**	**73**	**872**

[1] TSF = thousand square feet

NET TRIP GENERATION

Table 4 shows the net trips generated by the Project compared to the existing use. The resulting net new trips are also identified on Table 4. As shown, the Project is anticipated to generate a net increase of 510 daily trips, 75 AM peak hour trips, 21 mid-day peak hour trips, and 46 PM peak hour trips in comparison to the existing uses.

TABLE 4: TRIP GENERATION COMPARISON

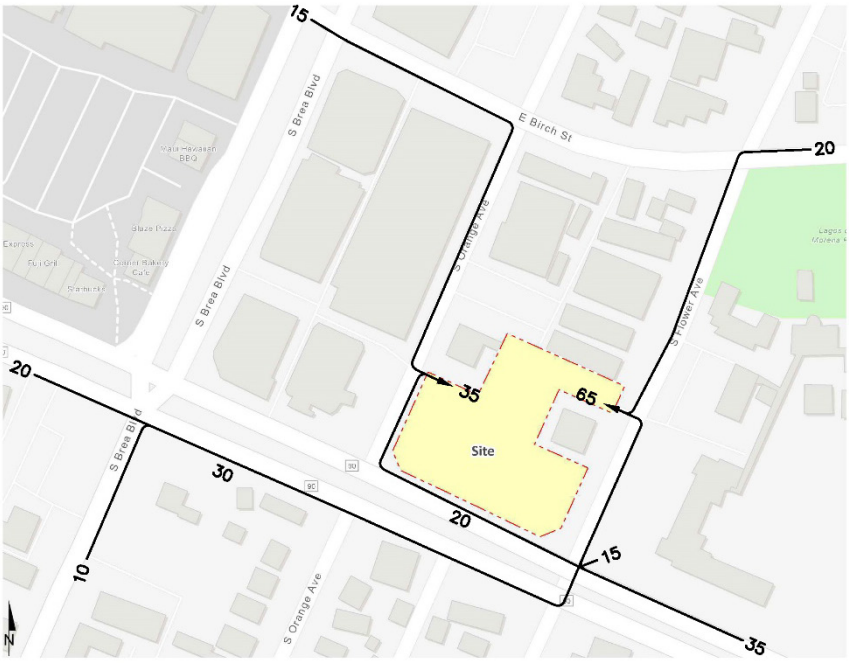
	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Project	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Existing Uses	31	13	44	18	23	41	7	20	27	362
Proposed Project	64	55	119	30	32	62	39	34	73	872
Variance (Proposed - Existing)	**33**	**42**	**75**	**12**	**9**	**21**	**32**	**14**	**46**	**510**

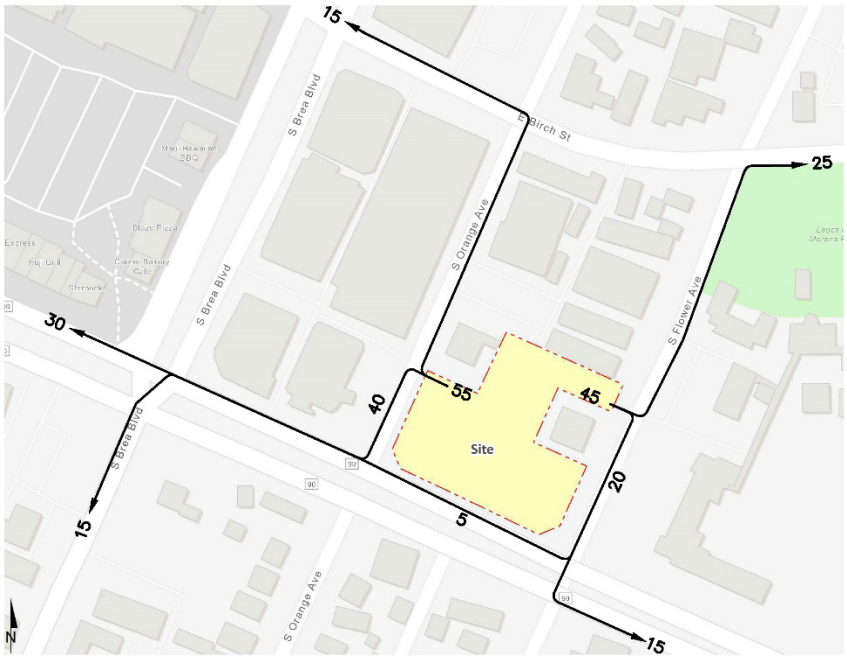
According to the City of Brea's Transportation Impact Analysis (TIA) Guidelines (September 2020), a level of service (LOS) based transportation assessment (non-CEQA analysis) shall be required for projects that generate more than 50 net new peak hour trips during either the AM or PM peak hours. Since the Project meets this criteria, additional peak hour traffic operations analysis is necessary based on the City's Guidelines.

TRIP DISTRIBUTION

The Project trip distribution represents the directional orientation of traffic to and from the Project site. Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. Exhibit 2 shows the Project trip distribution patterns with the Existing roadway network while Exhibit 3 shows the modified Project trip distribution patterns with the closure of Flower Avenue at Imperial Highway (SR-90).

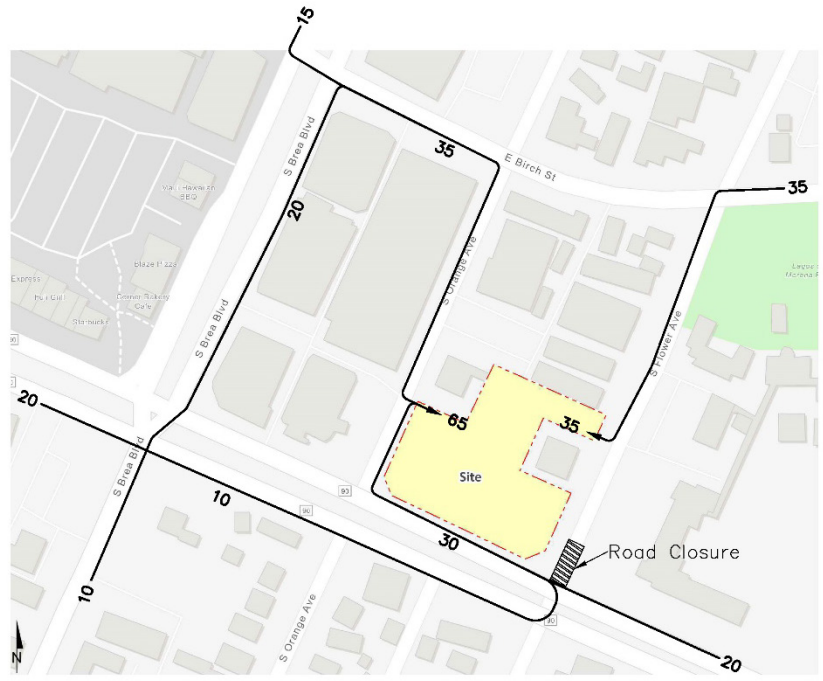
EXHIBIT 2: PROJECT TRIP DISTRIBUTION – WITH EXISTING ROADWAY NETWORK

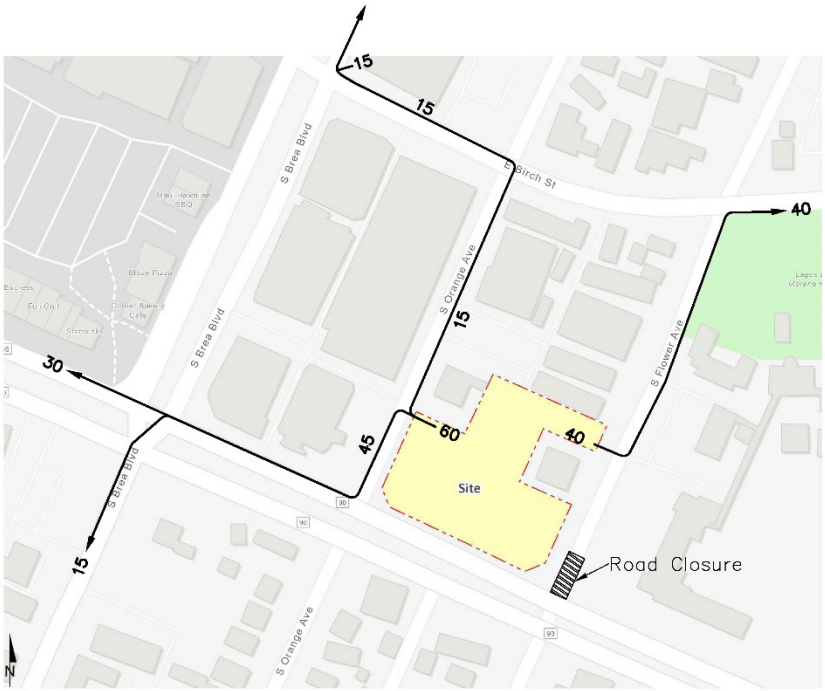




10 = *Percent From Project*

EXHIBIT 3: PROJECT TRIP DISTRIBUTION – WITH FLOWER AVENUE CLOSURE





10 = ***Percent From Project***

ANALYSIS SCENARIOS

Consistent with the City's TIA Guidelines, intersection analysis will be provided for the following scenarios:

- Existing (2022) Conditions
- Opening Year Cumulative (2024) Without Project (Without and With the Closure of Flower Avenue at Imperial Highway)
- Opening Year Cumulative (2024) With Project (Without and With the Closure of Flower Avenue at Imperial Highway)
- General Plan Buildout Without Project – based on OCTAM representing buildout of the City's General Plan (Without and With the Closure of Flower Avenue at Imperial Highway)
- General Plan Buildout With Project (Without and With the Closure of Flower Avenue at Imperial Highway)

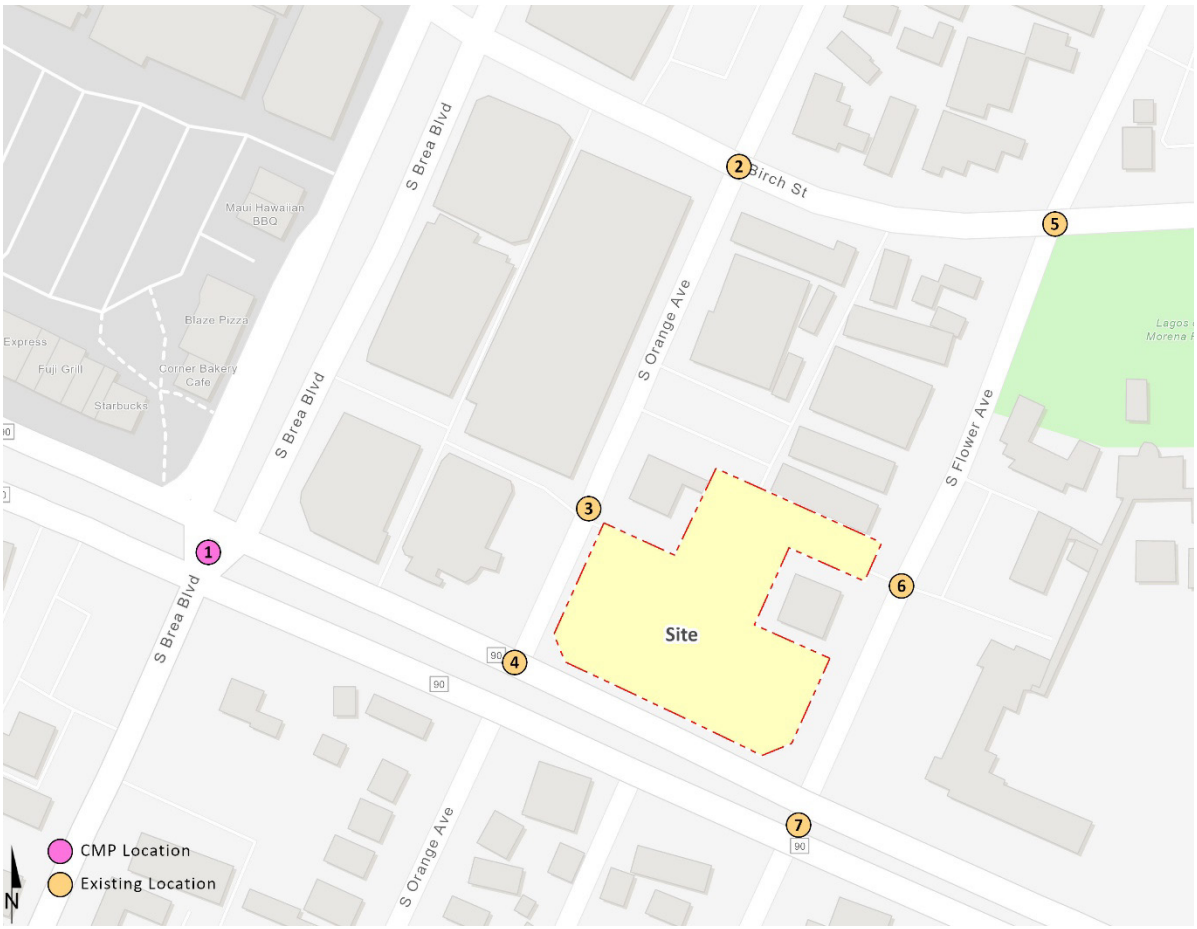
All study area intersections will be evaluated using the Highway Capacity Manual (HCM) 6th Edition analysis methodology.

STUDY AREA INTERSECTIONS

Based on the Project's anticipated travel patterns and trip generation characteristics, the following study area intersection locations shown on Exhibit 4 and listed below were selected for analysis (where the Project would add 25 or more peak hour trips or if used for site access):

#	Intersection	Jurisdiction	CMP?
1	Brea Bl. & Imperial Hwy. (SR-90)	Brea	Yes
2	Orange Av. & Birch St.	Brea	No
3	Orange Av. & Driveway 1	Brea	No
4	Orange Av. & Imperial Hwy. (SR-90)	Brea	No
5	Flower Av. & Birch St.	Brea	No
6	Flower Av. & Driveway 2	Brea	No
7	Flower Av. & Imperial Hwy. (SR-90)	Brea	No

EXHIBIT 4: STUDY AREA



EXISTING COUNT DATA

As local schools are back in session (with in-person instruction), we are proposing to conduct new traffic counts on a typical weekday when local schools are open and operating on normal bell schedules. No additional adjustments are proposed for the purposes of establishing the existing baseline conditions. Traffic counts will be conducted when the local schools (such as Laurel Elementary) are in session and operating on normal bell schedules. The timeframes to be counted for each period are outlined below:

- AM Peak Period: 7:00-9:00 AM
- Mid-Day Peak Period: 12:00-2:00 PM (Wednesday counts only); 1:00-3:00 PM
- PM Peak Period: 4:00-6:00 PM

GENERAL PLAN CONSISTENCY REQUIREMENTS

Per the City's General Plan Circulation Element and Growth Management Element requirements, a volume/capacity ratio of 0.90 (Level of Service D) shall be the lowest acceptable LOS at intersections. Improvements required to bring intersections and roadway segments to acceptable service levels must be clearly described as feasible. Per the City's guidelines, ICU analysis will be conducted for any signalized CMP intersections.

LEVEL OF SERVICE (LOS) CRITERIA

An effect on traffic operations occurs if the project causes one or more study intersections to operate at LOS D or better to degrade to LOS E or F; for intersections already operating at LOS E a change in control delay of 4 seconds and for intersections operating at LOS F a change in control delay of 2 seconds shall be considered unacceptable and cause an effect on traffic operations.

If a project causes an effect on traffic operations, improvements to study intersections may be required to bring back the intersection to an acceptable LOS or make other improvements to the intersection comparable to the operational deficiency. If a feasible identified improvement(s) cannot be provided as determined by the City Traffic Engineer, then contribution of fair share towards an improvement will be considered. Unsignalized intersections operating at a deficient LOS with or without project conditions shall be evaluated for the installation of a traffic signal using the traffic signal peak hour warrant and crash experience warrant per the latest version of the California Manual on Uniform Traffic Control Devices (CA MUTCD). Where applicable, any new traffic signals shall be analyzed and/or reviewed to ensure the new traffic signal operations does not unduly disrupt arterial synchronization.

AMBIENT GROWTH

Consistent with other studies performed in the area, an ambient growth rate of 1.0% per year is proposed for the study area intersections to approximate background traffic growth not identified by nearby cumulative development projects. The rate will be compounded over a 2-year period (i.e., $1.01^{2 \text{ years}} = 1.0201$ or 2.01% for 2024).

FAIR SHARE CALCULATION METHODOLOGY

Improvements found to be included in the City of Brea's Development Impact Fee (DIF) program will be identified as such. For improvements that do not appear to be in a pre-existing fee program, a fair share financial contribution based on the Project's fair share impact may be imposed in order to mitigate the Project's share of impacts in lieu of construction. The Project's fair share cost of improvements would be determined based on the following equation, which is the ratio of Project traffic to new traffic, where new traffic is total future traffic less existing baseline traffic:

Project Fair Share % = Project Traffic / (GPBO With Project Total Traffic – Existing Traffic)

CUMULATIVE PROJECTS

We will use the cumulative projects provided by the City's Planning Department.

SPECIAL ISSUES

The following special issues will also be addressed:

- Site Access Evaluation: Provide a turn lane queuing analysis for exclusive left turns at study intersections. The turn pocket lengths will be determined through peak hour traffic simulations developed using Synchro and SimTraffic software in an effort to identify the required storage capacity for turn lanes at each Project driveway. Specifically, the queuing analysis will be conducted in order to determine the necessary turn pocket storage lengths needed to accommodate peak hour queues at the Project driveways and to ensure queues at driveways do not spillback into adjacent intersections due to the driveway spacing.
- Drive-thru Stacking: The traffic study will analyze peak hour queues within the proposed drive-through to ensure that there is sufficient storage capacity on-site for vehicles waiting while gates open. Reference will also be provided to the City's required drive-through parking based on the Municipal Code.
- Traffic Signal Warrant: A traffic signal warrant analysis will be prepared for all analysis scenarios for the unsignalized, full access study area intersections, including the intersection of Flower Avenue and Imperial Highway (SR-90) and Orange Avenue/Birch Street.
- On-Site Circulation: Conduct an on-site internal vehicle circulation assessment.
- Pedestrian/Cyclist: Review of the access, circulation, and safety for pedestrians and cyclists.
- Safety Review: The applicant shall review and document that adequate site access is provided for vehicles, bikes, and pedestrians. City will provide collision statistics for all study intersections. We will review the history and pattern of collision types to identify if any improvements could improve safety at the study intersections. Any improvements proposed to address LOS deficiencies should consider the collision patterns at the intersection. The queue lengths for any intersection approaches that operate at an unacceptable LOS E or F should be identified and storage length reviewed to ensure that there are no adjacent lane or intersection blockages.
- Active Transportation & Public Transit: Potential impacts to public transit, pedestrian facilities and travel, and bicycle facilities and travel can be evaluated using the following criteria: A significant impact occurs if the project conflicts with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decreases the performance or safety of such facilities. Therefore, the traffic study should include analysis of a project to examine if it is consistent with adopted policies, plans, or programs regarding active transportation or public transit facilities, or otherwise increases or decreases the performance or safety of such facilities and make a determination as to whether it has the potential to conflict with existing or proposed facilities supporting these travel modes.
- Vehicle Miles Traveled: Pursuant to discussions with City staff, a separate VMT memo is not necessary.

If you have any questions or comments, I can be reached at cso@urbanxroads.com.

Respectfully submitted,

URBAN CROSSROADS, INC.



Charlene So, PE
Principal

ATTACHMENT A: DRIVEWAY COUNTS

TABLE A-1: SUMMARY OF DRIVEWAY COUNTS BY DAY

	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			
Land Use	In	Out	Total	In	Out	Total	In	Out	Total	Daily
Day 1: September 20, 2022										
Passenger Cars:	33	16	49	13	6	19	7	18	25	349
2-axle Trucks:	0	0	0	0	0	0	0	0	0	5
3-axle Trucks:	0	0	0	0	0	0	0	0	0	0
4+-axle Trucks:	0	0	0	0	0	0	0	0	0	0
Total Truck Trips:	0	0	0	0	0	0	0	0	0	5
Total Trips[1]	33	16	49	13	6	19	7	18	25	354
Day 2: September 21, 2022										
Passenger Cars:	29	9	38	23	40	63	7	22	29	362
2-axle Trucks:	0	0	0	0	0	0	0	0	0	6
3-axle Trucks:	0	0	0	0	0	0	0	0	0	0
4+-axle Trucks:	0	0	0	0	0	0	0	0	0	0
Total Truck Trips:	0	0	0	0	0	0	0	0	0	6
Total Trips[1]	29	9	38	23	40	63	7	22	29	368

* Note: data collected on September 20 and 21, 2022.

Note: Driveway counts only reflect the proposed uses that will be replaced. The existing uses for two buildings which are proposed to remain are not reflected in the driveway counts summarized above.

City:	Brea
Location:	TOTAL
Date:	Tuesday, September 20, 2022
Count Type:	Classified Driveway Count

	Entering				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
0:00	0	0	0	0	0
0:15	0	0	0	0	0
0:30	0	0	0	0	0
0:45	0	0	0	0	0
1:00	0	0	0	0	0
1:15	0	0	0	0	0
1:30	0	0	0	0	0
1:45	0	0	0	0	0
2:00	0	0	0	0	0
2:15	0	0	0	0	0
2:30	0	0	0	0	0
2:45	0	0	0	0	0
3:00	0	0	0	0	0
3:15	0	0	0	0	0
3:30	1	0	0	0	1
3:45	0	0	0	0	0
4:00	1	0	0	0	1
4:15	0	0	0	0	0
4:30	0	0	0	0	0
4:45	0	0	0	0	0
5:00	0	0	0	0	0
5:15	0	0	0	0	0
5:30	0	0	0	0	0
5:45	0	0	0	0	0
6:00	0	0	0	0	0
6:15	0	0	0	0	0
6:30	1	0	0	0	1
6:45	1	0	0	0	1
7:00	1	0	0	0	1
7:15	3	0	0	0	3
7:30	4	0	0	0	4
7:45	18	0	0	0	18
8:00	5	0	0	0	5
8:15	6	0	0	0	6
8:30	6	0	0	0	6
8:45	5	0	0	0	5
9:00	3	0	0	0	3
9:15	1	0	0	0	1
9:30	0	1	0	0	1
9:45	1	0	0	0	1
10:00	2	0	0	0	2
10:15	4	1	0	0	5
10:30	0	0	0	0	0
10:45	1	0	0	0	1
11:00	6	0	0	0	6
11:15	3	0	0	0	3
11:30	1	0	0	0	1
11:45	0	0	0	0	0

	Exiting				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
0:00	0	0	0	0	0
0:15	0	0	0	0	0
0:30	0	0	0	0	0
0:45	0	0	0	0	0
1:00	0	0	0	0	0
1:15	0	0	0	0	0
1:30	0	0	0	0	0
1:45	0	0	0	0	0
2:00	0	0	0	0	0
2:15	0	0	0	0	0
2:30	0	0	0	0	0
2:45	0	0	0	0	0
3:00	0	0	0	0	0
3:15	0	0	0	0	0
3:30	0	0	0	0	0
3:45	0	0	0	0	0
4:00	1	0	0	0	1
4:15	0	0	0	0	0
4:30	0	0	0	0	0
4:45	0	0	0	0	0
5:00	0	1	0	0	1
5:15	4	0	0	0	4
5:30	0	0	0	0	0
5:45	0	0	0	0	0
6:00	1	0	0	0	1
6:15	0	0	0	0	0
6:30	1	0	0	0	1
6:45	0	0	0	0	0
7:00	0	0	0	0	0
7:15	0	0	0	0	0
7:30	5	0	0	0	5
7:45	7	0	0	0	7
8:00	3	0	0	0	3
8:15	1	0	0	0	1
8:30	1	0	0	0	1
8:45	1	0	0	0	1
9:00	3	0	0	0	3
9:15	2	0	0	0	2
9:30	2	0	0	0	2
9:45	1	1	0	0	2
10:00	1	0	0	0	1
10:15	1	0	0	0	1
10:30	4	1	0	0	5
10:45	1	0	0	0	1
11:00	5	0	0	0	5
11:15	3	0	0	0	3
11:30	4	0	0	0	4
11:45	2	0	0	0	2

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City: Brea
Location: TOTAL
Date: Tuesday, September 20, 2022
Count Type: Classified Driveway Count

	Entering					Exiting				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
12:00	2	0	0	0	2	7	0	0	0	7
12:15	0	0	0	0	0	3	0	0	0	3
12:30	2	0	0	0	2	1	0	0	0	1
12:45	5	0	0	0	5	3	0	0	0	3
13:00	5	0	0	0	5	1	0	0	0	1
13:15	2	0	0	0	2	0	0	0	0	0
13:30	2	0	0	0	2	2	0	0	0	2
13:45	4	0	0	0	4	3	0	0	0	3
14:00	5	0	0	0	5	9	0	0	0	9
14:15	5	0	0	0	5	6	0	0	0	6
14:30	4	0	0	0	4	7	0	0	0	7
14:45	8	0	0	0	8	3	0	0	0	3
15:00	10	0	0	0	10	9	0	0	0	9
15:15	9	0	0	0	9	12	0	0	0	12
15:30	3	0	0	0	3	4	0	0	0	4
15:45	4	0	0	0	4	1	0	0	0	1
16:00	0	0	0	0	0	2	0	0	0	2
16:15	1	0	0	0	1	2	0	0	0	2
16:30	5	0	0	0	5	4	0	0	0	4
16:45	1	0	0	0	1	3	0	0	0	3
17:00	1	0	0	0	1	4	0	0	0	4
17:15	0	0	0	0	0	7	0	0	0	7
17:30	3	0	0	0	3	5	0	0	0	5
17:45	1	0	0	0	1	3	0	0	0	3
18:00	2	0	0	0	2	1	0	0	0	1
18:15	0	0	0	0	0	1	0	0	0	1
18:30	4	0	0	0	4	4	0	0	0	4
18:45	0	0	0	0	0	0	0	0	0	0
19:00	3	0	0	0	3	1	0	0	0	1
19:15	0	0	0	0	0	0	0	0	0	0
19:30	4	0	0	0	4	0	0	0	0	0
19:45	1	0	0	0	1	0	0	0	0	0
20:00	2	0	0	0	2	1	0	0	0	1
20:15	0	0	0	0	0	0	0	0	0	0
20:30	1	0	0	0	1	1	0	0	0	1
20:45	0	0	0	0	0	0	0	0	0	0
21:00	1	0	0	0	1	0	0	0	0	0
21:15	0	0	0	0	0	4	0	0	0	4
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	2	0	0	0	2
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	1	0	0	0	1
22:45	0	0	0	0	0	0	0	0	0	0
23:00	1	0	0	0	1	1	0	0	0	1
23:15	1	0	0	0	1	1	0	0	0	1
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
TOTAL	**176**	**2**	**0**	**0**	**178**	**173**	**3**	**0**	**0**	**176**

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

City:	Brea
Location:	TOTAL
Date:	Wednesday, September 21, 2022
Count Type:	Classified Driveway Count

	Entering				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
0:00	0	0	0	0	0
0:15	1	0	0	0	1
0:30	0	0	0	0	0
0:45	0	0	0	0	0
1:00	0	0	0	0	0
1:15	0	0	0	0	0
1:30	0	0	0	0	0
1:45	0	0	0	0	0
2:00	0	0	0	0	0
2:15	0	0	0	0	0
2:30	0	0	0	0	0
2:45	0	0	0	0	0
3:00	1	0	0	0	1
3:15	0	0	0	0	0
3:30	0	0	0	0	0
3:45	0	0	0	0	0
4:00	0	0	0	0	0
4:15	0	0	0	0	0
4:30	0	0	0	0	0
4:45	0	0	0	0	0
5:00	0	0	0	0	0
5:15	0	0	0	0	0
5:30	0	0	0	0	0
5:45	0	0	0	0	0
6:00	0	0	0	0	0
6:15	0	0	0	0	0
6:30	2	0	0	0	2
6:45	0	0	0	0	0
7:00	2	0	0	0	2
7:15	6	0	0	0	6
7:30	10	0	0	0	10
7:45	9	0	0	0	9
8:00	7	0	0	0	7
8:15	3	0	0	0	3
8:30	4	0	0	0	4
8:45	6	0	0	0	6
9:00	0	0	0	0	0
9:15	2	0	0	0	2
9:30	2	1	0	0	3
9:45	1	0	0	0	1
10:00	1	0	0	0	1
10:15	3	0	0	0	3
10:30	3	0	0	0	3
10:45	4	0	0	0	4
11:00	5	1	0	0	6
11:15	5	0	0	0	5
11:30	2	0	0	0	2
11:45	2	0	0	0	2

	Exiting				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
0:00	0	0	0	0	0
0:15	1	0	0	0	1
0:30	0	0	0	0	0
0:45	0	0	0	0	0
1:00	0	0	0	0	0
1:15	0	0	0	0	0
1:30	1	0	0	0	1
1:45	0	0	0	0	0
2:00	0	0	0	0	0
2:15	0	0	0	0	0
2:30	0	0	0	0	0
2:45	0	0	0	0	0
3:00	1	0	0	0	1
3:15	0	0	0	0	0
3:30	0	0	0	0	0
3:45	0	0	0	0	0
4:00	0	0	0	0	0
4:15	0	0	0	0	0
4:30	0	0	0	0	0
4:45	0	0	0	0	0
5:00	0	0	0	0	0
5:15	0	1	0	0	1
5:30	1	0	0	0	1
5:45	0	0	0	0	0
6:00	0	0	0	0	0
6:15	2	0	0	0	2
6:30	2	0	0	0	2
6:45	0	0	0	0	0
7:00	0	0	0	0	0
7:15	0	0	0	0	0
7:30	2	0	0	0	2
7:45	2	0	0	0	2
8:00	2	0	0	0	2
8:15	3	0	0	0	3
8:30	2	0	0	0	2
8:45	2	0	0	0	2
9:00	2	0	0	0	2
9:15	0	0	0	0	0
9:30	3	1	0	0	4
9:45	0	0	0	0	0
10:00	3	1	0	0	4
10:15	0	0	0	0	0
10:30	3	0	0	0	3
10:45	1	0	0	0	1
11:00	3	1	0	0	4
11:15	5	0	0	0	5
11:30	3	0	0	0	3
11:45	3	0	0	0	3

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
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City: Brea
Location: TOTAL
Date: Wednesday, September 21, 2022
Count Type: Classified Driveway Count

	Entering				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
12:00	4	0	0	0	4
12:15	1	0	0	0	1
12:30	4	0	0	0	4
12:45	9	0	0	0	9
13:00	6	0	0	0	6
13:15	6	0	0	0	6
13:30	4	0	0	0	4
13:45	7	0	0	0	7
14:00	4	0	0	0	4
14:15	2	0	0	0	2
14:30	1	0	0	0	1
14:45	5	0	0	0	5
15:00	4	0	0	0	4
15:15	4	0	0	0	4
15:30	2	0	0	0	2
15:45	2	0	0	0	2
16:00	2	0	0	0	2
16:15	3	0	0	0	3
16:30	0	0	0	0	0
16:45	2	0	0	0	2
17:00	2	0	0	0	2
17:15	2	0	0	0	2
17:30	3	0	0	0	3
17:45	0	0	0	0	0
18:00	0	0	0	0	0
18:15	1	0	0	0	1
18:30	0	0	0	0	0
18:45	1	0	0	0	1
19:00	4	0	0	0	4
19:15	2	0	0	0	2
19:30	3	0	0	0	3
19:45	1	0	0	0	1
20:00	1	0	0	0	1
20:15	0	0	0	0	0
20:30	0	0	0	0	0
20:45	0	0	0	0	0
21:00	0	0	0	0	0
21:15	0	0	0	0	0
21:30	1	0	0	0	1
21:45	0	0	0	0	0
22:00	1	0	0	0	1
22:15	1	0	0	0	1
22:30	1	0	0	0	1
22:45	0	0	0	0	0
23:00	0	0	0	0	0
23:15	0	0	0	0	0
23:30	2	0	0	0	2
23:45	4	0	0	0	4
TOTAL	**183**	**2**	**0**	**0**	**185**

	Exiting				
	Pass Veh	Large 2 Axle	3 Axle	4+ Axle	Total
12:00	6	0	0	0	6
12:15	3	0	0	0	3
12:30	4	0	0	0	4
12:45	2	0	0	0	2
13:00	3	0	0	0	3
13:15	13	0	0	0	13
13:30	14	0	0	0	14
13:45	10	0	0	0	10
14:00	6	0	0	0	6
14:15	5	0	0	0	5
14:30	5	0	0	0	5
14:45	2	0	0	0	2
15:00	2	0	0	0	2
15:15	2	0	0	0	2
15:30	4	0	0	0	4
15:45	4	0	0	0	4
16:00	5	0	0	0	5
16:15	9	0	0	0	9
16:30	6	0	0	0	6
16:45	2	0	0	0	2
17:00	0	0	0	0	0
17:15	0	0	0	0	0
17:30	1	0	0	0	1
17:45	4	0	0	0	4
18:00	0	0	0	0	0
18:15	1	0	0	0	1
18:30	1	0	0	0	1
18:45	1	0	0	0	1
19:00	1	0	0	0	1
19:15	3	0	0	0	3
19:30	0	0	0	0	0
19:45	2	0	0	0	2
20:00	0	0	0	0	0
20:15	0	0	0	0	0
20:30	0	0	0	0	0
20:45	1	0	0	0	1
21:00	0	0	0	0	0
21:15	1	0	0	0	1
21:30	0	0	0	0	0
21:45	1	0	0	0	1
22:00	1	0	0	0	1
22:15	1	0	0	0	1
22:30	0	0	0	0	0
22:45	0	0	0	0	0
23:00	0	0	0	0	0
23:15	0	0	0	0	0
23:30	2	0	0	0	2
23:45	4	0	0	0	4
	179	**4**	**0**	**0**	**183**

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Corona, CA 92878
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ATTACHMENT B: ITE TIME OF DAY DISTRIBUTION TABLES

Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use			
Source: ITE *Trip Generation Manual* , 11th Edition			
Land Use Code	822		
Land Use	Strip Retail Plaza		
Setting	General Urban/Suburban		
Time Period	Weekday		
# Data Sites	2		
	% of 16-Hour Vehicle Trips		
Time	Total	Entering	Exiting
12:00 - 1:00 AM	--	--	--
1:00 - 2:00 AM	--	--	--
2:00 - 3:00 AM	--	--	--
3:00 - 4:00 AM	--	--	--
4:00 - 5:00 AM	--	--	--
5:00 - 6:00 AM	--	--	--
6:00 - 7:00 AM	0.5%	--	--
7:00 - 8:00 AM	2.2%	--	--
8:00 - 9:00 AM	4.5%	--	--
9:00 - 10:00 AM	5.8%	--	--
10:00 - 11:00 AM	6.5%	--	--
11:00 - 12:00 PM	6.3%	--	--
12:00 - 1:00 PM	6.1%	--	--
1:00 - 2:00 PM	6.9%	--	--
2:00 - 3:00 PM	6.1%	--	--
3:00 - 4:00 PM	7.4%	--	--
4:00 - 5:00 PM	8.0%	--	--
5:00 - 6:00 PM	8.0%	--	--
6:00 - 7:00 PM	8.0%	--	--
7:00 - 8:00 PM	8.5%	--	--
8:00 - 9:00 PM	8.5%	--	--
9:00 - 10:00 PM	6.7%	--	--
10:00 - 11:00 PM	--	--	--
11:00 - 12:00 AM	--	--	--

Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE *Trip Generation Manual*, 11th Edition

Land Use Code	932			932			932		
Land Use	High-Turnover (Sit-Down) Restaurant			High-Turnover (Sit-Down) Restaurant			High-Turnover (Sit-Down) Restaurant		
Setting	General Urban/Suburban			General Urban/Suburban			General Urban/Suburban		
Time Period	Weekday			Saturday			Sunday		
# Data Sites	37			2			1		
	% of 24-Hour Vehicle Trips			% of 24-Hour Vehicle Trips			% of 24-Hour Vehicle Trips		
Time	Total	Entering	Exiting	Total	Entering	Exiting	Total	Entering	Exiting
12:00 - 1:00 AM	0.5%	0.3%	0.8%	1.3%	0.3%	2.3%	1.4%	0.7%	2.1%
1:00 - 2:00 AM	0.2%	0.1%	0.3%	0.1%	0.0%	0.1%	0.2%	0.2%	0.2%
2:00 - 3:00 AM	0.3%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3:00 - 4:00 AM	0.3%	0.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4:00 - 5:00 AM	0.3%	0.2%	0.3%	0.2%	0.3%	0.1%	0.0%	0.0%	0.0%
5:00 - 6:00 AM	0.5%	0.7%	0.2%	0.1%	0.1%	0.1%	0.2%	0.5%	0.0%
6:00 - 7:00 AM	1.3%	1.7%	0.9%	0.2%	0.3%	0.1%	0.5%	0.7%	0.2%
7:00 - 8:00 AM	2.3%	2.7%	1.8%	1.3%	2.0%	0.6%	2.3%	3.2%	1.4%
8:00 - 9:00 AM	3.2%	3.4%	3.1%	3.6%	5.2%	2.0%	5.0%	8.5%	1.7%
9:00 - 10:00 AM	3.7%	4.0%	3.4%	4.9%	5.9%	3.8%	13.0%	17.2%	8.8%
10:00 - 11:00 AM	4.9%	5.5%	4.4%	6.7%	7.5%	5.8%	19.7%	19.7%	19.8%
11:00 - 12:00 PM	9.5%	12.1%	6.9%	7.8%	7.1%	8.5%	15.1%	16.0%	14.3%
12:00 - 1:00 PM	12.3%	12.4%	12.3%	7.0%	8.1%	5.8%	13.6%	11.9%	15.2%
1:00 - 2:00 PM	8.8%	6.5%	11.2%	6.0%	4.6%	7.4%	7.7%	4.6%	10.7%
2:00 - 3:00 PM	4.5%	4.0%	5.1%	5.4%	3.9%	7.0%	5.6%	4.6%	6.7%
3:00 - 4:00 PM	3.6%	3.3%	4.0%	4.9%	5.3%	4.4%	2.9%	1.5%	4.3%
4:00 - 5:00 PM	5.1%	6.2%	3.9%	4.4%	5.4%	3.4%	2.4%	1.7%	3.1%
5:00 - 6:00 PM	8.5%	10.2%	6.8%	7.8%	10.0%	5.5%	1.7%	1.5%	1.9%
6:00 - 7:00 PM	9.4%	10.1%	8.7%	9.8%	12.3%	7.2%	1.8%	2.2%	1.4%
7:00 - 8:00 PM	8.2%	7.2%	9.2%	9.3%	7.8%	10.8%	3.2%	3.2%	3.3%
8:00 - 9:00 PM	5.7%	4.3%	7.1%	7.7%	4.9%	10.6%	1.4%	1.0%	1.9%
9:00 - 10:00 PM	3.7%	2.6%	4.8%	6.0%	5.4%	6.5%	0.8%	0.7%	1.0%
10:00 - 11:00 PM	2.2%	1.4%	2.9%	3.5%	2.1%	5.0%	0.7%	0.5%	1.0%
11:00 - 12:00 AM	0.9%	0.5%	1.4%	2.2%	1.5%	2.8%	0.5%	0.0%	1.0%

Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use			
Source: ITE *Trip Generation Manual* , 11th Edition			
Land Use Code	937		
Land Use	Coffee/Donut Shop with Drive-Through Window		
Setting	General Urban/Suburban		
Time Period	Weekday		
# Data Sites	1		
	% of 24-Hour Vehicle Trips		
Time	Total	Entering	Exiting
12:00 - 1:00 AM	0.1%	0.1%	0.1%
1:00 - 2:00 AM	0.1%	0.1%	0.1%
2:00 - 3:00 AM	0.0%	0.0%	0.1%
3:00 - 4:00 AM	0.3%	0.4%	0.1%
4:00 - 5:00 AM	1.7%	1.9%	1.5%
5:00 - 6:00 AM	7.5%	8.2%	6.8%
6:00 - 7:00 AM	9.5%	10.0%	8.9%
7:00 - 8:00 AM	10.0%	10.3%	9.8%
8:00 - 9:00 AM	10.0%	10.0%	10.1%
9:00 - 10:00 AM	8.1%	7.7%	8.5%
10:00 - 11:00 AM	7.4%	7.2%	7.6%
11:00 - 12:00 PM	6.9%	6.7%	7.2%
12:00 - 1:00 PM	5.8%	5.4%	6.1%
1:00 - 2:00 PM	6.0%	6.3%	5.7%
2:00 - 3:00 PM	5.4%	5.2%	5.6%
3:00 - 4:00 PM	5.5%	5.7%	5.3%
4:00 - 5:00 PM	4.4%	4.6%	4.2%
5:00 - 6:00 PM	3.0%	2.7%	3.4%
6:00 - 7:00 PM	2.9%	2.7%	3.0%
7:00 - 8:00 PM	2.1%	2.1%	2.2%
8:00 - 9:00 PM	1.6%	1.2%	1.9%
9:00 - 10:00 PM	1.2%	1.2%	1.2%
10:00 - 11:00 PM	0.5%	0.4%	0.6%
11:00 - 12:00 AM	0.0%	0.0%	0.1%

APPENDIX 1.2: SITE ACCESS QUEUING ANALYSIS WORKSHEETS

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Queuing and Blocking Report
Opening Year Cumulative (2024) With Project - AM Peak Hour

01/31/2023

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	69	37
Average Queue (ft)	31	3
95th Queue (ft)	56	18
Link Distance (ft)	96	369
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	T	T	T	TR	R	R
Maximum Queue (ft)	34	82	85	85	22	76	99
Average Queue (ft)	1	3	10	6	1	24	37
95th Queue (ft)	21	38	56	40	14	58	72
Link Distance (ft)	268	268	303	303	303	601	122
Upstream Blk Time (%)							1
Queuing Penalty (veh)							0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	66	70	23
Average Queue (ft)	30	14	2
95th Queue (ft)	56	50	13
Link Distance (ft)	84	209	366
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	TR	T	T	TR	R	L	R
Maximum Queue (ft)	140	12	13	20	10	52	36	89	89
Average Queue (ft)	56	0	0	3	1	7	5	26	38
95th Queue (ft)	114	8	8	13	6	30	24	70	66
Link Distance (ft)		303	303	630	630	630	615		209
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	125							100	
Storage Blk Time (%)	1							2	
Queuing Penalty (veh)	8							2	

Zone Summary

Zone wide Queuing Penalty: 11

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	62	48
Average Queue (ft)	25	6
95th Queue (ft)	56	34
Link Distance (ft)	96	369
Upstream Blk Time (%)	2	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	WB	WB	WB	NB	SB
Directions Served	T	T	T	TR	R	R
Maximum Queue (ft)	9	203	168	118	53	132
Average Queue (ft)	0	46	34	11	20	57
95th Queue (ft)	6	149	125	57	48	117
Link Distance (ft)	268	303	303	303	601	122
Upstream Blk Time (%)						8
Queuing Penalty (veh)						5
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	41	23
Average Queue (ft)	9	2
95th Queue (ft)	33	12
Link Distance (ft)	84	209
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T	T	TR	R	L	R
Maximum Queue (ft)	75	14	20	5	11	31	64	84
Average Queue (ft)	35	0	2	0	2	2	19	37
95th Queue (ft)	66	9	12	5	11	15	53	69
Link Distance (ft)		303	630	630	630	615		209
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	125						100	
Storage Blk Time (%)							0	0
Queuing Penalty (veh)							0	0

Zone Summary

Zone wide Queuing Penalty: 5

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	62	204
Average Queue (ft)	45	139
95th Queue (ft)	98	415
Link Distance (ft)	96	369
Upstream Blk Time (%)	40	28
Queuing Penalty (veh)	0	19
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	T	T	TR	R	R
Maximum Queue (ft)	28	6	319	334	317	53	129
Average Queue (ft)	1	0	272	262	240	20	88
95th Queue (ft)	13	4	402	407	403	50	158
Link Distance (ft)	268	268	303	303	303	601	122
Upstream Blk Time (%)			19	15	12		50
Queuing Penalty (veh)			131	103	87		30
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	63	29	186
Average Queue (ft)	32	3	87
95th Queue (ft)	78	19	327
Link Distance (ft)	84	209	366
Upstream Blk Time (%)	16		14
Queuing Penalty (veh)	0		14
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	TR	T	T	TR	R	L	R
Maximum Queue (ft)	96	10	428	327	237	41	153	157
Average Queue (ft)	41	0	207	166	98	9	41	103
95th Queue (ft)	82	6	522	460	314	33	117	235
Link Distance (ft)		303	630	630	630	615		209
Upstream Blk Time (%)			0					28
Queuing Penalty (veh)			0					24
Storage Bay Dist (ft)	125						100	
Storage Blk Time (%)	0						9	40
Queuing Penalty (veh)	0						7	6

Zone Summary

Zone wide Queuing Penalty: 421

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	71	29
Average Queue (ft)	30	2
95th Queue (ft)	57	16
Link Distance (ft)	96	369
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	T	TR	T	T	TR	R	R
Maximum Queue (ft)	41	59	77	204	197	215	55	114
Average Queue (ft)	3	4	3	59	39	29	28	38
95th Queue (ft)	37	51	44	164	126	146	56	83
Link Distance (ft)	268	268	268	303	303	303	601	122
Upstream Blk Time (%)			0			2		1
Queuing Penalty (veh)			0			13		0
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	77	108	106
Average Queue (ft)	35	20	23
95th Queue (ft)	66	81	150
Link Distance (ft)	84	209	366
Upstream Blk Time (%)	6	2	1
Queuing Penalty (veh)	0	5	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	TR	T	T	TR	R	L	R
Maximum Queue (ft)	176	286	244	78	159	176	200	31	142	147
Average Queue (ft)	82	32	26	10	14	11	18	5	88	64
95th Queue (ft)	164	186	170	100	117	130	148	23	168	154
Link Distance (ft)		303	303	303	630	630	630	615		209
Upstream Blk Time (%)		2	0	0		0	1			7
Queuing Penalty (veh)		12	3	0		0	0			10
Storage Bay Dist (ft)	125								100	
Storage Blk Time (%)	12	0							49	2
Queuing Penalty (veh)	82	0							53	0

Zone Summary

Zone wide Queuing Penalty: 181

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	103	376
Average Queue (ft)	76	243
95th Queue (ft)	124	484
Link Distance (ft)	96	369
Upstream Blk Time (%)	60	42
Queuing Penalty (veh)	0	30
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	WB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	331	329	335	59	137
Average Queue (ft)	267	257	231	21	116
95th Queue (ft)	385	392	398	51	155
Link Distance (ft)	303	303	303	601	122
Upstream Blk Time (%)	14	10	8		81
Queuing Penalty (veh)	111	79	64		63
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	46	36	99
Average Queue (ft)	12	2	12
95th Queue (ft)	38	16	71
Link Distance (ft)	84	209	366
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	T	TR	R	L	R
Maximum Queue (ft)	116	14	485	440	349	31	136	203
Average Queue (ft)	45	0	175	137	75	5	35	91
95th Queue (ft)	98	9	458	400	282	24	102	213
Link Distance (ft)		303	630	630	630	615		209
Upstream Blk Time (%)			0		0			12
Queuing Penalty (veh)			0		0			11
Storage Bay Dist (ft)	125						100	
Storage Blk Time (%)	0						3	31
Queuing Penalty (veh)	3						3	5

Zone Summary

Zone wide Queuing Penalty: 368

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	99	377
Average Queue (ft)	80	330
95th Queue (ft)	101	469
Link Distance (ft)	96	369
Upstream Blk Time (%)	94	74
Queuing Penalty (veh)	0	57
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	T	TR	T	T	TR	R	R
Maximum Queue (ft)	58	112	45	330	334	337	74	129
Average Queue (ft)	2	4	2	313	311	305	29	123
95th Queue (ft)	37	51	30	326	336	351	63	127
Link Distance (ft)	268	268	268	303	303	303	601	122
Upstream Blk Time (%)				33	30	29		99
Queuing Penalty (veh)				268	244	233		65
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	84	73	317
Average Queue (ft)	59	6	229
95th Queue (ft)	108	57	506
Link Distance (ft)	84	209	366
Upstream Blk Time (%)	59	1	47
Queuing Penalty (veh)	0	2	55
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	T	TR	R	L	R
Maximum Queue (ft)	106	13	644	627	606	36	142	223
Average Queue (ft)	43	0	470	419	348	7	27	182
95th Queue (ft)	86	8	781	760	718	27	119	276
Link Distance (ft)		303	630	630	630	615		209
Upstream Blk Time (%)			14	10	12			69
Queuing Penalty (veh)			0	0	0			67
Storage Bay Dist (ft)	125						100	
Storage Blk Time (%)	0						1	83
Queuing Penalty (veh)	0						1	15

Zone Summary

Zone wide Queuing Penalty: 1007

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	70	13	57
Average Queue (ft)	33	0	5
95th Queue (ft)	62	8	32
Link Distance (ft)	96	122	369
Upstream Blk Time (%)	1		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	T	T	T	TR	R	R
Maximum Queue (ft)	46	58	267	270	227	82	113
Average Queue (ft)	2	2	113	101	75	33	53
95th Queue (ft)	29	27	242	230	200	67	104
Link Distance (ft)	268	268	301	301	301	601	122
Upstream Blk Time (%)			1	0	0		7
Queuing Penalty (veh)			4	3	1		4
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	63	90	36
Average Queue (ft)	27	17	3
95th Queue (ft)	50	59	18
Link Distance (ft)	76	208	366
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
General Plan Buildout With Project - AM Peak Hour WITH IMPROVEMENTS 01/31/2023

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	TR	T	T	TR	LTR	L	TR
Maximum Queue (ft)	183	222	263	272	508	464	359	36	62	105
Average Queue (ft)	86	44	43	50	249	199	152	3	13	46
95th Queue (ft)	158	152	173	181	467	411	310	20	45	80
Link Distance (ft)		301	301	301	631	631	631	615	208	208
Upstream Blk Time (%)		0	0	0						
Queuing Penalty (veh)		0	0	0						
Storage Bay Dist (ft)	125									
Storage Blk Time (%)	7	1								
Queuing Penalty (veh)	48	1								

Zone Summary

Zone wide Queuing Penalty: 62

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	106	335
Average Queue (ft)	56	127
95th Queue (ft)	116	332
Link Distance (ft)	96	369
Upstream Blk Time (%)	38	7
Queuing Penalty (veh)	0	5
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	WB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	329	333	323	62	140
Average Queue (ft)	258	252	234	23	108
95th Queue (ft)	394	388	387	57	165
Link Distance (ft)	301	301	301	601	122
Upstream Blk Time (%)	7	5	4		65
Queuing Penalty (veh)	57	40	28		51
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	27	52
Average Queue (ft)	9	6
95th Queue (ft)	29	35
Link Distance (ft)	76	208
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	TR	T	T	TR	LTR	L	TR
Maximum Queue (ft)	114	162	187	194	646	626	456	31	87	127
Average Queue (ft)	50	40	64	78	371	312	207	5	17	52
95th Queue (ft)	100	116	152	181	676	602	420	23	53	101
Link Distance (ft)		301	301	301	631	631	631	615	208	208
Upstream Blk Time (%)					2	0				
Queuing Penalty (veh)					0	0				
Storage Bay Dist (ft)	125									
Storage Blk Time (%)	1	0								
Queuing Penalty (veh)	6	0								

Zone Summary

Zone wide Queuing Penalty: 186

Queuing and Blocking Report
General Plan Buildout With Project - PM Peak Hour WITH IMPROVEMENTS 01/31/2023

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	102	267
Average Queue (ft)	54	63
95th Queue (ft)	115	213
Link Distance (ft)	96	369
Upstream Blk Time (%)	42	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	WB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	345	350	346	53	130
Average Queue (ft)	279	270	259	20	94
95th Queue (ft)	387	384	383	49	163
Link Distance (ft)	301	301	301	601	122
Upstream Blk Time (%)	10	8	6		54
Queuing Penalty (veh)	78	60	48		36
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (ft)	38	81
Average Queue (ft)	16	7
95th Queue (ft)	39	36
Link Distance (ft)	76	208
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	EB	EB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	TR	T	T	TR	LTR	L	TR
Maximum Queue (ft)	126	128	146	188	686	593	530	31	61	92
Average Queue (ft)	46	36	46	65	425	351	262	6	18	48
95th Queue (ft)	104	95	112	147	727	649	550	25	51	87
Link Distance (ft)		301	301	301	631	631	631	615	208	208
Upstream Blk Time (%)					4	1	1			
Queuing Penalty (veh)					0	0	0			
Storage Bay Dist (ft)	125									
Storage Blk Time (%)	1	0								
Queuing Penalty (veh)	11	0								

Zone Summary

Zone wide Queuing Penalty: 234

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	71	8	37
Average Queue (ft)	35	0	2
95th Queue (ft)	60	5	17
Link Distance (ft)	96	122	369
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	WB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	236	219	154	69	98
Average Queue (ft)	61	47	20	28	44
95th Queue (ft)	172	146	89	60	84
Link Distance (ft)	308	308	308	601	122
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	57	48	26
Average Queue (ft)	20	9	1
95th Queue (ft)	50	35	12
Link Distance (ft)	90	215	366
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	WB	NB	SB
Directions Served	T	R	R
Maximum Queue (ft)	163	31	102
Average Queue (ft)	5	5	41
95th Queue (ft)	103	23	75
Link Distance (ft)	636	620	215
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 0

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	94	6	381
Average Queue (ft)	74	0	274
95th Queue (ft)	117	4	497
Link Distance (ft)	96	122	369
Upstream Blk Time (%)	81		49
Queuing Penalty (veh)	0		36
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	WB	WB	WB	NB	SB
Directions Served	T	T	T	TR	R	R
Maximum Queue (ft)	60	323	328	327	68	139
Average Queue (ft)	2	261	244	213	21	121
95th Queue (ft)	38	399	395	386	53	150
Link Distance (ft)	268	308	308	308	601	122
Upstream Blk Time (%)		12	8	7		86
Queuing Penalty (veh)		91	64	53		76
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	29	8	189
Average Queue (ft)	3	1	55
95th Queue (ft)	17	7	254
Link Distance (ft)	90	215	366
Upstream Blk Time (%)			8
Queuing Penalty (veh)			14
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	WB	WB	WB	NB	SB
Directions Served	TR	T	T	TR	R	R
Maximum Queue (ft)	23	417	363	272	30	199
Average Queue (ft)	1	159	116	57	3	96
95th Queue (ft)	11	458	381	232	16	232
Link Distance (ft)	308	636	636	636	620	215
Upstream Blk Time (%)		1	0			23
Queuing Penalty (veh)		0	0			16
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Zone Summary

Zone wide Queuing Penalty: 349

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	99	378
Average Queue (ft)	83	307
95th Queue (ft)	118	477
Link Distance (ft)	96	369
Upstream Blk Time (%)	89	63
Queuing Penalty (veh)	0	52
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	T	T	TR	R	R
Maximum Queue (ft)	70	78	329	334	347	58	133
Average Queue (ft)	2	3	296	291	278	24	124
95th Queue (ft)	37	42	382	390	418	54	131
Link Distance (ft)	268	268	308	308	308	601	122
Upstream Blk Time (%)		0	25	23	21		97
Queuing Penalty (veh)		0	202	186	169		77
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Flower Av. & Driveway 2

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (ft)	74	20	255
Average Queue (ft)	22	1	80
95th Queue (ft)	63	11	283
Link Distance (ft)	90	215	366
Upstream Blk Time (%)	8		5
Queuing Penalty (veh)	0		9
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	WB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	593	572	529	31	225
Average Queue (ft)	326	273	203	7	140
95th Queue (ft)	695	621	507	26	273
Link Distance (ft)	636	636	636	620	215
Upstream Blk Time (%)	3	0	0		35
Queuing Penalty (veh)	0	0	0		22
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 717

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	63	46
Average Queue (ft)	33	6
95th Queue (ft)	54	28
Link Distance (ft)	96	369
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	WB	WB	WB	NB	SB
Directions Served	T	T	TR	R	R
Maximum Queue (ft)	94	98	24	72	85
Average Queue (ft)	12	5	1	30	38
95th Queue (ft)	57	36	15	63	70
Link Distance (ft)	309	309	309	601	122
Upstream Blk Time (%)					0
Queuing Penalty (veh)					0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Flower Av. & Driveway 2/Driveway

Movement	EB	WB	SB
Directions Served	LTR	LTR	LTR
Maximum Queue (ft)	64	28	36
Average Queue (ft)	23	2	3
95th Queue (ft)	50	13	18
Link Distance (ft)	92	61	370
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Queuing and Blocking Report
General Plan Buildout With Project - AM Peak Hour 02/22/2023

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	NB
Directions Served	R
Maximum Queue (ft)	31
Average Queue (ft)	7
95th Queue (ft)	28
Link Distance (ft)	615
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 0

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	116	5	335
Average Queue (ft)	68	0	178
95th Queue (ft)	117	3	429
Link Distance (ft)	96	122	369
Upstream Blk Time (%)	56		22
Queuing Penalty (veh)	0		16
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	T	T	TR	R	R
Maximum Queue (ft)	61	56	325	346	307	63	136
Average Queue (ft)	2	2	185	172	106	25	111
95th Queue (ft)	39	36	365	362	271	54	161
Link Distance (ft)	268	268	309	309	309	601	122
Upstream Blk Time (%)			2	1	0		69
Queuing Penalty (veh)			17	6	0		60
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Flower Av. & Driveway 2/Driveway

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	30	15
Average Queue (ft)	4	1
95th Queue (ft)	19	11
Link Distance (ft)	92	61
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	13	281	224	41	30
Average Queue (ft)	0	36	16	1	3
95th Queue (ft)	8	159	116	21	19
Link Distance (ft)	309	636	636	636	615
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 100

Intersection: 3: Orange Av. & Driveway 1

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	96	377
Average Queue (ft)	75	264
95th Queue (ft)	118	501
Link Distance (ft)	96	369
Upstream Blk Time (%)	79	51
Queuing Penalty (veh)	0	43
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Orange Av. & Imperial Hwy. (SR-90)

Movement	EB	WB	WB	WB	NB	SB
Directions Served	T	T	T	TR	R	R
Maximum Queue (ft)	75	342	342	330	64	133
Average Queue (ft)	5	256	244	211	26	115
95th Queue (ft)	66	412	417	413	55	153
Link Distance (ft)	268	309	309	309	601	122
Upstream Blk Time (%)	0	12	9	8		84
Queuing Penalty (veh)	0	97	73	65		66
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Flower Av. & Driveway 2/Driveway

Movement	EB	WB
Directions Served	LTR	LTR
Maximum Queue (ft)	30	29
Average Queue (ft)	15	2
95th Queue (ft)	39	14
Link Distance (ft)	92	61
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Flower Av. & Imperial Hwy. (SR-90)

Movement	EB	WB	WB	WB	NB
Directions Served	TR	T	T	T	R
Maximum Queue (ft)	14	491	442	337	42
Average Queue (ft)	0	176	137	87	6
95th Queue (ft)	9	517	447	335	28
Link Distance (ft)	309	636	636	636	615
Upstream Blk Time (%)		1	0	0	
Queuing Penalty (veh)		0	0	0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Zone Summary

Zone wide Queuing Penalty: 344

APPENDIX 3.1: EXISTING TRAFFIC COUNTS

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Volume Development - AM Peak Hour

1. Brea Bl. & Imperial Hwy. (SR-90)

PHF: 0.946 7:45 AM Count Date: 12/21/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	392	431	149	150	567	146	132	1,350	348	137	1,247	93	5,142
U Turn:		8			16			8			8		

2. Orange Av. & Birch St.

PHF: 0.878 7:45 AM Count Date: 12/21/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	6	1	16	0	0	15	0	579	15	15	652	5	1,304
U Turn:													

3. Orange Av. & Driveway 1

PHF: 0.568 7:30 AM Count Date: 9/21/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	18	1	28	18	0	0	0	0	4	0	15	84
U Turn:													

4. Orange Av. & Imperial Hwy. (SR-90)

PHF: 0.966 7:30 AM Count Date: 12/8/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	35	0	0	22	0	1,711	13	0	1,579	19	3,379
U Turn:													

5. Flower Av. & Birch St.

PHF: 0.853 7:45 AM Count Date: 12/21/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	80	46	25	46	10	13	18	592	14	56	564	10	1,474
U Turn:													

6. Flower Av. & Driveway 2

PHF: 0.592 7:15 AM Count Date: 9/21/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	25	164	12	18	100	21	16	0	4	0	0	2	362
U Turn:													

7. Flower Av. & Imperial Hwy. (SR-90)

PHF: 0.926 7:15 AM Count Date: 12/8/2022

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	4	7	0	73	80	1,625	3	0	1,525	121	3,438
U Turn:													

Volume Development - Mid-Day Peak Hour

1. Brea Bl. & Imperial Hwy. (SR-90)

	PHF: 0.931			1:00 PM					Count Date:		12/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	378	531	202	207	514	207	194	1,187	329	261	1,311	135	5,456
U Turn:		9			28			5			11		

2. Orange Av. & Birch St.

	PHF: 0.882			1:00 PM					Count Date:		12/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	14	1	67	0	0	21	0	814	36	23	936	20	1,932
U Turn:													

3. Orange Av. & Driveway 1

	PHF: 0.656			1:00 PM					Count Date:		9/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	28	6	22	48	0	0	0	0	8	0	19	131
U Turn:													

4. Orange Av. & Imperial Hwy. (SR-90)

	PHF: 0.863			2:00 PM					Count Date:		12/8/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	23	0	0	56	0	1,648	21	0	1,818	34	3,600
U Turn:													**0**

5. Flower Av. & Birch St.

	PHF: 0.888			1:00 PM					Count Date:		12/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	43	35	51	33	3	20	25	858	19	76	920	19	2,102
U Turn:													**0**

6. Flower Av. & Driveway 2

	PHF: 0.783			2:00 PM					Count Date:		9/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	3	99	8	10	71	3	0	0	0	0	0	1	195
U Turn:													

7. Flower Av. & Imperial Hwy. (SR-90)

	PHF: 0.903			2:00 PM					Count Date:		12/8/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	3	12	0	59	46	1,592	13	0	1,793	64	3,582
U Turn:													

Volume Development - PM Peak Hour
With Flower Connection at Imperial Highway

1. Brea Bl. & Imperial Hwy. (SR-90)

	PHF:	0.980		4:45 PM					Count Date:		12/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	489	672	229	202	559	177	195	1,465	430	238	1,447	144	6,247
U Turn:		3			40			4			12		

2. Orange Av. & Birch St.

	PHF:	0.917		4:45 PM					Count Date:		12/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	5	6	41	0	0	26	0	933	32	30	1,059	19	2,151
U Turn:													

3. Orange Av. & Driveway 1

	PHF:	0.714		4:00 PM					Count Date:		9/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	35	1	5	36	0	0	0	0	5	0	6	88
U Turn:													

4. Orange Av. & Imperial Hwy. (SR-90)

	PHF:	0.955		5:00 PM					Count Date:		12/8/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	26	0	0	41	0	1,775	18	0	1,894	36	3,790
U Turn:													**0**

5. Flower Av. & Birch St.

	PHF:	0.992		4:00 PM					Count Date:		12/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	15	10	54	26	2	15	24	977	7	87	1,036	8	2,261
U Turn:													

6. Flower Av. & Driveway 2

	PHF:	0.721		4:00 PM					Count Date:		9/21/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	16	88	3	4	63	19	6	0	6	1	0	1	207
U Turn:													

7. Flower Av. & Imperial Hwy. (SR-90)

	PHF:	0.970		4:45 PM					Count Date:		12/8/2022		
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	7	14	0	56	42	1,780	5	0	1,874	65	3,843
U Turn:													

Baseline Volume Development - AM Peak Hour

With Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	400	431	149	166	567	146	140	1,350	348	145	1,247	93	5,182
Flow Cons. Adj:													0
Adjusted Existing:	**400**	**431**	**149**	**166**	**567**	**146**	**140**	**1,350**	**348**	**145**	**1,247**	**93**	**5,182**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	6	1	16	0	0	15	0	579	15	15	652	5	1,304
Flow Cons. Adj:													0
Adjusted Existing:	**6**	**1**	**16**	**0**	**0**	**15**	**0**	**579**	**15**	**15**	**652**	**5**	**1,304**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	18	1	28	18	0	0	0	0	4	0	15	84
Flow Cons. Adj:													0
Adjusted Existing:	**0**	**18**	**1**	**28**	**18**	**0**	**0**	**0**	**0**	**4**	**0**	**15**	**84**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	0	35	0	0	10	0	1,711	13	0	1,579	12	3,360
Flow Cons. Adj:						12						7	19
Adjusted Existing:	**0**	**0**	**35**	**0**	**0**	**22**	**0**	**1,711**	**13**	**0**	**1,579**	**19**	**3,379**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	80	46	25	46	10	13	18	592	14	56	564	10	1,474
Flow Cons. Adj:													0
Adjusted Existing:	**80**	**46**	**25**	**46**	**10**	**13**	**18**	**592**	**14**	**56**	**564**	**10**	**1,474**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	25	136	12	18	100	21	16	0	4	0	0	2	334
Flow Cons. Adj:		28											28
Adjusted Existing:	**25**	**164**	**12**	**18**	**100**	**21**	**16**	**0**	**4**	**0**	**0**	**2**	**362**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	0	4	7	0	73	80	1,625	3	0	1,514	121	3,427
Flow Cons. Adj:											11		11
Adjusted Existing:	**0**	**0**	**4**	**7**	**0**	**73**	**80**	**1,625**	**3**	**0**	**1,525**	**121**	**3,438**

Baseline Volume Development - Mid Day Peak Hour

With Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	387	531	202	235	514	207	199	1,187	329	272	1,311	135	5,509
Flow Cons. Adj:													0
Adjusted Existing:	**387**	**531**	**202**	**235**	**514**	**207**	**199**	**1,187**	**329**	**272**	**1,311**	**135**	**5,509**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	14	1	67	0	0	21	0	814	36	23	936	20	1,932
Flow Cons. Adj:													0
Adjusted Existing:	**14**	**1**	**67**	**0**	**0**	**21**	**0**	**814**	**36**	**23**	**936**	**20**	**1,932**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	28	6	22	35	0	0	0	0	8	0	19	118
Flow Cons. Adj:					13								13
Adjusted Existing:	**0**	**28**	**6**	**22**	**48**	**0**	**0**	**0**	**0**	**8**	**0**	**19**	**131**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	0	23	0	0	56	0	1,648	21	0	1,818	29	3,595
Flow Cons. Adj:												5	5
Adjusted Existing:	**0**	**0**	**23**	**0**	**0**	**56**	**0**	**1,648**	**21**	**0**	**1,818**	**34**	**3,600**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	43	35	51	33	3	20	25	858	19	76	920	19	2,102
Flow Cons. Adj:													0
Adjusted Existing:	**43**	**35**	**51**	**33**	**3**	**20**	**25**	**858**	**19**	**76**	**920**	**19**	**2,102**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	3	67	8	10	49	3	0	0	0	0	0	1	141
Flow Cons. Adj:		32			22								54
Adjusted Existing:	**3**	**99**	**8**	**10**	**71**	**3**	**0**	**0**	**0**	**0**	**0**	**1**	**195**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	0	3	12	0	59	46	1,592	13	0	1,753	64	3,542
Flow Cons. Adj:											40		40
Adjusted Existing:	**0**	**0**	**3**	**12**	**0**	**59**	**46**	**1,592**	**13**	**0**	**1,793**	**64**	**3,582**

Baseline Volume Development - PM Peak Hour

With Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	492	672	229	242	559	177	199	1,465	430	250	1,447	144	6,306
Flow Cons. Adj:													0
Adjusted Existing:	**492**	**672**	**229**	**242**	**559**	**177**	**199**	**1,465**	**430**	**250**	**1,447**	**144**	**6,306**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	5	6	41	0	0	26	0	933	32	30	1,059	19	2,151
Flow Cons. Adj:													0
Adjusted Existing:	**5**	**6**	**41**	**0**	**0**	**26**	**0**	**933**	**32**	**30**	**1,059**	**19**	**2,151**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	22	1	5	21	0	0	0	0	5	0	6	60
Flow Cons. Adj:		13			15								28
Adjusted Existing:	**0**	**35**	**1**	**5**	**36**	**0**	**0**	**0**	**0**	**5**	**0**	**6**	**88**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	0	26	0	0	41	0	1,775	18	0	1,894	36	3,790
Flow Cons. Adj:													0
Adjusted Existing:	**0**	**0**	**26**	**0**	**0**	**41**	**0**	**1,775**	**18**	**0**	**1,894**	**36**	**3,790**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	15	10	54	26	2	15	24	977	7	87	1,036	8	2,261
Flow Cons. Adj:													0
Adjusted Existing:	**15**	**10**	**54**	**26**	**2**	**15**	**24**	**977**	**7**	**87**	**1,036**	**8**	**2,261**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	16	88	3	4	58	19	6	0	6	1	0	1	202
Flow Cons. Adj:					5								5
Adjusted Existing:	**16**	**88**	**3**	**4**	**63**	**19**	**6**	**0**	**6**	**1**	**0**	**1**	**207**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Count Data:	0	0	7	14	0	56	42	1,780	5	0	1,766	20	3,690
Flow Cons. Adj:											108	45	153
Adjusted Existing:	**0**	**0**	**7**	**14**	**0**	**56**	**42**	**1,780**	**5**	**0**	**1,874**	**65**	**3,843**

Development of Daily Volumes

The discussion below outlines the development of the existing daily volumes. Where actual 24-hour tube count data was not available, Existing ADT volumes were factored based on intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 13.1 = Leg Volume

This results in a peak-to-daily relationship of 7.6 percent. As shown on the attached table, we had 24-hour daily volume data for Imperial Highway west of Flower and on Flower north of Imperial Highway (as denoted in **green**). For each of these segments the peak-to-daily percentage was determined by the following equations:

Flower, North of Imperial Highway:

(SBL+SBT+SBR+EBL+WBR) / 2,262 (ADT count) = 7.8%

Imperial Highway, West of Flower:

(EBL+EBT+EBR+NBL+SBR+WBT) / 50,797 (ADT count) = 7.4%

The average of these two is 7.6% percent. 100% divided by 7.6% is a factor of 13.1.

This factor has been used to multiply to the sum of all turning movements for each leg at all other intersections (as well as the East and South legs of Flower/Imperial) to estimate the daily volume.

Volume Development - ADTs

1. Brea Bl. & Imperial Hwy. (SR-90)

	PHF: 0.980			4:45 PM				Count Date: 12/21/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	489	672	229	202	559	177	195	1,465	430	238	1,447	144	6,247
2022 ADT:		34,387			25,609			55,226			48,945		
2022 Pk-Daily:		7.61%			7.61%			7.61%			7.61%		

2. Orange Av. & Birch St.

	PHF: 0.917			4:45 PM				Count Date: 12/21/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	5	6	41	0	0	26	0	933	32	30	1,059	19	2,151
2022 ADT:		1,498			670			27,002			27,357		
2022 Pk-Daily:		7.61%			7.61%			7.61%			7.61%		

3. Orange Av. & Driveway 1

	PHF: 0.714			4:00 PM				Count Date: 9/21/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	35	1	5	36	0	0	0	0	5	0	6	88
2022 ADT:		1,012			1,077			0			223		
2022 Pk-Daily:		7.61%			7.61%			0.00%			7.61%		

4. Orange Av. & Imperial Hwy. (SR-90)

	PHF: 0.955			5:00 PM				Count Date: 12/8/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	26	0	0	41	0	1,775	18	0	1,894	36	3,790
2022 ADT:		578			1,012			48,985			50,797		
2022 Pk-Daily:		7.61%			7.61%			7.61%			7.34%		

5. Flower Av. & Birch St.

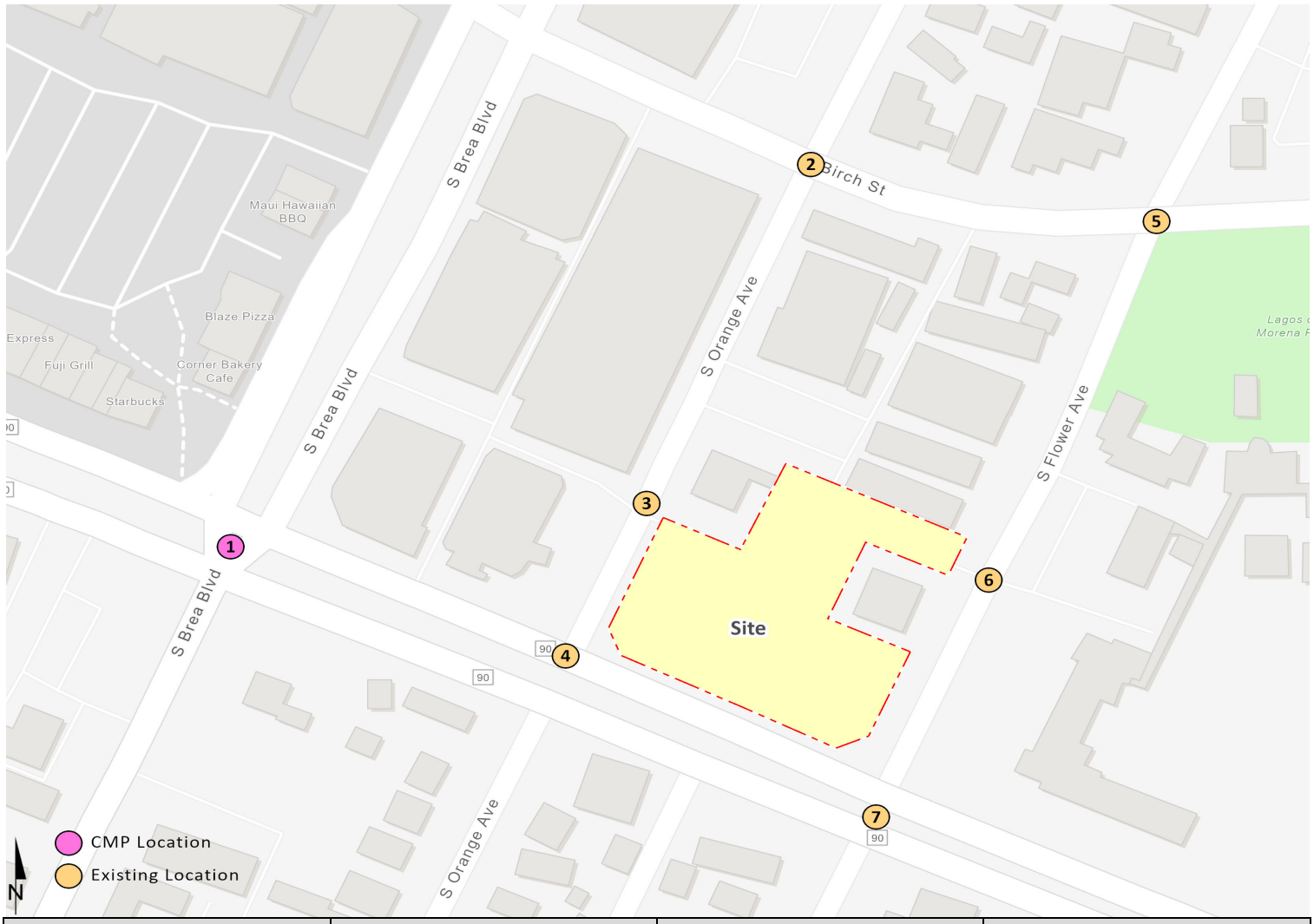
	PHF: 0.992			4:00 PM				Count Date: 12/21/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	15	10	54	26	2	15	24	977	7	87	1,036	8	2,261
2022 ADT:		2,299			1,117			27,252			28,750		
2022 Pk-Daily:		7.61%			7.61%			7.61%			7.61%		

6. Flower Av. & Driveway 2

	PHF: 0.721			4:00 PM				Count Date: 9/21/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	16	88	3	4	63	19	6	0	6	1	0	1	207
2022 ADT:		2,326			2,378			618			118		
2022 Pk-Daily:		7.61%			7.61%			7.61%			7.61%		

7. Flower Av. & Imperial Hwy. (SR-90)

	PHF: 0.970			4:45 PM				Count Date: 12/8/2022				
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing 2022:	0	0	7	14	0	56	42	1,780	5	0	1,874	65	3,843
2022 ADT:		158			**2,262**			**50,797**			49,143		
2022 Pk-Daily:		7.61%			7.82%			7.40%			7.61%		

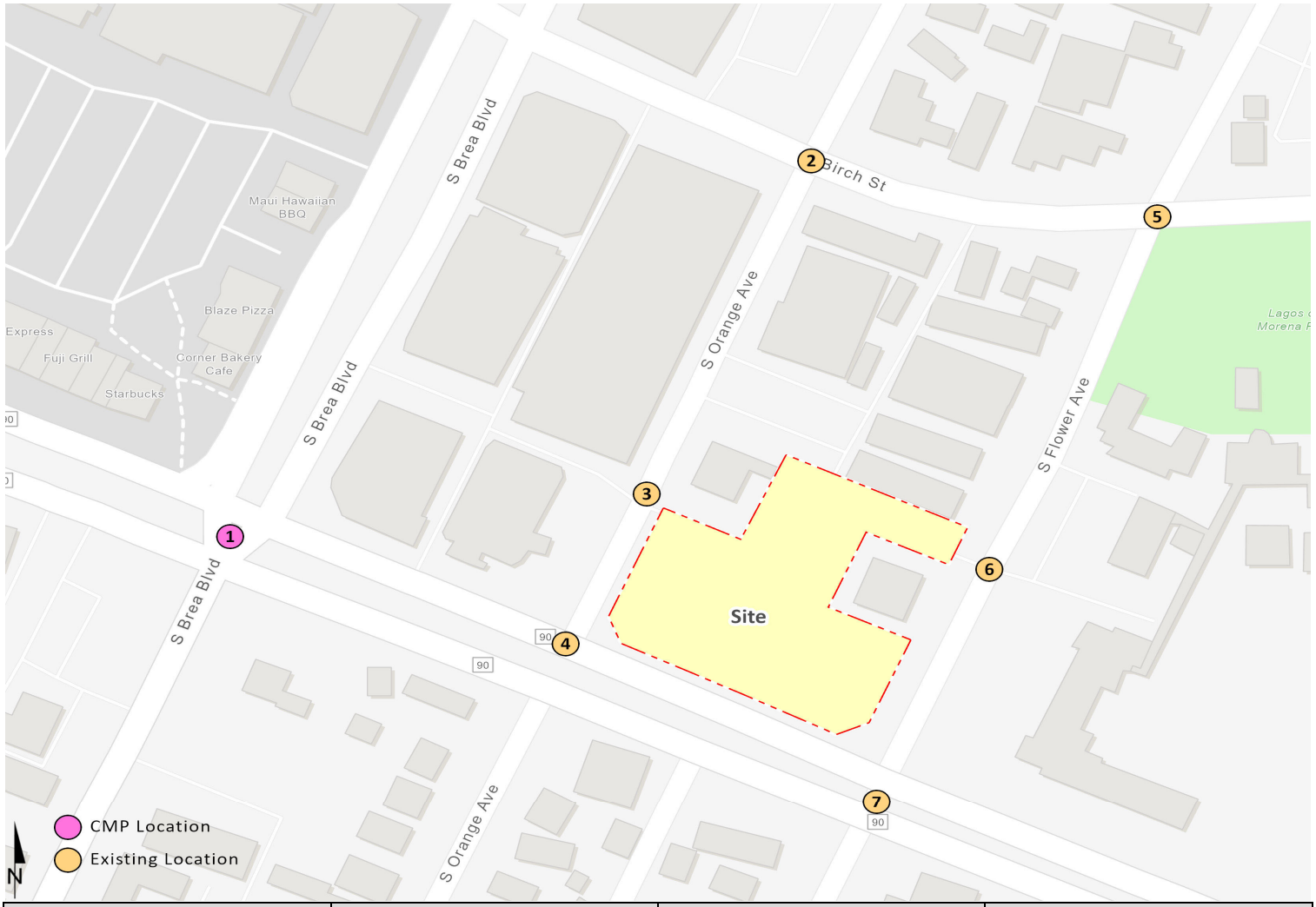


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
		← 0(15) 0(13) →	↰ 12(0) ↱ 7(0)

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
	← 0(5) 28(0) →	↱ 0(45) ← 11(108)

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips



1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
		← 13	↱ 5

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
	← 22 32 →	← 40

MD Peak Hour Intersection Volumes

Baseline Volume Development - AM Peak Hour

Without Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	400	431	149	166	567	146	140	1,350	348	145	1,247	93	5,182
Vol Adjustment:						73	80	-80			-73		0
W/O Flower:	**400**	**431**	**149**	**166**	**567**	**219**	**220**	**1,270**	**348**	**145**	**1,174**	**93**	**5,182**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	6	1	16	0	0	15	0	579	15	15	652	5	1,304
Vol Adjustment:								80			73		153
W/O Flower:	**6**	**1**	**16**	**0**	**0**	**15**	**0**	**659**	**15**	**15**	**725**	**5**	**1,457**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	18	1	28	18	0	0	0	0	4	0	15	84
Vol Adjustment:													0
W/O Flower:	**0**	**18**	**1**	**28**	**18**	**0**	**0**	**0**	**0**	**4**	**0**	**15**	**84**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	0	35	0	0	22	0	1,711	13	0	1,579	19	3,379
Vol Adjustment:								-80			-73		-153
W/O Flower:	**0**	**0**	**35**	**0**	**0**	**22**	**0**	**1,631**	**13**	**0**	**1,506**	**19**	**3,226**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	80	46	25	46	10	13	18	592	14	56	564	10	1,474
Vol Adjustment:	73		7						80	121			281
W/O Flower:	**153**	**46**	**32**	**46**	**10**	**13**	**18**	**592**	**94**	**177**	**564**	**10**	**1,755**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	25	164	12	18	76	21	16	0	4	0	0	2	338
Vol Adjustment:	-25	-164	-12	12	-76	25	4		-4	0		0	-240
W/O Flower:	**0**	**0**	**0**	**30**	**0**	**46**	**20**	**0**	**0**	**0**	**0**	**2**	**98**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	0	4	7	0	73	80	1,625	3	0	1,525	121	3,438
Vol Adjustment:				-7		-73	-80					-121	-281
W/O Flower:	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**1,625**	**3**	**0**	**1,525**	**0**	**3,157**

Baseline Volume Development - Mid Day Peak Hour

Without Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	387	531	202	235	514	207	199	1,187	329	272	1,311	135	5,509
Vol Adjustment:						59	46	-46			-59		0
W/O Flower:	**387**	**531**	**202**	**235**	**514**	**266**	**245**	**1,141**	**329**	**272**	**1,252**	**135**	**5,509**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	14	1	67	0	0	21	0	814	36	23	936	20	1,932
Vol Adjustment:								46			59		105
W/O Flower:	**14**	**1**	**67**	**0**	**0**	**21**	**0**	**860**	**36**	**23**	**995**	**20**	**2,037**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	28	6	22	48	0	0	0	0	8	0	19	131
Vol Adjustment:													0
W/O Flower:	**0**	**28**	**6**	**22**	**48**	**0**	**0**	**0**	**0**	**8**	**0**	**19**	**131**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	0	23	0	0	56	0	1,648	21	0	1,818	34	3,600
Vol Adjustment:								-46			-59		-105
W/O Flower:	**0**	**0**	**23**	**0**	**0**	**56**	**0**	**1,602**	**21**	**0**	**1,759**	**34**	**3,495**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	43	35	51	33	3	20	25	858	19	76	920	19	2,102
Vol Adjustment:	59		12						46	64			181
W/O Flower:	**102**	**35**	**63**	**33**	**3**	**20**	**25**	**858**	**65**	**140**	**920**	**19**	**2,283**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	3	99	8	10	71	3	0	0	0	0	0	1	195
Vol Adjustment:	-3	-99	-8	8	-71	3	0		0	0		0	-170
W/O Flower:	**0**	**0**	**0**	**18**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**1**	**25**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	0	3	12	0	59	46	1,592	13	0	1,793	64	3,582
Vol Adjustment:				-12		-59	-46					-64	-181
W/O Flower:	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**1,592**	**13**	**0**	**1,793**	**0**	**3,401**

Baseline Volume Development - PM Peak Hour

Without Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	492	672	229	242	559	177	199	1,465	430	250	1,447	144	6,306
Vol Adjustment:						56	42	-42			-56		0
W/O Flower:	**492**	**672**	**229**	**242**	**559**	**233**	**241**	**1,423**	**430**	**250**	**1,391**	**144**	**6,306**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	5	6	41	0	0	26	0	933	32	30	1,059	19	2,151
Vol Adjustment:								42			56		98
W/O Flower:	**5**	**6**	**41**	**0**	**0**	**26**	**0**	**975**	**32**	**30**	**1,115**	**19**	**2,249**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	35	1	5	36	0	0	0	0	5	0	6	88
Vol Adjustment:													0
W/O Flower:	**0**	**35**	**1**	**5**	**36**	**0**	**0**	**0**	**0**	**5**	**0**	**6**	**88**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	0	26	0	0	41	0	1,775	18	0	1,894	36	3,790
Vol Adjustment:								-42			-56		-98
W/O Flower:	**0**	**0**	**26**	**0**	**0**	**41**	**0**	**1,733**	**18**	**0**	**1,838**	**36**	**3,692**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	15	10	54	26	2	15	24	977	7	87	1,036	8	2,261
Vol Adjustment:	56		14						42	65			177
W/O Flower:	**71**	**10**	**68**	**26**	**2**	**15**	**24**	**977**	**49**	**152**	**1,036**	**8**	**2,438**

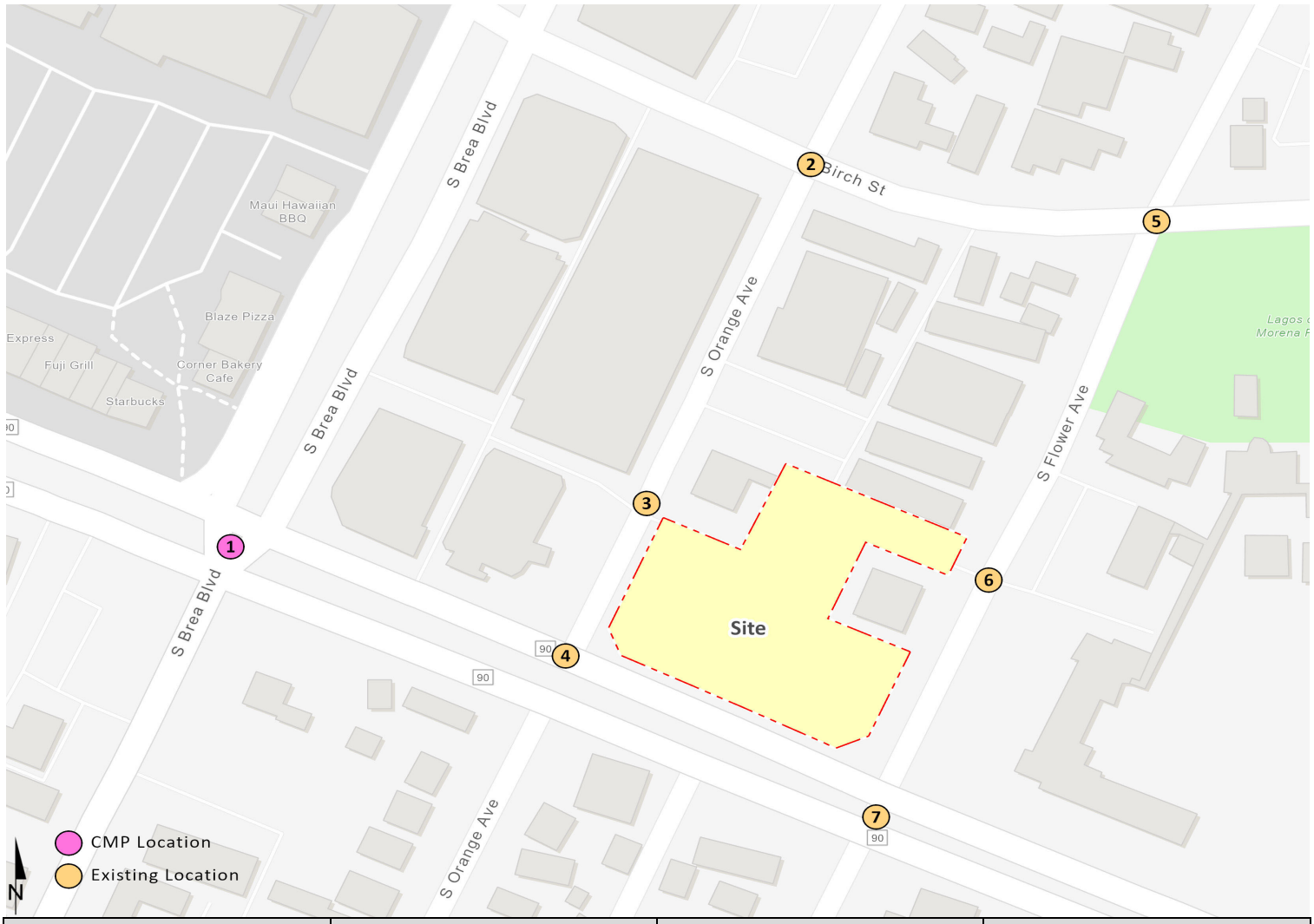
6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	16	88	3	4	63	19	6	0	6	1	0	1	207
Vol Adjustment:	-16	-88	-3	3	-63	16	6		-6	-1		1	-151
W/O Flower:	**0**	**0**	**0**	**7**	**0**	**35**	**12**	**0**	**0**	**0**	**0**	**2**	**56**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Existing:	0	0	7	14	0	56	42	1,780	5	0	1,874	65	3,843
Vol Adjustment:				-14		-56	-42					-65	-177
W/O Flower:	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**1,780**	**5**	**0**	**1,874**	**0**	**3,666**

VOLUME ADJUSTMENT
WITHOUT FLOWER CONNECTION



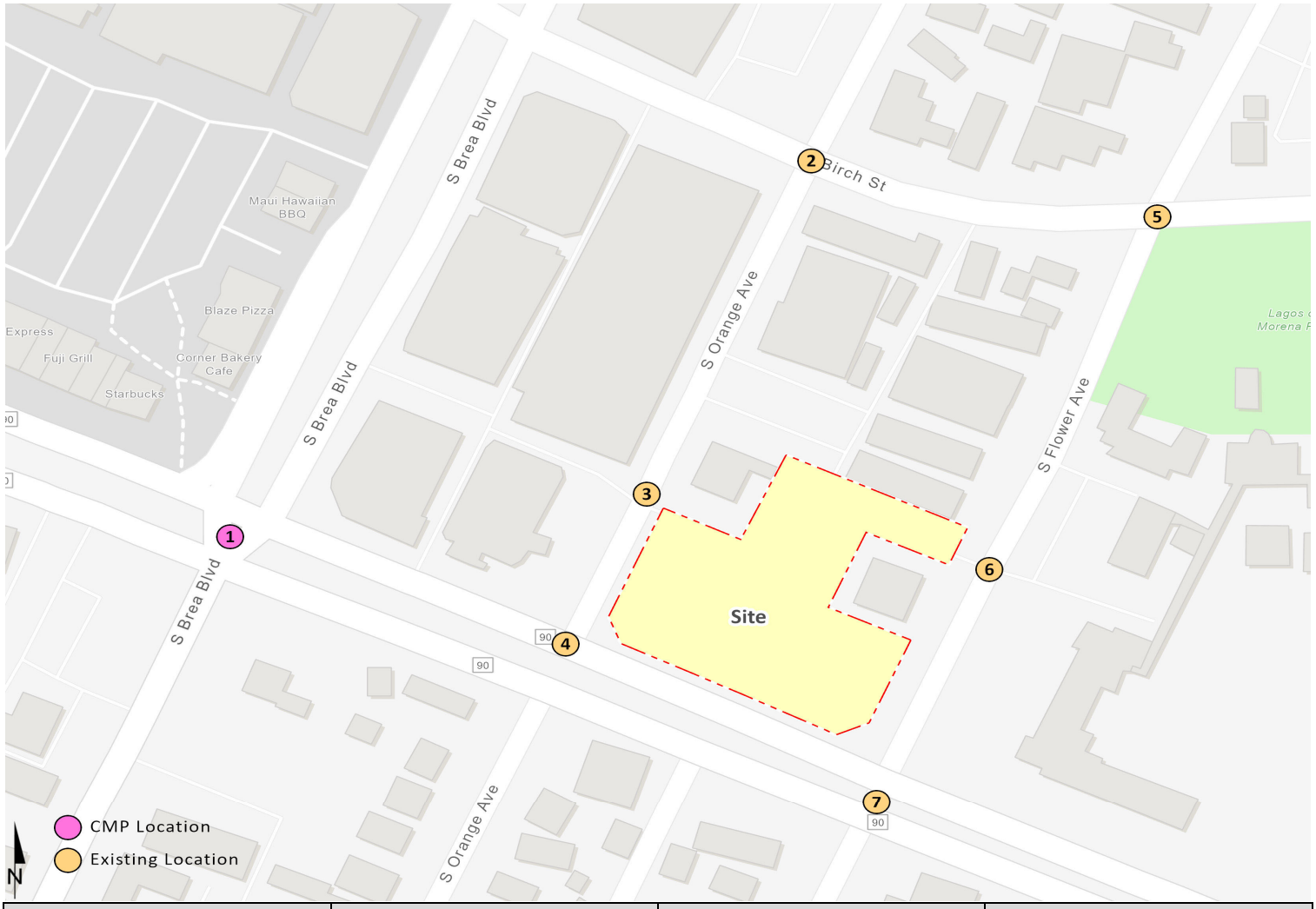
1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
↲ 73(56) ← -73(-56) 80(42) ⮎ -80(-42) →	← 73(56) 80(42) →		← -73(-56) -80(-42) →

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↰ 121(65) 80(42) ↴ 73(56) ↱ 7(14)	↲ 25(16) ← 76(-63) ↳ 12(3) ↱ 0(1) ↰ 0(-1) 4(6) ↳ ↰ -25(-16) → -164(-88) ↱ -12(-3) -4(-6) ↴	↲ -73(-56) ↳ -7(-14) ↱ -121(-65) -80(-42) ↳

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

VOLUME ADJUSTMENT
WITHOUT FLOWER CONNECTION

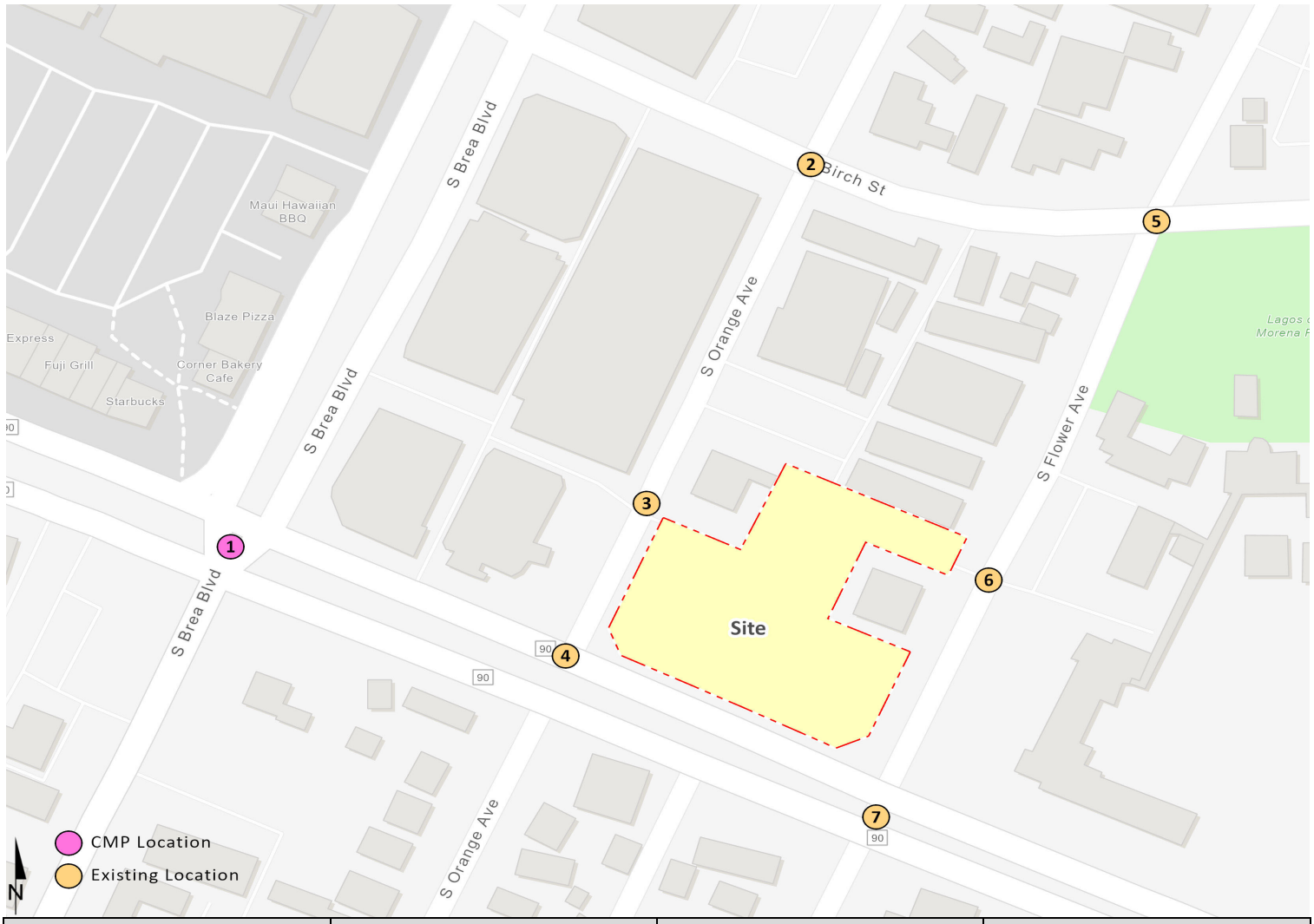


1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
59 ↲ ← -59(0) 46 ↳ -46(0) →	← 59 46 →		← -59(0) -46(0) →

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↰ 64 59 ↰ 12 ↱ 46 ↳	3 ↲ -71(0) ← 8 ↳ -3(0) ↰ -99(0) ↑ -8(0) ↱	-59(0) ↲ -12(0) ↳ ↱ -64(0) -46(0) ↳

MD Peak Hour Intersection Volumes

EXISTING VOLUMES
WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)				2 Orange Av. & Birch St.			
			↱ 93(144)				↱ 5(19)
			← 1174(1391)				← 725(1115)
219(233) ↲	567(559) ↓	166(242) ↳	↰ 145(250)	15(26) ↲			↰ 15(30)
220(241) ↴			↰ 400(492)			↰ 6(5)	
1270(1423) →			→ 431(672)	659(975) →		→ 1(6)	
348(430) ↴			↱ 149(229)	15(32) ↴		↱ 16(41)	

3 Orange Av. & Driveway 1				4 Orange Av. & Imperial Hwy. (SR-90)			
			↱ 15(6)				↱ 19(36)
							← 1506(1838)
18(36) ↓	28(5) ↳		↰ 4(5)	22(41) ↲			
			↰ 18(35)				
			→ 1(1)	1631(1733) →			
				13(18) ↴			↱ 35(26)

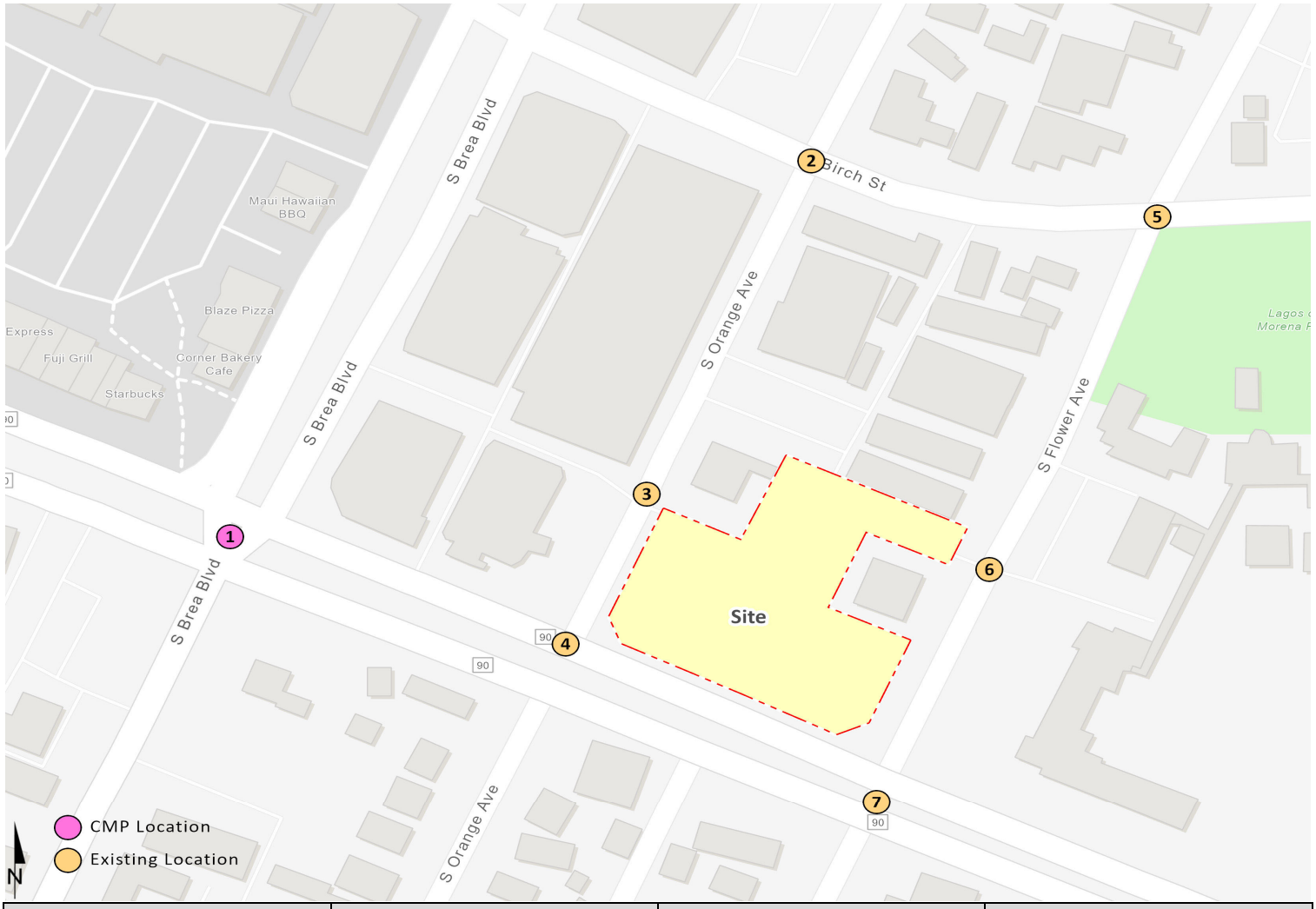
5 Flower Av. & Birch St.				6 Flower Av. & Driveway 2			
			↱ 10(8)				↱ 2(2)
			← 564(1036)				
13(15) ↲	10(2) ↓	46(26) ↳	↰ 177(152)	46(35) ↲	30(7) ↳		
18(24) ↴			↰ 153(71)				
592(977) →			→ 46(10)	20(12) ↴			
94(49) ↴			↱ 32(68)				

7 Flower Av. & Imperial Hwy. (SR-90)			
			← 1525(1874)
			↱ 4(7)
1625(1780) →			
3(5) ↴			

##(##) AM(PM) Peak Hour Intersection Volumes

Average Daily Trips

EXISTING VOLUMES
WITHOUT FLOWER CONNECTION



1 Brea Bl. & Imperial Hwy. (SR-90)	2 Orange Av. & Birch St.	3 Orange Av. & Driveway 1	4 Orange Av. & Imperial Hwy. (SR-90)
↲ 266 ↓ 514 ↳ 235 ↰ 272 ← 1252 ↱ 135 245 ↳ 1141 → 329 ↲ ↰ 387 ↑ 531 ↱ 202	↲ 21 ↰ 23 ← 995 ↱ 20 860 → 36 ↲ ↰ 14 ↑ 1 ↱ 67	↓ 48 ↳ 22 ↰ 8 ← 19 ↑ 28 ↱ 6	↲ 56 ← 1759 ↱ 34 1602 → 21 ↲ ↱ 23

5 Flower Av. & Birch St.	6 Flower Av. & Driveway 2	7 Flower Av. & Imperial Hwy. (SR-90)
↲ 20 ↓ 3 ↳ 33 ↰ 140 ← 920 ↱ 19 25 ↳ 858 → 65 ↲ ↰ 102 ↑ 35 ↱ 63	↲ 6 ↳ 18 ↱ 1	← 1793 1592 → 13 ↲ ↱ 3

MD Peak Hour Intersection Volumes

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951)268-6268

City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp AM
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

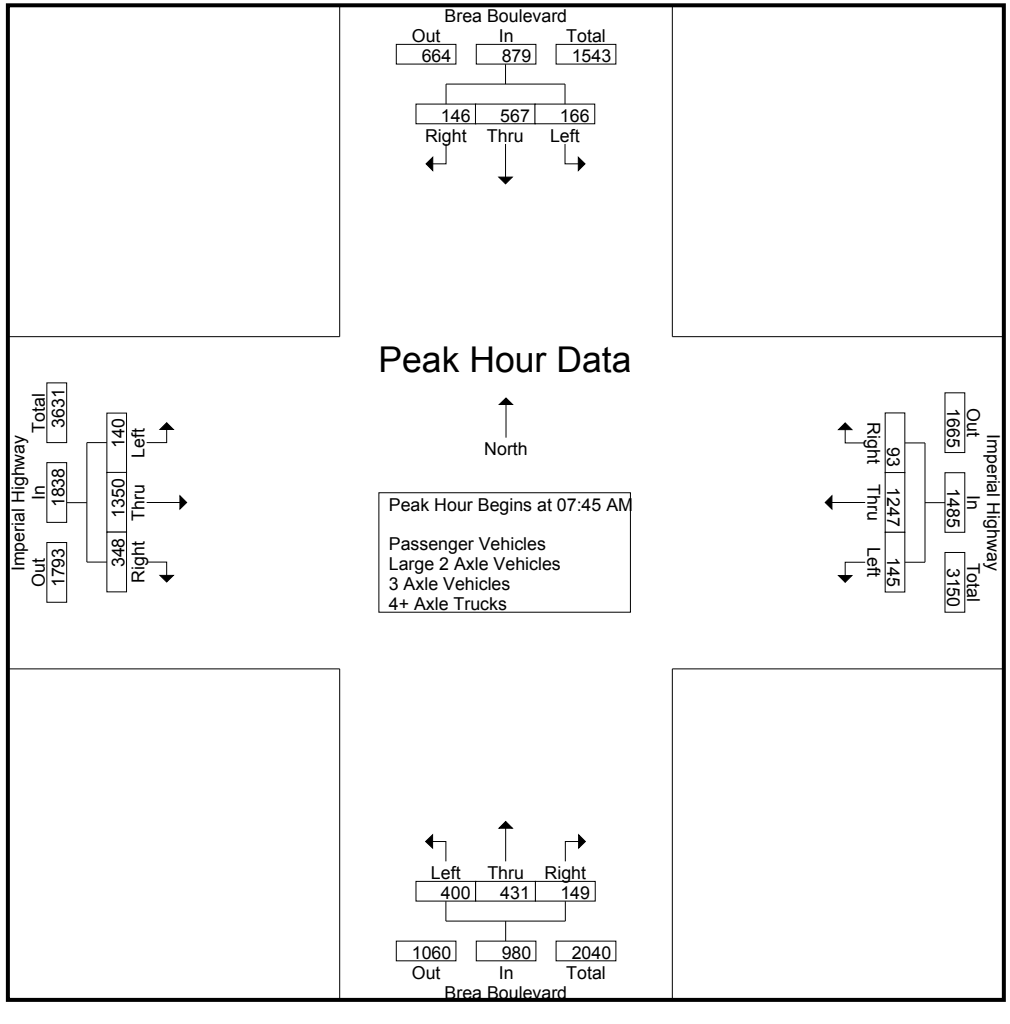
	Brea Boulevard Southbound						Imperial Highway Westbound						Brea Boulevard Northbound						Imperial Highway Eastbound								
Start Time	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	12	102	20	1	9	134	30	243	8	0	2	281	38	35	18	0	15	91	7	241	39	1	14	287	42	793	835
07:15 AM	18	82	23	3	16	123	28	281	13	4	1	322	52	51	19	0	9	122	13	307	44	1	10	364	44	931	975
07:30 AM	18	107	32	2	19	157	30	319	12	0	5	361	77	70	24	1	17	171	14	327	60	2	23	401	69	1090	1159
07:45 AM	37	148	43	1	16	228	32	343	25	2	13	400	122	105	23	1	10	250	41	354	96	4	30	491	77	1369	1446
Total	85	439	118	7	60	642	120	1186	58	6	21	1364	289	261	84	2	51	634	75	1229	239	8	77	1543	232	4183	4415
08:00 AM	30	154	36	7	6	220	46	314	27	3	11	387	90	102	39	2	17	231	35	287	93	1	37	415	84	1253	1337
08:15 AM	51	135	33	3	10	219	33	308	19	1	7	360	81	119	38	4	21	238	31	362	89	3	35	482	84	1299	1383
08:30 AM	48	130	34	5	14	212	34	282	22	2	9	338	107	105	49	1	22	261	33	347	70	0	22	450	75	1261	1336
08:45 AM	35	138	27	2	9	200	51	339	27	0	11	417	67	95	39	4	20	201	30	318	66	0	23	414	69	1232	1301
Total	164	557	130	17	39	851	164	1243	95	6	38	1502	345	421	165	11	80	931	129	1314	318	4	117	1761	312	5045	5357
Grand Total	249	996	248	24	99	1493	284	2429	153	12	59	2866	634	682	249	13	131	1565	204	2543	557	12	194	3304	544	9228	9772
Apprch %	16.7	66.7	16.6				9.9	84.8	5.3				40.5	43.6	15.9				6.2	77	16.9						
Total %	2.7	10.8	2.7			16.2	3.1	26.3	1.7			31.1	6.9	7.4	2.7			17	2.2	27.6	6			35.8	5.6	94.4	
Passenger Vehicles	241	982	239			1583	269	2269	144			2750	625	670	236			1668	196	2353	533			3281	0	0	9282
% Passenger Vehicles	96.8	98.6	96.4	100	98	98	94.7	93.4	94.1	100	94.9	93.6	98.6	98.2	94.8	100	94.7	97.6	96.1	92.5	95.7	100	96.4	93.5	0	0	95
Large 2 Axle Vehicles	5	14	6			27	9	61	8			80	7	12	9			33	5	99	21			131	0	0	271
% Large 2 Axle Vehicles	2	1.4	2.4	0	2	1.7	3.2	2.5	5.2	0	3.4	2.7	1.1	1.8	3.6	0	3.8	1.9	2.5	3.9	3.8	0	3.1	3.7	0	0	2.8
3 Axle Vehicles	3	0	0			3	3	19	0			22	1	0	3			5	0	19	2			22	0	0	52
% 3 Axle Vehicles	1.2	0	0	0	0	0.2	1.1	0.8	0	0	0	0.7	0.2	0	1.2	0	0.8	0.3	0	0.7	0.4	0	0.5	0.6	0	0	0.5
4+ Axle Trucks	0	0	3			3	3	80	1			85	1	0	1			3	3	72	1			76	0	0	167
% 4+ Axle Trucks	0	0	1.2	0	0	0.2	1.1	3.3	0.7	0	1.7	2.9	0.2	0	0.4	0	0.8	0.2	1.5	2.8	0.2	0	0	2.2	0	0	1.7

	Brea Boulevard Southbound				Imperial Highway Westbound				Brea Boulevard Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	37	148	**43**	**228**	32	**343**	25	**400**	**122**	105	23	250	**41**	354	**96**	**491**	**1369**
08:00 AM	30	**154**	36	220	**46**	314	**27**	387	90	102	39	231	35	287	93	415	1253
08:15 AM	**51**	135	33	219	33	308	19	360	81	**119**	38	238	31	**362**	89	482	1299
08:30 AM	48	130	34	212	34	282	22	338	107	105	**49**	**261**	33	347	70	450	1261
Total Volume	166	567	146	879	145	1247	93	1485	400	431	149	980	140	1350	348	1838	5182
% App. Total	18.9	64.5	16.6		9.8	84	6.3		40.8	44	15.2		7.6	73.4	18.9		
PHF	.814	.920	.849	.964	.788	.909	.861	.928	.820	.905	.760	.939	.854	.932	.906	.936	.946

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951)268-6268

City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp AM
Site Code : 221110
Start Date : 12/21/2022
Page No : 2



Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951)268-6268

City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp AM
Site Code : 221110
Start Date : 12/21/2022

	Brea Boulevard Southbound				Imperial Highway Westbound				Brea Boulevard Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:45 AM				07:30 AM				07:45 AM				07:45 AM				
+0 mins.	37	148	**43**	**228**	30	319	12	361	**122**	105	23	250	**41**	354	**96**	**491**	
+15 mins.	30	**154**	36	220	32	**343**	25	**400**	90	102	39	231	35	287	93	415	
+30 mins.	**51**	135	33	219	**46**	314	**27**	387	81	**119**	38	238	31	**362**	89	482	
+45 mins.	48	130	34	212	33	308	19	360	107	105	**49**	**261**	33	347	70	450	
Total Volume	166	567	146	879	141	1284	83	1508	400	431	149	980	140	1350	348	1838	
% App. Total	18.9	64.5	16.6		9.4	85.1	5.5		40.8	44	15.2		7.6	73.4	18.9		
PHF	.814	.920	.849	.964	.766	.936	.769	.943	.820	.905	.760	.939	.854	.932	.906	.936	

Counts Unlimited, Inc.
PO Box 1178
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(951)268-6268

City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp MD
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

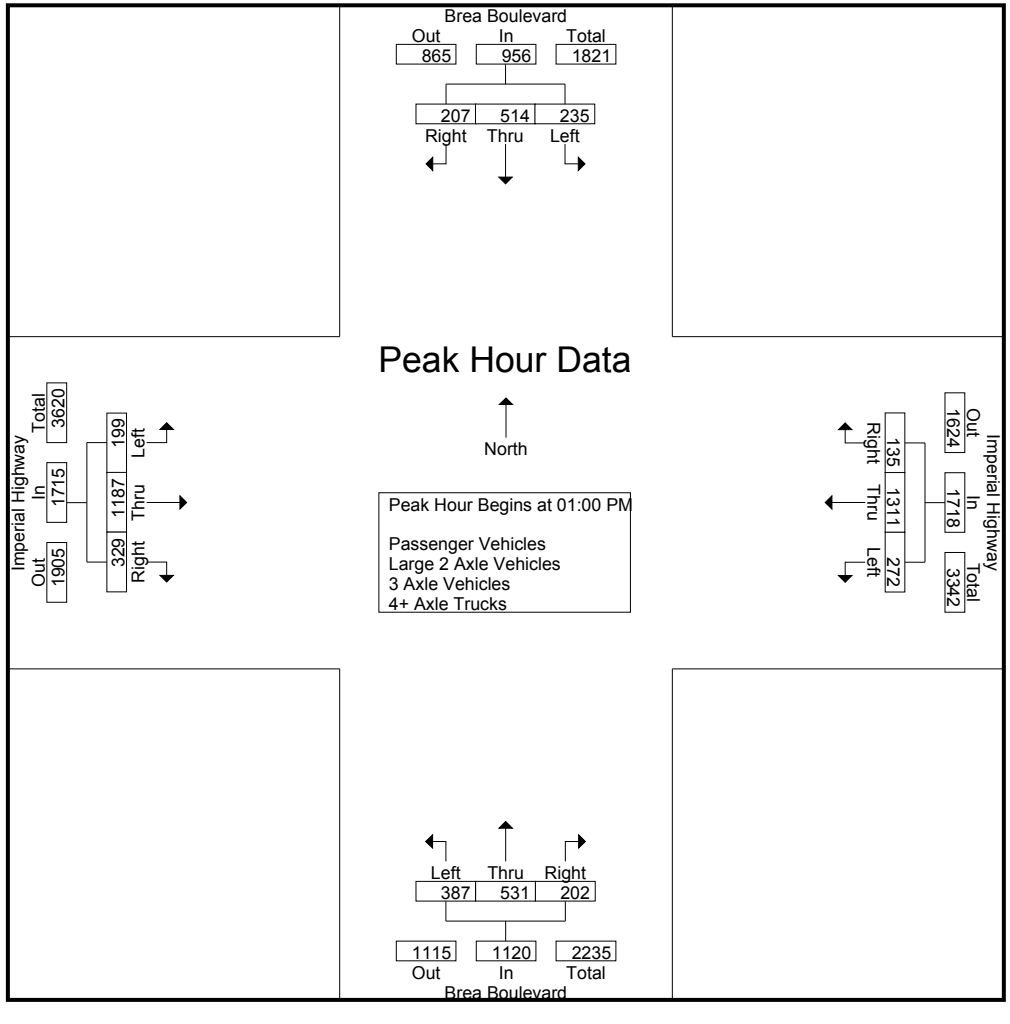
	Brea Boulevard Southbound						Imperial Highway Westbound						Brea Boulevard Northbound						Imperial Highway Eastbound								
Start Time	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
12:00 PM	44	126	44	9	11	214	60	293	46	3	22	399	80	99	71	3	35	250	56	310	68	4	33	434	120	1297	1417
12:15 PM	49	126	40	6	15	215	75	308	38	2	15	421	86	92	54	1	26	232	49	339	72	1	25	460	91	1328	1419
12:30 PM	56	134	52	12	20	242	62	314	24	3	15	400	94	104	60	2	24	258	48	304	83	0	32	435	108	1335	1443
12:45 PM	42	119	51	16	25	212	52	310	31	3	7	393	86	115	74	3	29	275	39	312	72	0	23	423	106	1303	1409
Total	191	505	187	43	71	883	249	1225	139	11	59	1613	346	410	259	9	114	1015	192	1265	295	5	113	1752	425	5263	5688
01:00 PM	50	132	51	9	13	233	58	298	38	0	16	394	88	136	54	1	30	278	49	297	74	1	30	420	100	1325	1425
01:15 PM	58	108	56	5	16	222	67	309	28	3	12	404	105	137	50	4	21	292	59	305	70	2	33	434	96	1352	1448
01:30 PM	63	138	56	2	17	257	73	346	37	6	8	456	109	123	54	2	23	286	45	322	113	1	40	480	99	1479	1578
01:45 PM	64	136	44	12	9	244	74	358	32	2	17	464	85	135	44	2	22	264	46	263	72	1	29	381	94	1353	1447
Total	235	514	207	28	55	956	272	1311	135	11	53	1718	387	531	202	9	96	1120	199	1187	329	5	132	1715	389	5509	5898
Grand Total	426	1019	394	71	126	1839	521	2536	274	22	112	3331	733	941	461	18	210	2135	391	2452	624	10	245	3467	814	10772	11586
Apprch %	23.2	55.4	21.4				15.6	76.1	8.2				34.3	44.1	21.6				11.3	70.7	18						
Total %	4	9.5	3.7			17.1	4.8	23.5	2.5			30.9	6.8	8.7	4.3			19.8	3.6	22.8	5.8			32.2	7	93	
Passenger Vehicles	413	1006	383			1997	508	2406	269			3316	724	924	455			2327	386	2337	611			3582	0	0	11222
% Passenger Vehicles	96.9	98.7	97.2	100	98.4	98.1	97.5	94.9	98.2	100	99.1	95.7	98.8	98.2	98.7	100	98.1	98.5	98.7	95.3	97.9	100	97.1	96.2	0	0	96.9
Large 2 Axle Vehicles	10	13	8			33	10	68	1			80	7	14	5			30	5	51	11			72	0	0	215
% Large 2 Axle Vehicles	2.3	1.3	2	0	1.6	1.6	1.9	2.7	0.4	0	0.9	2.3	1	1.5	1.1	0	1.9	1.3	1.3	2.1	1.8	0	2	1.9	0	0	1.9
3 Axle Vehicles	2	0	1			3	1	19	2			22	1	2	1			4	0	17	2			21	0	0	50
% 3 Axle Vehicles	0.5	0	0.3	0	0	0.1	0.2	0.7	0.7	0	0	0.6	0.1	0.2	0.2	0	0	0.2	0	0.7	0.3	0	0.8	0.6	0	0	0.4
4+ Axle Trucks	1	0	2			3	2	43	2			47	1	1	0			2	0	47	0			47	0	0	99
% 4+ Axle Trucks	0.2	0	0.5	0	0	0.1	0.4	1.7	0.7	0	0	1.4	0.1	0.1	0	0	0	0.1	0	1.9	0	0	0	1.3	0	0	0.9

	Brea Boulevard Southbound				Imperial Highway Westbound				Brea Boulevard Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	50	132	51	233	58	298	**38**	394	88	136	**54**	278	49	297	74	420	1325
01:15 PM	58	108	**56**	222	67	309	28	404	105	**137**	50	**292**	**59**	305	70	434	1352
01:30 PM	63	**138**	56	**257**	73	346	37	456	**109**	123	54	286	45	**322**	**113**	**480**	**1479**
01:45 PM	**64**	136	44	244	**74**	**358**	32	**464**	85	135	44	264	46	263	72	381	1353
Total Volume	235	514	207	956	272	1311	135	1718	387	531	202	1120	199	1187	329	1715	5509
% App. Total	24.6	53.8	21.7		15.8	76.3	7.9		34.6	47.4	18		11.6	69.2	19.2		
PHF	.918	.931	.924	.930	.919	.916	.888	.926	.888	.969	.935	.959	.843	.922	.728	.893	.931

Counts Unlimited, Inc.
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City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp MD
Site Code : 221110
Start Date : 12/21/2022
Page No : 2



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(951)268-6268

City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp MD
Site Code : 221110
Start Date : 12/21/2022

	Brea Boulevard Southbound				Imperial Highway Westbound				Brea Boulevard Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	01:00 PM				01:00 PM				12:45 PM				12:45 PM				
+0 mins.	50	132	51	233	58	298	**38**	394	86	115	**74**	275	39	312	72	423	
+15 mins.	58	108	**56**	222	67	309	28	404	88	136	54	278	49	297	74	420	
+30 mins.	63	**138**	56	**257**	73	346	37	456	105	**137**	50	**292**	**59**	305	70	434	
+45 mins.	**64**	136	44	244	**74**	**358**	32	**464**	**109**	123	54	286	45	**322**	**113**	**480**	
Total Volume	235	514	207	956	272	1311	135	1718	388	511	232	1131	192	1236	329	1757	
% App. Total	24.6	53.8	21.7		15.8	76.3	7.9		34.3	45.2	20.5		10.9	70.3	18.7		
PHF	.918	.931	.924	.930	.919	.916	.888	.926	.890	.932	.784	.968	.814	.960	.728	.915	

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City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp PM
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

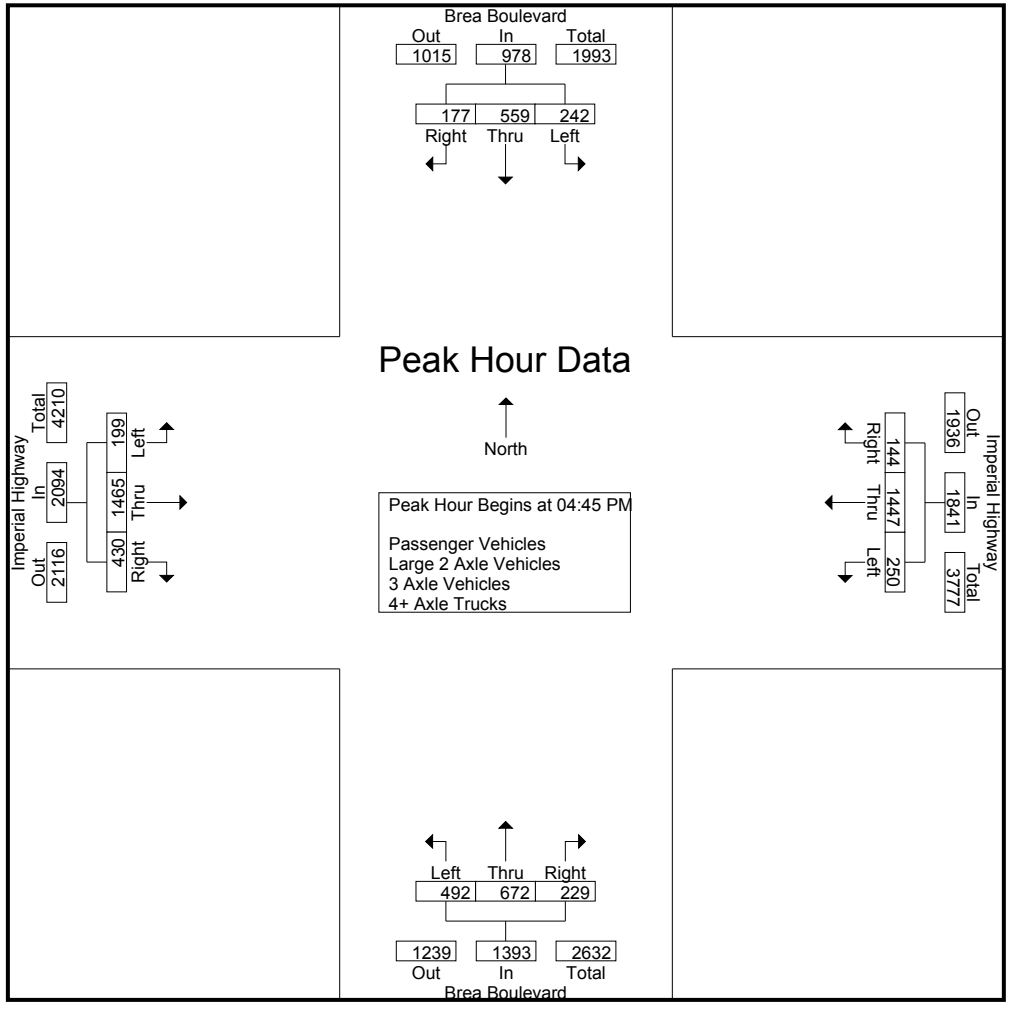
	Brea Boulevard Southbound						Imperial Highway Westbound						Brea Boulevard Northbound						Imperial Highway Eastbound								
Start Time	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Left	Thru	Right	U-Turns	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	51	136	30	7	8	217	58	334	24	1	14	416	102	164	49	2	28	315	56	339	98	1	30	493	91	1441	1532
04:15 PM	53	162	37	7	2	252	60	341	32	4	16	433	127	165	57	1	27	349	53	330	95	1	40	478	98	1512	1610
04:30 PM	37	146	49	13	9	232	72	377	22	4	6	471	118	160	66	0	32	344	46	337	108	1	47	491	112	1538	1650
04:45 PM	61	156	41	8	9	258	70	349	33	5	13	452	123	176	49	0	17	348	49	360	94	1	42	503	95	1561	1656
Total	202	600	157	35	28	959	260	1401	111	14	49	1772	470	665	221	3	104	1356	204	1366	395	4	159	1965	396	6052	6448
05:00 PM	50	134	49	6	12	233	66	368	36	3	14	470	122	178	65	2	29	365	48	365	114	3	45	527	114	1595	1709
05:15 PM	73	160	45	8	10	278	55	311	30	1	11	396	133	164	58	0	28	355	52	353	107	0	36	512	94	1541	1635
05:30 PM	58	109	42	18	9	209	59	419	45	3	21	523	114	154	57	1	26	325	50	387	115	0	44	552	122	1609	1731
05:45 PM	62	142	41	7	10	245	58	387	40	0	22	485	106	157	46	1	21	309	55	300	72	2	29	427	92	1466	1558
Total	243	545	177	39	41	965	238	1485	151	7	68	1874	475	653	226	4	104	1354	205	1405	408	5	154	2018	422	6211	6633
Grand Total	445	1145	334	74	69	1924	498	2886	262	21	117	3646	945	1318	447	7	208	2710	409	2771	803	9	313	3983	818	12263	13081
Apprch %	23.1	59.5	17.4				13.7	79.2	7.2				34.9	48.6	16.5				10.3	69.6	20.2						
Total %	3.6	9.3	2.7			15.7	4.1	23.5	2.1			29.7	7.7	10.7	3.6			22.1	3.3	22.6	6.5			32.5	6.3	93.7	
Passenger Vehicles	438	1136	331			2045	496	2793	258			3683	931	1310	447			2903	405	2723	796			4244	0	0	12875
% Passenger Vehicles	98.4	99.2	99.1	100	95.7	98.9	99.6	96.8	98.5	100	98.3	97.3	98.5	99.4	100	100	100	99.2	99	98.3	99.1	100	99.4	98.6	0	0	98.4
Large 2 Axle Vehicles	4	7	2			15	1	38	3			44	9	8	0			17	3	20	7			32	0	0	108
% Large 2 Axle Vehicles	0.9	0.6	0.6	0	2.9	0.7	0.2	1.3	1.1	0	1.7	1.2	1	0.6	0	0	0	0.6	0.7	0.7	0.9	0	0.6	0.7	0	0	0.8
3 Axle Vehicles	2	0	1			4	0	5	1			6	5	0	0			5	1	6	0			7	0	0	22
% 3 Axle Vehicles	0.4	0	0.3	0	1.4	0.2	0	0.2	0.4	0	0	0.2	0.5	0	0	0	0	0.2	0.2	0.2	0	0	0	0.2	0	0	0.2
4+ Axle Trucks	1	2	0			3	1	50	0			51	0	0	0			0	0	22	0			22	0	0	76
% 4+ Axle Trucks	0.2	0.2	0	0	0	0.1	0.2	1.7	0	0	0	1.3	0	0	0	0	0	0	0	0.8	0	0	0	0.5	0	0	0.6

	Brea Boulevard Southbound				Imperial Highway Westbound				Brea Boulevard Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	61	156	41	258	**70**	349	33	452	123	176	49	348	49	360	94	503	1561
05:00 PM	50	134	**49**	233	66	368	36	470	122	**178**	**65**	**365**	48	365	114	527	1595
05:15 PM	**73**	**160**	45	**278**	55	311	30	396	**133**	164	58	355	**52**	353	107	512	1541
05:30 PM	58	109	42	209	59	**419**	**45**	**523**	114	154	57	325	50	**387**	**115**	**552**	**1609**
Total Volume	242	559	177	978	250	1447	144	1841	492	672	229	1393	199	1465	430	2094	6306
% App. Total	24.7	57.2	18.1		13.6	78.6	7.8		35.3	48.2	16.4		9.5	70	20.5		
PHF	.829	.873	.903	.879	.893	.863	.800	.880	.925	.944	.881	.954	.957	.946	.935	.948	.980

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City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp PM
Site Code : 221110
Start Date : 12/21/2022
Page No : 2



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(951)268-6268

City of Brea
N/S: Brea Boulevard
E/W: Imperial Highway
Weather: Clear

File Name : 01A_BRE_Brea_Imp PM
Site Code : 221110
Start Date : 12/21/2022

	Brea Boulevard Southbound				Imperial Highway Westbound				Brea Boulevard Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:30 PM				05:00 PM				04:30 PM				04:45 PM				
+0 mins.	37	146	**49**	232	**66**	368	36	470	118	160	**66**	344	49	360	94	503	
+15 mins.	61	156	41	258	55	311	30	396	123	176	49	348	48	365	114	527	
+30 mins.	50	134	49	233	59	**419**	**45**	**523**	122	**178**	65	**365**	**52**	353	107	512	
+45 mins.	**73**	**160**	45	**278**	58	387	40	485	**133**	164	58	355	50	**387**	**115**	**552**	
Total Volume	221	596	184	1001	238	1485	151	1874	496	678	238	1412	199	1465	430	2094	
% App. Total	22.1	59.5	18.4		12.7	79.2	8.1		35.1	48	16.9		9.5	70	20.5		
PHF	.757	.931	.939	.900	.902	.886	.839	.896	.932	.952	.902	.967	.957	.946	.935	.948	

Location: Brea
N/S: Brea Boulevard
E/W: Imperial Highway

Date: 12/21/2022
Day: Wednesday

PEDESTRIANS

	North Leg Brea Boulevard	East Leg Imperial Highway	South Leg Brea Boulevard	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	2	1	0	2	5
7:15 AM	0	0	0	0	0
7:30 AM	0	4	3	0	7
7:45 AM	2	3	3	4	12
8:00 AM	2	1	1	4	8
8:15 AM	0	0	0	0	0
8:30 AM	0	0	2	2	4
8:45 AM	0	1	0	0	1
TOTAL VOLUMES:	6	10	9	12	37

	North Leg Brea Boulevard	East Leg Imperial Highway	South Leg Brea Boulevard	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
12:00 PM	0	0	0	0	0
12:15 PM	0	0	1	0	1
12:30 PM	0	1	2	2	5
12:45 PM	1	1	2	0	4
1:00 PM	2	2	3	3	10
1:15 PM	1	0	0	2	3
1:30 PM	5	4	3	4	16
1:45 PM	2	1	3	2	8
TOTAL VOLUMES:	11	9	14	13	47

	North Leg Brea Boulevard	East Leg Imperial Highway	South Leg Brea Boulevard	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	1	0	0	0	1
4:15 PM	2	0	0	5	7
4:30 PM	2	0	2	0	4
4:45 PM	1	1	0	4	6
5:00 PM	5	1	5	1	12
5:15 PM	0	0	0	3	3
5:30 PM	1	0	0	0	1
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	12	2	7	13	34

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Location: Brea
N/S: Brea Boulevard
E/W: Imperial Highway

Date: 12/21/2022
Day: Wednesday

BICYCLES

	Southbound Brea Boulevard			Westbound Imperial Highway			Northbound Brea Boulevard			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	1
7:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	0	1	0	0	1	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1
8:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	2	0	0	0	0	0	2
TOTAL VOLUMES:	0	2	0	0	1	0	2	2	0	0	1	0	8

	Southbound Brea Boulevard			Westbound Imperial Highway			Northbound Brea Boulevard			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
12:00 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
12:15 PM	0	0	0	0	0	0	0	2	0	0	0	0	2
12:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
12:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
1:30 PM	0	0	0	0	0	0	0	2	0	0	0	0	2
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	2	0	0	0	0	0	5	0	0	1	0	8

	Southbound Brea Boulevard			Westbound Imperial Highway			Northbound Brea Boulevard			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	1
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	0	0	0	0	0	0	1	0	0	1	0	2
5:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
TOTAL VOLUMES:	0	4	0	0	0	0	0	1	1	0	1	0	7

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City of Brea
N/S: Orange Avenue
E/W: Birch Street
Weather: Clear

File Name : 02A_BRE_Ora_Birch AM
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

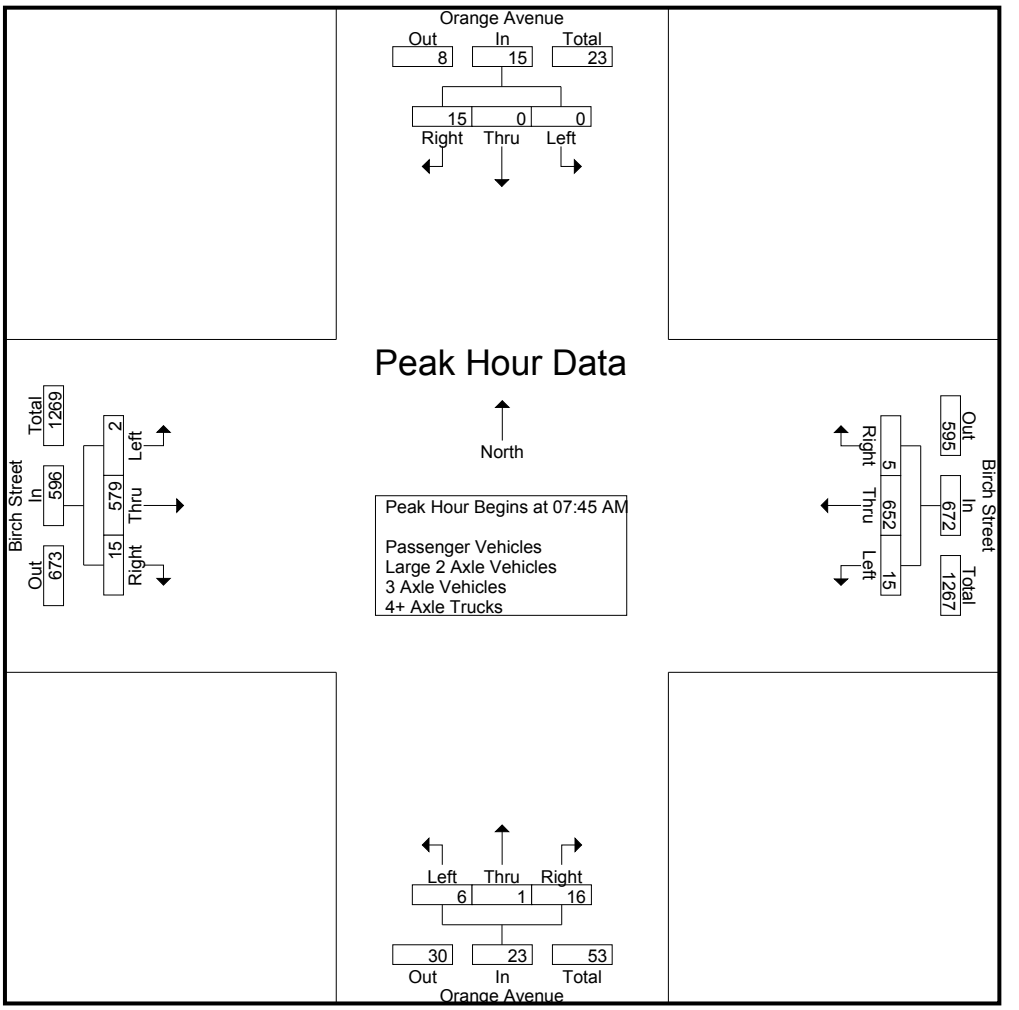
	Orange Avenue Southbound				Birch Street Westbound				Orange Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	1	1	1	53	2	56	0	0	1	1	0	58	3	61	119
07:15 AM	0	0	3	3	4	76	2	82	0	1	2	3	0	70	2	72	160
07:30 AM	0	0	5	5	2	103	0	105	0	0	3	3	0	87	2	89	202
07:45 AM	0	0	7	7	6	184	2	192	1	0	5	6	1	156	10	167	372
Total	0	0	16	16	13	416	6	435	1	1	11	13	1	371	17	389	853
08:00 AM	0	0	3	3	3	179	0	182	3	1	9	13	1	143	2	146	344
08:15 AM	0	0	3	3	2	153	2	157	2	0	0	2	0	139	2	141	303
08:30 AM	0	0	2	2	4	136	1	141	0	0	2	2	0	141	1	142	287
08:45 AM	0	0	4	4	2	128	0	130	1	0	1	2	0	157	4	161	297
Total	0	0	12	12	11	596	3	610	6	1	12	19	1	580	9	590	1231
Grand Total	0	0	28	28	24	1012	9	1045	7	2	23	32	2	951	26	979	2084
Apprch %	0	0	100		2.3	96.8	0.9		21.9	6.2	71.9		0.2	97.1	2.7		
Total %	0	0	1.3	1.3	1.2	48.6	0.4	50.1	0.3	0.1	1.1	1.5	0.1	45.6	1.2	47	
Passenger Vehicles	0	0	27	27	24	992	9	1025	7	2	22	31	2	932	26	960	2043
% Passenger Vehicles	0	0	96.4	96.4	100	98	100	98.1	100	100	95.7	96.9	100	98	100	98.1	98
Large 2 Axle Vehicles	0	0	1	1	0	19	0	19	0	0	1	1	0	18	0	18	39
% Large 2 Axle Vehicles	0	0	3.6	3.6	0	1.9	0	1.8	0	0	4.3	3.1	0	1.9	0	1.8	1.9
3 Axle Vehicles	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
% 3 Axle Vehicles	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0

	Orange Avenue Southbound				Birch Street Westbound				Orange Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	0	**7**	**7**	**6**	**184**	**2**	**192**	1	0	5	6	**1**	**156**	**10**	**167**	**372**
08:00 AM	0	0	3	3	3	179	0	182	**3**	**1**	**9**	**13**	1	143	2	146	344
08:15 AM	0	0	3	3	2	153	2	157	2	0	0	2	0	139	2	141	303
08:30 AM	0	0	2	2	4	136	1	141	0	0	2	2	0	141	1	142	287
Total Volume	0	0	15	15	15	652	5	672	6	1	16	23	2	579	15	596	1306
% App. Total	0	0	100		2.2	97	0.7		26.1	4.3	69.6		0.3	97.1	2.5		
PHF	.000	.000	.536	.536	.625	.886	.625	.875	.500	.250	.444	.442	.500	.928	.375	.892	.878

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City of Brea
N/S: Orange Avenue
E/W: Birch Street
Weather: Clear

File Name : 02A_BRE_Ora_Birch AM
Site Code : 221110
Start Date : 12/21/2022



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:45 AM				07:15 AM				07:45 AM			
+0 mins.	0	0	3	3	**6**	**184**	**2**	**192**	0	**1**	2	3	**1**	**156**	**10**	**167**
+15 mins.	0	0	5	5	3	179	0	182	0	0	3	3	1	143	2	146
+30 mins.	0	0	**7**	**7**	2	153	2	157	1	0	5	6	0	139	2	141
+45 mins.	0	0	3	3	4	136	1	141	**3**	1	**9**	**13**	0	141	1	142
Total Volume	0	0	18	18	15	652	5	672	4	2	19	25	2	579	15	596
% App. Total	0	0	100		2.2	97	0.7		16	8	76		0.3	97.1	2.5	
PHF	.000	.000	.643	.643	.625	.886	.625	.875	.333	.500	.528	.481	.500	.928	.375	.892

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City of Brea
N/S: Orange Avenue
E/W: Birch Street
Weather: Clear

File Name : 02A_BRE_Ora_Birch MD
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

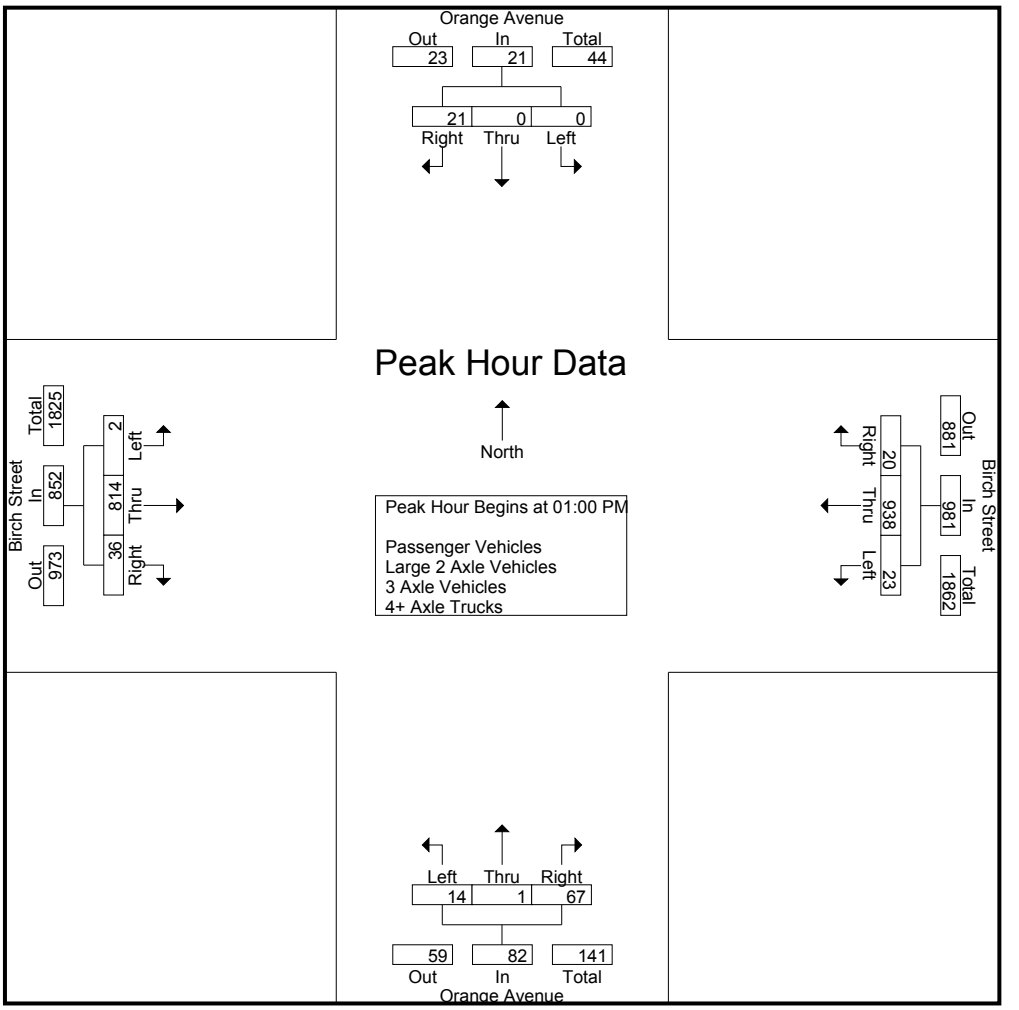
	Orange Avenue Southbound				Birch Street Westbound				Orange Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
12:00 PM	0	0	5	5	5	190	8	203	2	2	5	9	3	194	13	210	427
12:15 PM	0	0	6	6	5	219	4	228	1	0	5	6	1	167	6	174	414
12:30 PM	0	0	6	6	7	233	5	245	1	0	4	5	1	185	9	195	451
12:45 PM	0	0	8	8	4	208	3	215	1	0	7	8	2	203	12	217	448
Total	0	0	25	25	21	850	20	891	5	2	21	28	7	749	40	796	1740
01:00 PM	0	0	6	6	3	204	5	212	3	0	5	8	0	207	8	215	441
01:15 PM	0	0	7	7	6	227	5	238	1	1	10	12	1	185	12	198	455
01:30 PM	0	0	7	7	8	270	8	286	5	0	20	25	0	217	14	231	549
01:45 PM	0	0	1	1	6	237	2	245	5	0	32	37	1	205	2	208	491
Total	0	0	21	21	23	938	20	981	14	1	67	82	2	814	36	852	1936
Grand Total	0	0	46	46	44	1788	40	1872	19	3	88	110	9	1563	76	1648	3676
Apprch %	0	0	100		2.4	95.5	2.1		17.3	2.7	80		0.5	94.8	4.6		
Total %	0	0	1.3	1.3	1.2	48.6	1.1	50.9	0.5	0.1	2.4	3	0.2	42.5	2.1	44.8	
Passenger Vehicles	0	0	44	44	44	1762	39	1845	19	3	85	107	9	1546	76	1631	3627
% Passenger Vehicles	0	0	95.7	95.7	100	98.5	97.5	98.6	100	100	96.6	97.3	100	98.9	100	99	98.7
Large 2 Axle Vehicles	0	0	2	2	0	25	1	26	0	0	2	2	0	17	0	17	47
% Large 2 Axle Vehicles	0	0	4.3	4.3	0	1.4	2.5	1.4	0	0	2.3	1.8	0	1.1	0	1	1.3
3 Axle Vehicles	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	2
% 3 Axle Vehicles	0	0	0	0	0	0.1	0	0.1	0	0	1.1	0.9	0	0	0	0	0.1
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Orange Avenue Southbound				Birch Street Westbound				Orange Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	0	0	6	6	3	204	5	212	3	0	5	8	0	207	8	215	441
01:15 PM	0	0	**7**	**7**	6	227	5	238	1	**1**	10	12	**1**	185	12	198	455
01:30 PM	0	0	7	7	**8**	**270**	**8**	**286**	**5**	0	20	25	0	**217**	**14**	**231**	**549**
01:45 PM	0	0	1	1	6	237	2	245	5	0	**32**	**37**	1	205	2	208	491
Total Volume	0	0	21	21	23	938	20	981	14	1	67	82	2	814	36	852	1936
% App. Total	0	0	100		2.3	95.6	2		17.1	1.2	81.7		0.2	95.5	4.2		
PHF	.000	.000	.750	.750	.719	.869	.625	.858	.700	.250	.523	.554	.500	.938	.643	.922	.882

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City of Brea
N/S: Orange Avenue
E/W: Birch Street
Weather: Clear

File Name : 02A_BRE_Ora_Birch MD
Site Code : 221110
Start Date : 12/21/2022
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:45 PM				01:00 PM				01:00 PM				12:45 PM			
+0 mins.	0	0	**8**	**8**	3	204	5	212	3	0	5	8	**2**	203	12	217
+15 mins.	0	0	6	6	6	227	5	238	1	**1**	10	12	0	207	8	215
+30 mins.	0	0	7	7	**8**	**270**	**8**	**286**	**5**	0	20	25	1	185	12	198
+45 mins.	0	0	7	7	6	237	2	245	5	0	**32**	**37**	0	**217**	**14**	**231**
Total Volume	0	0	28	28	23	938	20	981	14	1	67	82	3	812	46	861
% App. Total	0	0	100		2.3	95.6	2		17.1	1.2	81.7		0.3	94.3	5.3	
PHF	.000	.000	.875	.875	.719	.869	.625	.858	.700	.250	.523	.554	.375	.935	.821	.932

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City of Brea
N/S: Orange Avenue
E/W: Birch Street
Weather: Clear

File Name : 02A_BRE_Ora_Birch PM
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

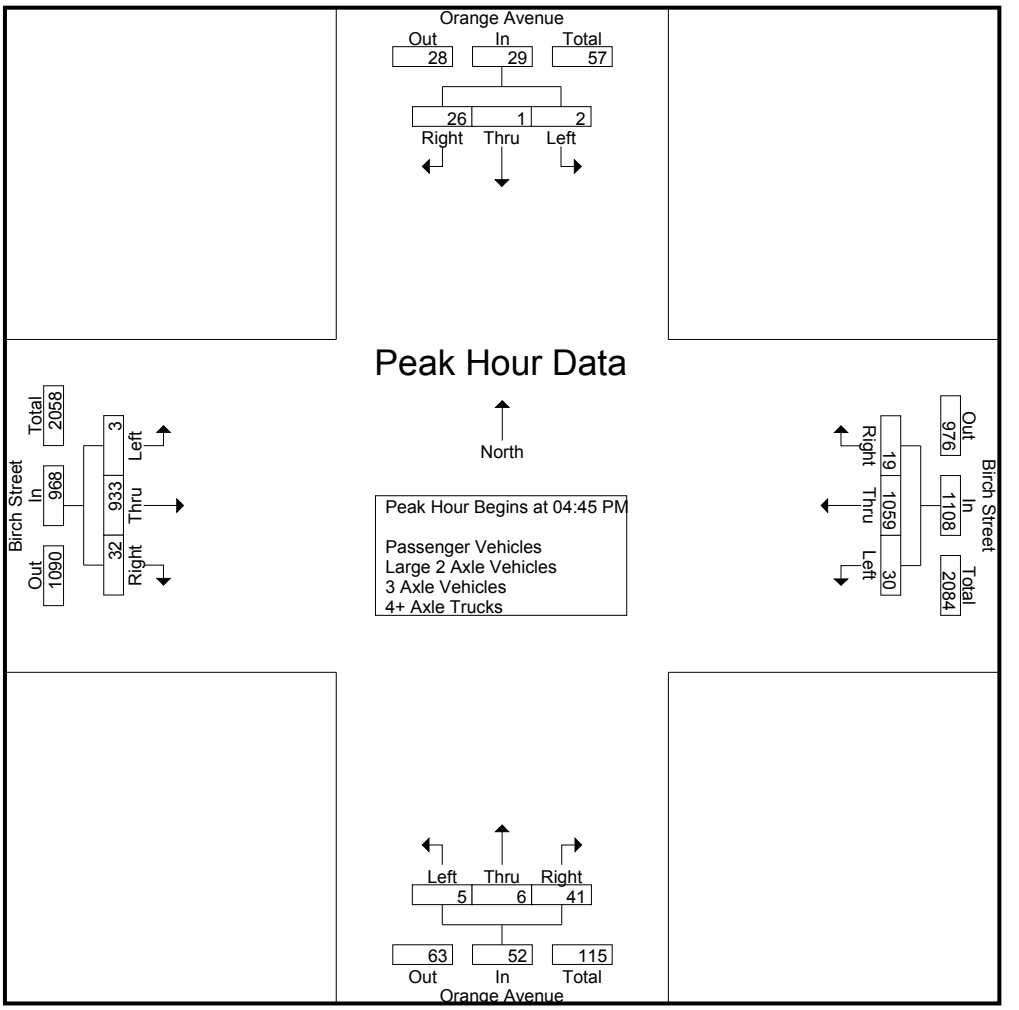
	Orange Avenue Southbound				Birch Street Westbound				Orange Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	7	7	8	257	5	270	0	0	10	10	1	257	7	265	552
04:15 PM	0	0	5	5	8	257	5	270	2	0	12	14	0	241	7	248	537
04:30 PM	0	0	12	12	6	248	4	258	1	0	12	13	1	231	8	240	523
04:45 PM	0	0	4	4	3	263	2	268	2	1	7	10	1	235	8	244	526
Total	0	0	28	28	25	1025	16	1066	5	1	41	47	3	964	30	997	2138
05:00 PM	1	0	8	9	11	252	6	269	2	2	6	10	1	224	6	231	519
05:15 PM	0	0	5	5	4	262	5	271	0	3	14	17	1	220	10	231	524
05:30 PM	1	1	9	11	12	282	6	300	1	0	14	15	0	254	8	262	588
05:45 PM	0	0	6	6	16	242	3	261	4	0	7	11	1	228	9	238	516
Total	2	1	28	31	43	1038	20	1101	7	5	41	53	3	926	33	962	2147
Grand Total	2	1	56	59	68	2063	36	2167	12	6	82	100	6	1890	63	1959	4285
Apprch %	3.4	1.7	94.9		3.1	95.2	1.7		12	6	82		0.3	96.5	3.2		
Total %	0	0	1.3	1.4	1.6	48.1	0.8	50.6	0.3	0.1	1.9	2.3	0.1	44.1	1.5	45.7	
Passenger Vehicles	2	1	56	59	68	2047	34	2149	12	6	82	100	6	1874	63	1943	4251
% Passenger Vehicles	100	100	100	100	100	99.2	94.4	99.2	100	100	100	100	100	99.2	100	99.2	99.2
Large 2 Axle Vehicles	0	0	0	0	0	15	2	17	0	0	0	0	0	15	0	15	32
% Large 2 Axle Vehicles	0	0	0	0	0	0.7	5.6	0.8	0	0	0	0	0	0.8	0	0.8	0.7
3 Axle Vehicles	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0.1	0

	Orange Avenue Southbound				Birch Street Westbound				Orange Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	4	4	3	263	2	268	**2**	1	7	10	**1**	235	8	244	526
05:00 PM	**1**	0	8	9	11	252	**6**	269	2	2	6	10	1	224	6	231	519
05:15 PM	0	0	5	5	4	262	5	271	0	**3**	**14**	**17**	1	220	**10**	231	524
05:30 PM	1	**1**	**9**	**11**	**12**	**282**	6	**300**	1	0	14	15	0	**254**	8	**262**	**588**
Total Volume	2	1	26	29	30	1059	19	1108	5	6	41	52	3	933	32	968	2157
% App. Total	6.9	3.4	89.7		2.7	95.6	1.7		9.6	11.5	78.8		0.3	96.4	3.3		
PHF	.500	.250	.722	.659	.625	.939	.792	.923	.625	.500	.732	.765	.750	.918	.800	.924	.917

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City of Brea
N/S: Orange Avenue
E/W: Birch Street
Weather: Clear

File Name : 02A_BRE_Ora_Birch PM
Site Code : 221110
Start Date : 12/21/2022



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:45 PM				05:00 PM				04:00 PM			
+0 mins.	**1**	0	8	9	3	263	2	268	2	2	6	10	**1**	**257**	7	**265**
+15 mins.	0	0	5	5	11	252	**6**	269	0	**3**	**14**	**17**	0	241	7	248
+30 mins.	1	**1**	**9**	**11**	4	262	5	271	1	0	14	15	1	231	**8**	240
+45 mins.	0	0	6	6	**12**	**282**	6	**300**	**4**	0	7	11	1	235	8	244
Total Volume	2	1	28	31	30	1059	19	1108	7	5	41	53	3	964	30	997
% App. Total	6.5	3.2	90.3		2.7	95.6	1.7		13.2	9.4	77.4		0.3	96.7	3	
PHF	.500	.250	.778	.705	.625	.939	.792	.923	.438	.417	.732	.779	.750	.938	.938	.941

Location: Brea
N/S: Orange Avenue
E/W: Birch Street

Date: 12/21/2022
Day: Wednesday

PEDESTRIANS

	North Leg Orange Avenue	East Leg Birch Street	South Leg Orange Avenue	West Leg Birch Street	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	1	0	0	0	1
7:45 AM	1	0	2	0	3
8:00 AM	1	0	0	0	1
8:15 AM	0	0	0	0	0
8:30 AM	2	0	1	0	3
8:45 AM	2	0	0	0	2
TOTAL VOLUMES:	7	0	3	0	10

	North Leg Orange Avenue	East Leg Birch Street	South Leg Orange Avenue	West Leg Birch Street	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
12:00 PM	1	0	1	0	2
12:15 PM	2	0	0	0	2
12:30 PM	2	0	1	0	3
12:45 PM	1	0	0	0	1
1:00 PM	0	0	1	0	1
1:15 PM	0	0	2	0	2
1:30 PM	1	0	3	0	4
1:45 PM	2	0	3	0	5
TOTAL VOLUMES:	9	0	11	0	20

	North Leg Orange Avenue	East Leg Birch Street	South Leg Orange Avenue	West Leg Birch Street	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	1	0	4	0	5
4:15 PM	3	0	1	0	4
4:30 PM	1	0	2	0	3
4:45 PM	3	0	1	1	5
5:00 PM	2	0	1	0	3
5:15 PM	1	0	0	0	1
5:30 PM	0	0	0	0	0
5:45 PM	0	0	1	0	1
TOTAL VOLUMES:	11	0	10	1	22

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Location: Brea
N/S: Orange Avenue
E/W: Birch Street

Date: 12/21/2022
Day: Wednesday

BICYCLES

	Southbound Orange Avenue			Westbound Birch Street			Northbound Orange Avenue			Eastbound Birch Street			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	2	0	2
8:00 AM	0	1	0	0	1	0	0	0	0	0	0	0	2
8:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	1	0	0	2	0	0	1	0	0	2	0	6

	Southbound Orange Avenue			Westbound Birch Street			Northbound Orange Avenue			Eastbound Birch Street			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
12:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	1	0	0	0	1
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	2	0	0	0	1	0	0	0	3

	Southbound Orange Avenue			Westbound Birch Street			Northbound Orange Avenue			Eastbound Birch Street			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	3	0	0	0	0	0	0	0	3

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 03_BRE_Org_DW1 AM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

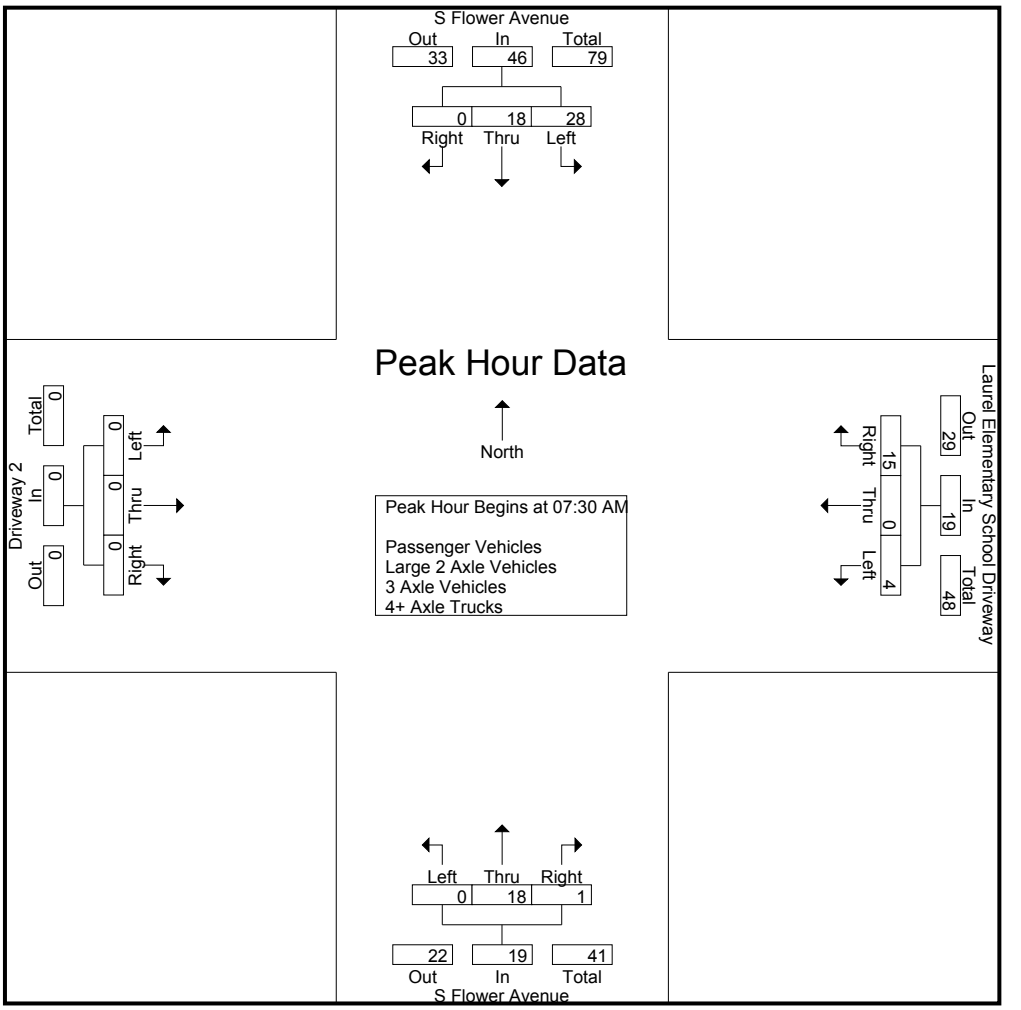
	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	2	1	0	3	0	0	0	0	0	3	0	3	0	0	0	0	6
07:15 AM	1	6	0	7	0	0	0	0	0	1	0	1	0	0	0	0	8
07:30 AM	7	3	0	10	0	0	1	1	0	1	1	2	0	0	0	0	13
07:45 AM	16	6	0	22	1	0	6	7	0	8	0	8	0	0	0	0	37
Total	26	16	0	42	1	0	7	8	0	13	1	14	0	0	0	0	64
08:00 AM	3	2	0	5	3	0	6	9	0	5	0	5	0	0	0	0	19
08:15 AM	2	7	0	9	0	0	2	2	0	4	0	4	0	0	0	0	15
08:30 AM	1	1	0	2	0	0	1	1	0	4	0	4	0	0	0	0	7
08:45 AM	4	2	0	6	0	0	2	2	0	1	0	1	0	0	0	0	9
Total	10	12	0	22	3	0	11	14	0	14	0	14	0	0	0	0	50
Grand Total	36	28	0	64	4	0	18	22	0	27	1	28	0	0	0	0	114
Apprch %	56.2	43.8	0		18.2	0	81.8		0	96.4	3.6		0	0	0		
Total %	31.6	24.6	0	56.1	3.5	0	15.8	19.3	0	23.7	0.9	24.6	0	0	0	0	
Passenger Vehicles	36	28	0	64	4	0	18	22	0	27	1	28	0	0	0	0	114
% Passenger Vehicles	100	100	0	100	100	0	100	100	0	100	100	100	0	0	0	0	100
Large 2 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Large 2 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	7	3	0	10	0	0	1	1	0	1	**1**	2	0	0	0	0	13
07:45 AM	**16**	6	0	**22**	1	0	**6**	7	0	**8**	0	**8**	0	0	0	0	**37**
08:00 AM	3	2	0	5	**3**	0	6	**9**	0	5	0	5	0	0	0	0	19
08:15 AM	2	**7**	0	9	0	0	2	2	0	4	0	4	0	0	0	0	15
Total Volume	28	18	0	46	4	0	15	19	0	18	1	19	0	0	0	0	84
% App. Total	60.9	39.1	0		21.1	0	78.9		0	94.7	5.3		0	0	0		
PHF	.438	.643	.000	.523	.333	.000	.625	.528	.000	.563	.250	.594	.000	.000	.000	.000	.568

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 03_BRE_Org_DW1 AM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:45 AM				07:00 AM			
+0 mins.	7	3	0	10	0	0	1	1	0	**8**	0	**8**	0	0	0	0
+15 mins.	**16**	6	0	**22**	1	0	**6**	7	0	5	0	5	0	0	0	0
+30 mins.	3	2	0	5	**3**	0	6	**9**	0	4	0	4	0	0	0	0
+45 mins.	2	**7**	0	9	0	0	2	2	0	4	0	4	0	0	0	0
Total Volume	28	18	0	46	4	0	15	19	0	21	0	21	0	0	0	0
% App. Total	60.9	39.1	0		21.1	0	78.9		0	100	0		0	0	0	
PHF	.438	.643	.000	.523	.333	.000	.625	.528	.000	.656	.000	.656	.000	.000	.000	.000

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City of Brea
N/S: S Orange Avenue
E/W: Driveway 1
Weather: Clear

File Name : 03_BRE_Org_DW1 MD 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

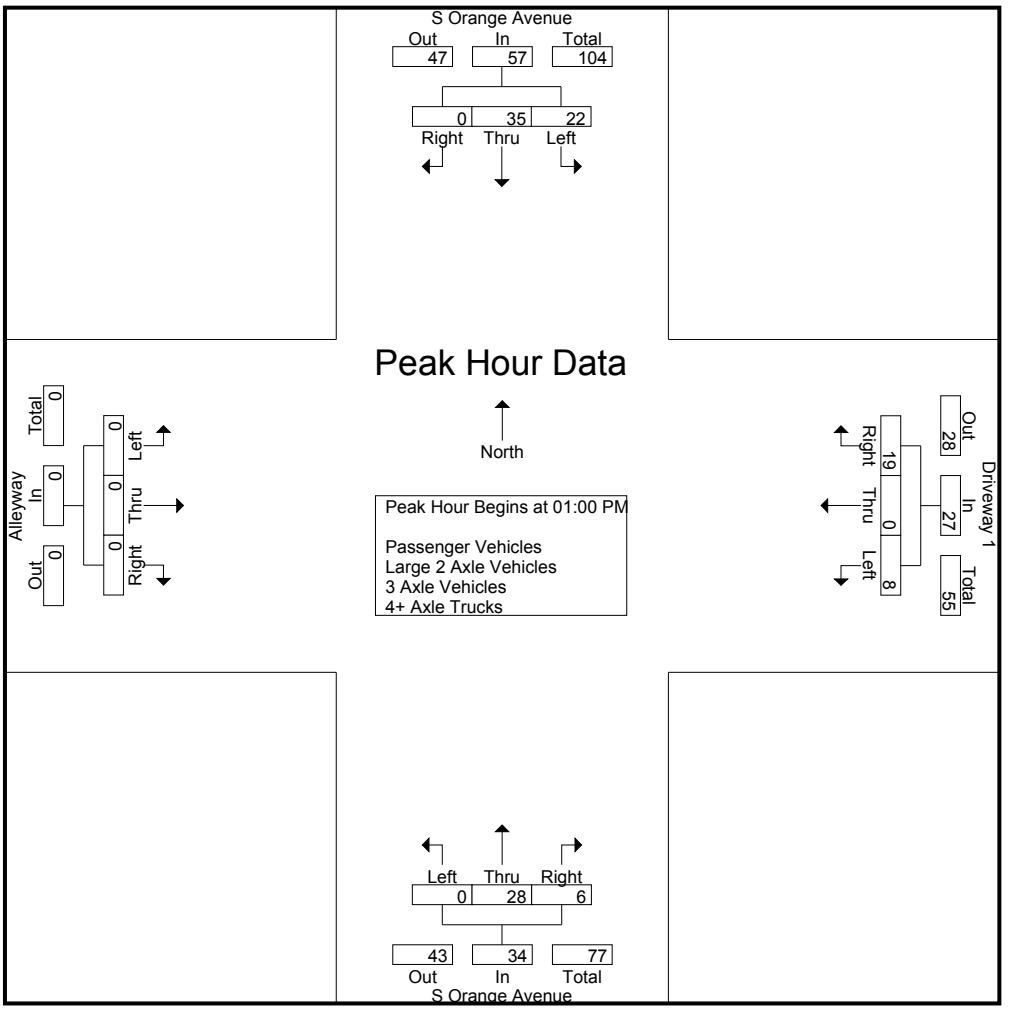
	S Orange Avenue Southbound				Driveway 1 Westbound				S Orange Avenue Northbound				Alleyway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
01:00 PM	4	7	0	11	0	0	1	1	0	7	2	9	0	0	0	0	21
01:15 PM	13	11	0	24	1	0	2	3	0	4	2	6	0	0	0	0	33
01:30 PM	0	12	0	12	6	0	15	21	0	10	2	12	0	0	0	0	45
01:45 PM	5	5	0	10	1	0	1	2	0	7	0	7	0	0	0	0	19
Total	22	35	0	57	8	0	19	27	0	28	6	34	0	0	0	0	118
02:00 PM	2	6	0	8	1	0	1	2	0	2	1	3	0	0	0	0	13
02:15 PM	1	5	0	6	0	0	4	4	0	5	0	5	0	0	0	0	15
02:30 PM	0	7	0	7	3	0	2	5	0	1	0	1	0	0	0	0	13
02:45 PM	1	3	0	4	0	0	2	2	0	2	0	2	0	0	0	0	8
Total	4	21	0	25	4	0	9	13	0	10	1	11	0	0	0	0	49
Grand Total	26	56	0	82	12	0	28	40	0	38	7	45	0	0	0	0	167
Apprch %	31.7	68.3	0		30	0	70		0	84.4	15.6		0	0	0		
Total %	15.6	33.5	0	49.1	7.2	0	16.8	24	0	22.8	4.2	26.9	0	0	0	0	
Passenger Vehicles	26	56	0	82	12	0	28	40	0	35	7	42	0	0	0	0	164
% Passenger Vehicles	100	100	0	100	100	0	100	100	0	92.1	100	93.3	0	0	0	0	98.2
Large 2 Axle Vehicles	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	3
% Large 2 Axle Vehicles	0	0	0	0	0	0	0	0	0	7.9	0	6.7	0	0	0	0	1.8
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	S Orange Avenue Southbound				Driveway 1 Westbound				S Orange Avenue Northbound				Alleyway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	4	7	0	11	0	0	1	1	0	7	**2**	9	0	0	0	0	21
01:15 PM	**13**	11	0	**24**	1	0	2	3	0	4	2	6	0	0	0	0	33
01:30 PM	0	**12**	0	12	**6**	0	**15**	**21**	0	**10**	2	**12**	0	0	0	0	**45**
01:45 PM	5	5	0	10	1	0	1	2	0	7	0	7	0	0	0	0	19
Total Volume	22	35	0	57	8	0	19	27	0	28	6	34	0	0	0	0	118
% App. Total	38.6	61.4	0		29.6	0	70.4		0	82.4	17.6		0	0	0		
PHF	.423	.729	.000	.594	.333	.000	.317	.321	.000	.700	.750	.708	.000	.000	.000	.000	.656

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City of Brea
N/S: S Orange Avenue
E/W: Driveway 1
Weather: Clear

File Name : 03_BRE_Org_DW1 MD 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 2



Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	01:00 PM				01:30 PM				01:00 PM				01:00 PM			
+0 mins.	4	7	0	11	**6**	0	**15**	**21**	0	7	**2**	9	0	0	0	0
+15 mins.	**13**	11	0	**24**	1	0	1	2	0	4	2	6	0	0	0	0
+30 mins.	0	**12**	0	12	1	0	1	2	0	**10**	2	**12**	0	0	0	0
+45 mins.	5	5	0	10	0	0	4	4	0	7	0	7	0	0	0	0
Total Volume	22	35	0	57	8	0	21	29	0	28	6	34	0	0	0	0
% App. Total	38.6	61.4	0		27.6	0	72.4		0	82.4	17.6		0	0	0	
PHF	.423	.729	.000	.594	.333	.000	.350	.345	.000	.700	.750	.708	.000	.000	.000	.000

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City of Brea
N/S: S Orange Avenue
E/W: Driveway 1
Weather: Clear

File Name : 03_BRE_Org_DW1 PM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

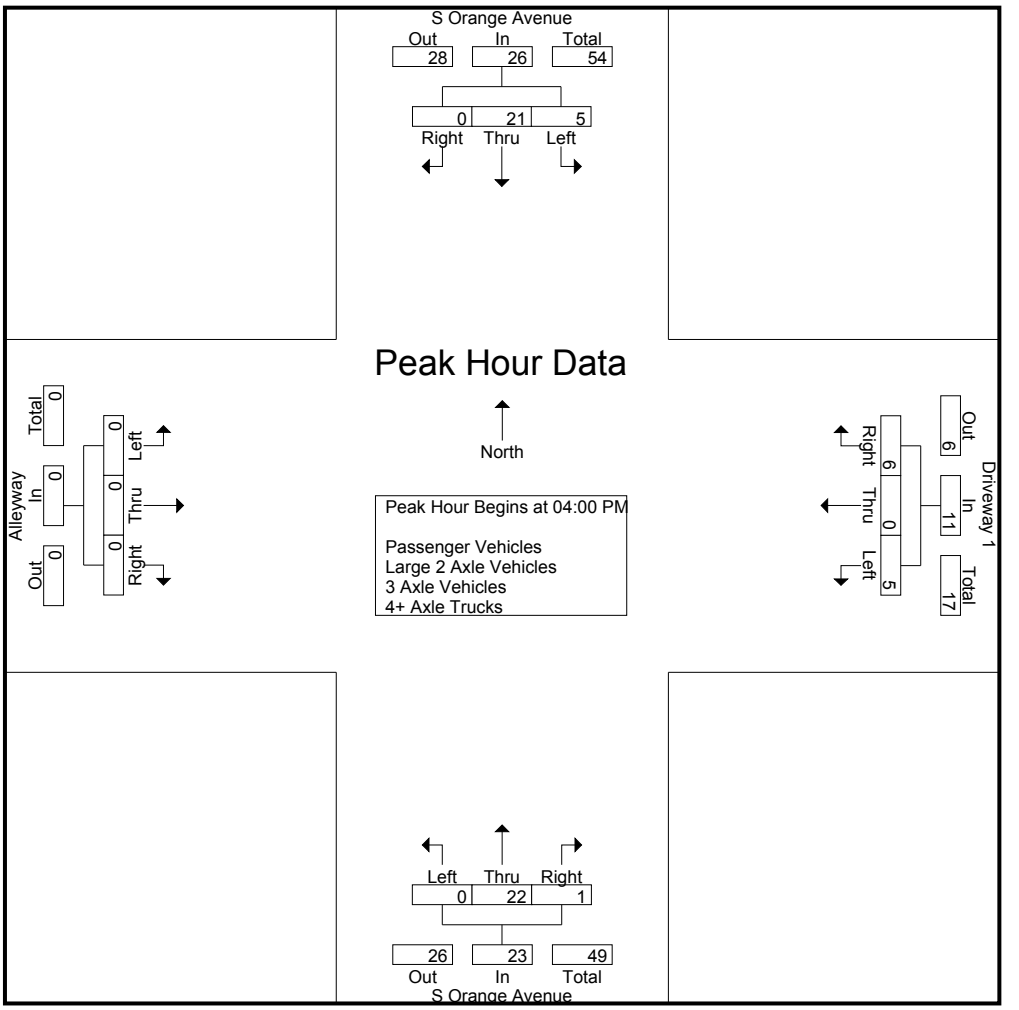
	S Orange Avenue Southbound				Driveway 1 Westbound				S Orange Avenue Northbound				Alleyway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	1	4	0	5	1	0	2	3	0	3	0	3	0	0	0	0	11
04:15 PM	1	4	0	5	2	0	2	4	0	5	0	5	0	0	0	0	14
04:30 PM	2	7	0	9	1	0	1	2	0	3	0	3	0	0	0	0	14
04:45 PM	1	6	0	7	1	0	1	2	0	11	1	12	0	0	0	0	21
Total	5	21	0	26	5	0	6	11	0	22	1	23	0	0	0	0	60
05:00 PM	0	1	0	1	0	0	0	0	0	4	0	4	0	0	0	0	5
05:15 PM	1	7	0	8	0	0	0	0	0	3	0	3	0	0	0	0	11
05:30 PM	1	5	0	6	0	0	2	2	0	6	0	6	0	0	0	0	14
05:45 PM	1	6	0	7	1	0	2	3	0	5	0	5	0	0	0	0	15
Total	3	19	0	22	1	0	4	5	0	18	0	18	0	0	0	0	45
Grand Total	8	40	0	48	6	0	10	16	0	40	1	41	0	0	0	0	105
Apprch %	16.7	83.3	0		37.5	0	62.5		0	97.6	2.4		0	0	0		
Total %	7.6	38.1	0	45.7	5.7	0	9.5	15.2	0	38.1	1	39	0	0	0	0	
Passenger Vehicles	8	40	0	48	6	0	10	16	0	40	1	41	0	0	0	0	105
% Passenger Vehicles	100	100	0	100	100	0	100	100	0	100	100	100	0	0	0	0	100
Large 2 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Large 2 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	S Orange Avenue Southbound				Driveway 1 Westbound				S Orange Avenue Northbound				Alleyway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	1	4	0	5	1	0	**2**	3	0	3	0	3	0	0	0	0	11
04:15 PM	1	4	0	5	**2**	0	2	**4**	0	5	0	5	0	0	0	0	14
04:30 PM	**2**	**7**	0	**9**	1	0	1	2	0	3	0	3	0	0	0	0	14
04:45 PM	1	6	0	7	1	0	1	2	0	**11**	**1**	**12**	0	0	0	0	**21**
Total Volume	5	21	0	26	5	0	6	11	0	22	1	23	0	0	0	0	60
% App. Total	19.2	80.8	0		45.5	0	54.5		0	95.7	4.3		0	0	0		
PHF	.625	.750	.000	.722	.625	.000	.750	.688	.000	.500	.250	.479	.000	.000	.000	.000	.714

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City of Brea
N/S: S Orange Avenue
E/W: Driveway 1
Weather: Clear

File Name : 03_BRE_Org_DW1 PM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:45 PM				04:00 PM			
+0 mins.	1	4	0	5	1	0	**2**	3	0	**11**	**1**	**12**	0	0	0	0
+15 mins.	1	4	0	5	**2**	0	2	**4**	0	4	0	4	0	0	0	0
+30 mins.	**2**	**7**	0	**9**	1	0	1	2	0	3	0	3	0	0	0	0
+45 mins.	1	6	0	7	1	0	1	2	0	6	0	6	0	0	0	0
Total Volume	5	21	0	26	5	0	6	11	0	24	1	25	0	0	0	0
% App. Total	19.2	80.8	0		45.5	0	54.5		0	96	4		0	0	0	
PHF	.625	.750	.000	.722	.625	.000	.750	.688	.000	.545	.250	.521	.000	.000	.000	.000

Location: Brea
N/S: S Orange Avenue
E/W: Driveway 1

Date: 9/21/2022
Day: Wednesday

PEDESTRIANS

	North Leg S Orange Avenue Pedestrians	East Leg Driveway 1 Pedestrians	South Leg S Orange Avenue Pedestrians	West Leg Alleyway Pedestrians	
7:00 AM	0	1	0	0	1
7:15 AM	0	0	0	0	0
7:30 AM	1	0	2	0	3
7:45 AM	1	1	4	0	6
8:00 AM	4	2	1	0	7
8:15 AM	1	1	1	0	3
8:30 AM	0	1	0	0	1
8:45 AM	1	1	0	0	2
TOTAL VOLUMES:	8	7	8	0	23

	North Leg S Orange Avenue Pedestrians	East Leg Driveway 1 Pedestrians	South Leg S Orange Avenue Pedestrians	West Leg Alleyway Pedestrians	
1:00 PM	0	0	1	0	1
1:15 PM	3	1	0	0	4
1:30 PM	0	0	6	0	6
1:45 PM	0	0	0	0	0
2:00 PM	0	0	0	0	0
2:15 PM	1	0	0	0	1
2:30 PM	1	1	0	0	2
2:45 PM	0	0	0	0	0
TOTAL VOLUMES:	5	2	7	0	14

	North Leg S Orange Avenue Pedestrians	East Leg Driveway 1 Pedestrians	South Leg S Orange Avenue Pedestrians	West Leg Alleyway Pedestrians	
4:00 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

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Location: Brea
N/S: S Orange Avenue
E/W: Driveway 1

Date: 9/21/2022
Day: Wednesday

BICYCLES

	Southbound S Orange Avenue			Westbound Driveway 1			Northbound S Orange Avenue			Eastbound Alleyway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	0	0	0	0	0

	Southbound S Orange Avenue			Westbound Driveway 1			Northbound S Orange Avenue			Eastbound Alleyway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	1	0	0	0	1
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	1	0	0	0	1

	Southbound S Orange Avenue			Westbound Driveway 1			Northbound S Orange Avenue			Eastbound Alleyway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	0	0	0	0	0

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City of Brea
N/S: Orange Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 01_BRE_Ora_Imp AM
Site Code : 221110
Start Date : 12/8/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

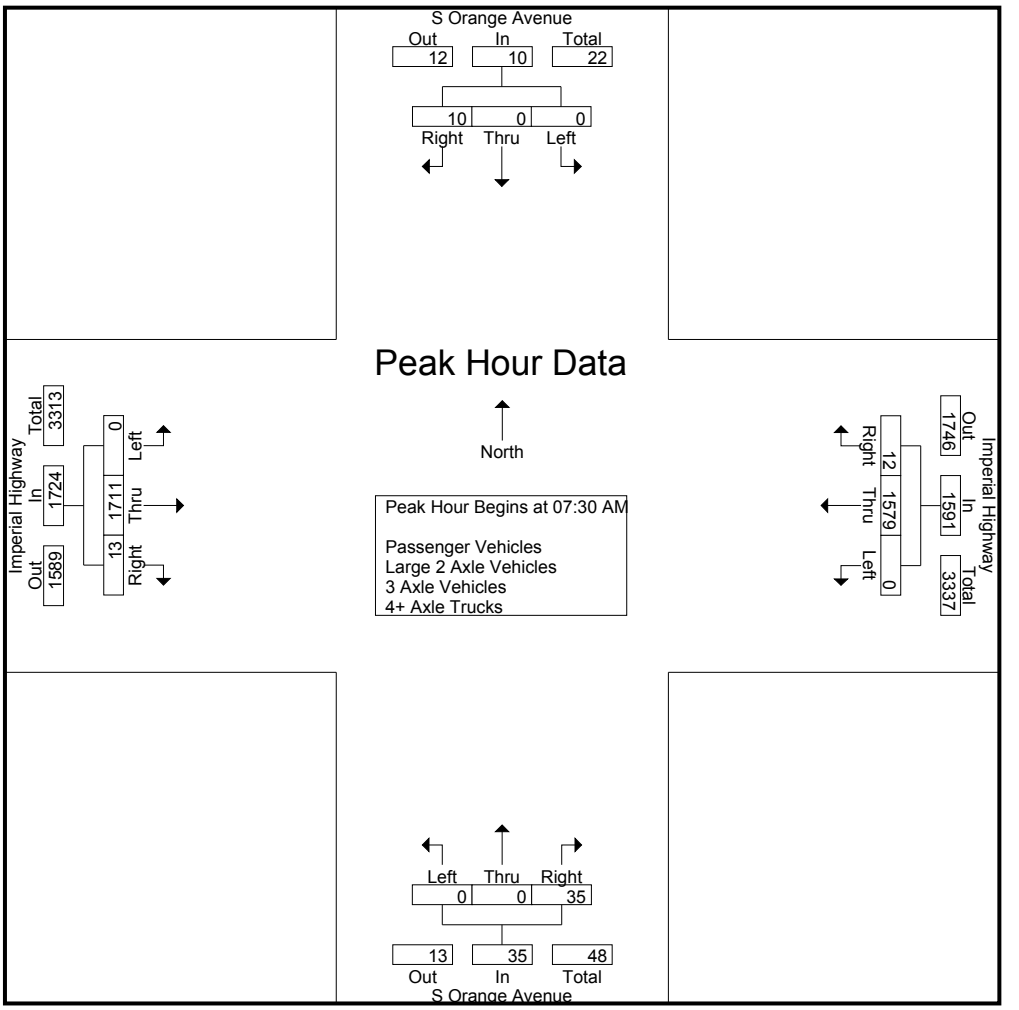
	S Orange Avenue Southbound				Imperial Highway Westbound				S Orange Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	0	0	0	292	1	293	0	0	6	6	0	347	1	348	647
07:15 AM	0	0	5	5	0	332	1	333	0	0	8	8	0	430	0	430	776
07:30 AM	0	0	3	3	0	365	3	368	0	0	6	6	0	435	3	438	815
07:45 AM	0	0	5	5	0	446	3	449	0	0	12	12	0	399	5	404	870
Total	0	0	13	13	0	1435	8	1443	0	0	32	32	0	1611	9	1620	3108
08:00 AM	0	0	1	1	0	420	4	424	0	0	11	11	0	429	4	433	869
08:15 AM	0	0	1	1	0	348	2	350	0	0	6	6	0	448	1	449	806
08:30 AM	0	0	1	1	0	375	2	377	0	0	5	5	0	354	1	355	738
08:45 AM	0	0	4	4	0	332	3	335	0	0	4	4	0	403	0	403	746
Total	0	0	7	7	0	1475	11	1486	0	0	26	26	0	1634	6	1640	3159
Grand Total	0	0	20	20	0	2910	19	2929	0	0	58	58	0	3245	15	3260	6267
Apprch %	0	0	100		0	99.4	0.6		0	0	100		0	99.5	0.5		
Total %	0	0	0.3	0.3	0	46.4	0.3	46.7	0	0	0.9	0.9	0	51.8	0.2	52	
Passenger Vehicles	0	0	20	20	0	2750	17	2767	0	0	57	57	0	3077	14	3091	5935
% Passenger Vehicles	0	0	100	100	0	94.5	89.5	94.5	0	0	98.3	98.3	0	94.8	93.3	94.8	94.7
Large 2 Axle Vehicles	0	0	0	0	0	70	1	71	0	0	1	1	0	84	1	85	157
% Large 2 Axle Vehicles	0	0	0	0	0	2.4	5.3	2.4	0	0	1.7	1.7	0	2.6	6.7	2.6	2.5
3 Axle Vehicles	0	0	0	0	0	14	1	15	0	0	0	0	0	32	0	32	47
% 3 Axle Vehicles	0	0	0	0	0	0.5	5.3	0.5	0	0	0	0	0	1	0	1	0.7
4+ Axle Trucks	0	0	0	0	0	76	0	76	0	0	0	0	0	52	0	52	128
% 4+ Axle Trucks	0	0	0	0	0	2.6	0	2.6	0	0	0	0	0	1.6	0	1.6	2

	S Orange Avenue Southbound				Imperial Highway Westbound				S Orange Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	3	3	0	365	3	368	0	0	6	6	0	435	3	438	815
07:45 AM	0	0	**5**	**5**	0	**446**	3	**449**	0	0	**12**	**12**	0	399	**5**	404	**870**
08:00 AM	0	0	1	1	0	420	**4**	424	0	0	11	11	0	429	4	433	869
08:15 AM	0	0	1	1	0	348	2	350	0	0	6	6	0	**448**	1	**449**	806
Total Volume	0	0	10	10	0	1579	12	1591	0	0	35	35	0	1711	13	1724	3360
% App. Total	0	0	100		0	99.2	0.8		0	0	100		0	99.2	0.8		
PHF	.000	.000	.500	.500	.000	.885	.750	.886	.000	.000	.729	.729	.000	.955	.650	.960	.966

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City of Brea
N/S: Orange Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 01_BRE_Ora_Imp AM
Site Code : 221110
Start Date : 12/8/2022
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				07:45 AM				07:15 AM				07:30 AM			
+0 mins.	0	0	**5**	**5**	0	**446**	3	**449**	0	0	8	8	0	435	3	438
+15 mins.	0	0	3	3	0	420	**4**	424	0	0	6	6	0	399	**5**	404
+30 mins.	0	0	5	5	0	348	2	350	0	0	**12**	**12**	0	429	4	433
+45 mins.	0	0	1	1	0	375	2	377	0	0	11	11	0	**448**	1	**449**
Total Volume	0	0	14	14	0	1589	11	1600	0	0	37	37	0	1711	13	1724
% App. Total	0	0	100		0	99.3	0.7		0	0	100		0	99.2	0.8	
PHF	.000	.000	.700	.700	.000	.891	.688	.891	.000	.000	.771	.771	.000	.955	.650	.960

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City of Brea
N/S: S Orange Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 01_BRE_Ora_Imp MD
Site Code : 221110
Start Date : 12/8/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

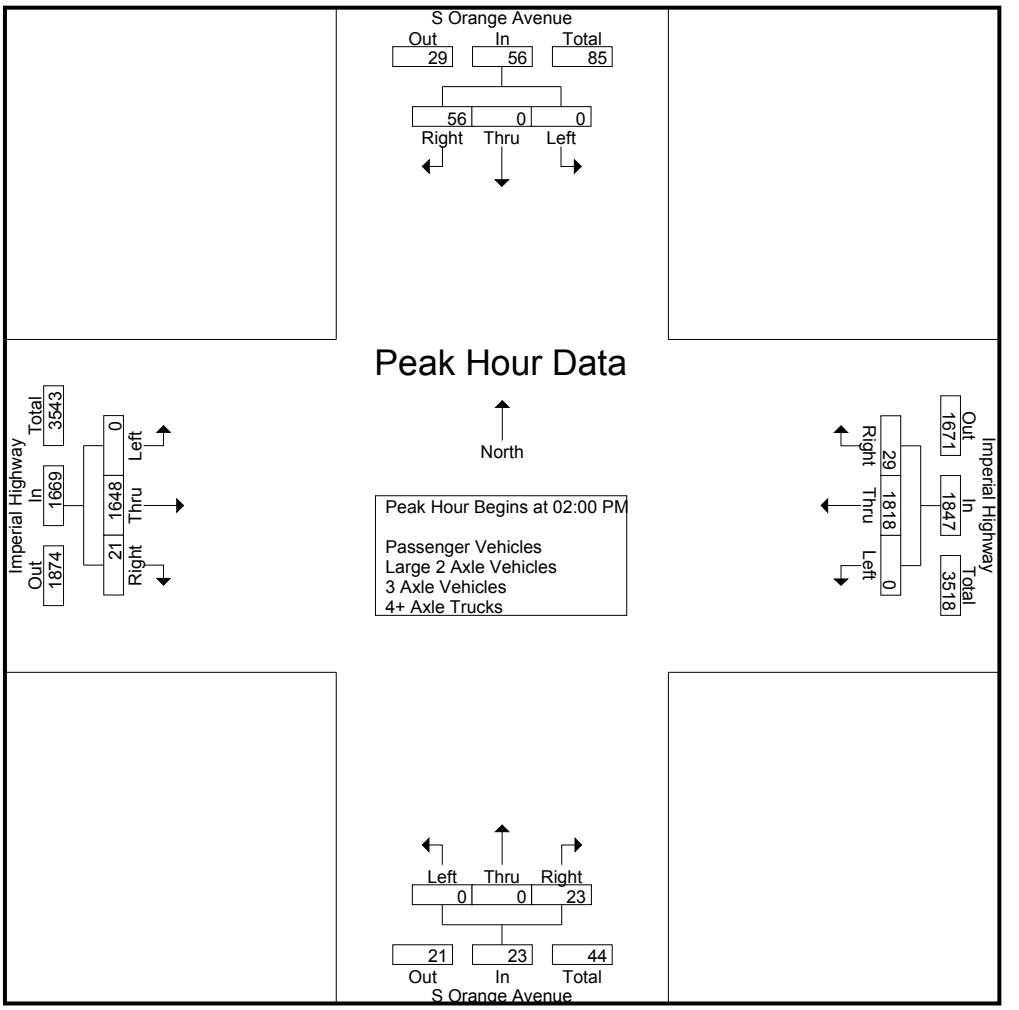
	S Orange Avenue Southbound				Imperial Highway Westbound				S Orange Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
01:00 PM	0	0	10	10	0	398	3	401	0	0	13	13	0	361	2	363	787
01:15 PM	0	0	10	10	0	378	6	384	0	0	0	0	0	406	1	407	801
01:30 PM	0	0	13	13	0	400	3	403	0	0	6	6	0	439	3	442	864
01:45 PM	0	0	7	7	0	377	7	384	0	0	4	4	0	396	4	400	795
Total	0	0	40	40	0	1553	19	1572	0	0	23	23	0	1602	10	1612	3247
02:00 PM	0	0	15	15	0	393	11	404	0	0	6	6	0	380	3	383	808
02:15 PM	0	0	21	21	0	472	8	480	0	0	2	2	0	394	8	402	905
02:30 PM	0	0	14	14	0	530	7	537	0	0	7	7	0	479	4	483	1041
02:45 PM	0	0	6	6	0	423	3	426	0	0	8	8	0	395	6	401	841
Total	0	0	56	56	0	1818	29	1847	0	0	23	23	0	1648	21	1669	3595
Grand Total	0	0	96	96	0	3371	48	3419	0	0	46	46	0	3250	31	3281	6842
Apprch %	0	0	100		0	98.6	1.4		0	0	100		0	99.1	0.9		
Total %	0	0	1.4	1.4	0	49.3	0.7	50	0	0	0.7	0.7	0	47.5	0.5	48	
Passenger Vehicles	0	0	96	96	0	3181	48	3229	0	0	45	45	0	3116	30	3146	6516
% Passenger Vehicles	0	0	100	100	0	94.4	100	94.4	0	0	97.8	97.8	0	95.9	96.8	95.9	95.2
Large 2 Axle Vehicles	0	0	0	0	0	105	0	105	0	0	1	1	0	72	1	73	179
% Large 2 Axle Vehicles	0	0	0	0	0	3.1	0	3.1	0	0	2.2	2.2	0	2.2	3.2	2.2	2.6
3 Axle Vehicles	0	0	0	0	0	30	0	30	0	0	0	0	0	16	0	16	46
% 3 Axle Vehicles	0	0	0	0	0	0.9	0	0.9	0	0	0	0	0	0.5	0	0.5	0.7
4+ Axle Trucks	0	0	0	0	0	55	0	55	0	0	0	0	0	46	0	46	101
% 4+ Axle Trucks	0	0	0	0	0	1.6	0	1.6	0	0	0	0	0	1.4	0	1.4	1.5

	S Orange Avenue Southbound				Imperial Highway Westbound				S Orange Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:00 PM																	
02:00 PM	0	0	15	15	0	393	**11**	404	0	0	6	6	0	380	3	383	808
02:15 PM	0	0	**21**	**21**	0	472	8	480	0	0	2	2	0	394	**8**	402	905
02:30 PM	0	0	14	14	0	**530**	7	**537**	0	0	7	7	0	**479**	4	**483**	**1041**
02:45 PM	0	0	6	6	0	423	3	426	0	0	**8**	**8**	0	395	6	401	841
Total Volume	0	0	56	56	0	1818	29	1847	0	0	23	23	0	1648	21	1669	3595
% App. Total	0	0	100		0	98.4	1.6		0	0	100		0	98.7	1.3		
PHF	.000	.000	.667	.667	.000	.858	.659	.860	.000	.000	.719	.719	.000	.860	.656	.864	.863

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City of Brea
N/S: S Orange Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 01_BRE_Ora_Imp MD
Site Code : 221110
Start Date : 12/8/2022



Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	01:45 PM				02:00 PM				01:00 PM				02:00 PM			
+0 mins.	0	0	7	7	0	393	**11**	404	0	0	**13**	**13**	0	380	3	383
+15 mins.	0	0	15	15	0	472	8	480	0	0	0	0	0	394	**8**	402
+30 mins.	0	0	**21**	**21**	0	**530**	7	**537**	0	0	6	6	0	**479**	4	**483**
+45 mins.	0	0	14	14	0	423	3	426	0	0	4	4	0	395	6	401
Total Volume	0	0	57	57	0	1818	29	1847	0	0	23	23	0	1648	21	1669
% App. Total	0	0	100		0	98.4	1.6		0	0	100		0	98.7	1.3	
PHF	.000	.000	.679	.679	.000	.858	.659	.860	.000	.000	.442	.442	.000	.860	.656	.864

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City of Brea
N/S: S Orange Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 01_BRE_Ora_Imp PM
Site Code : 221110
Start Date : 12/8/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

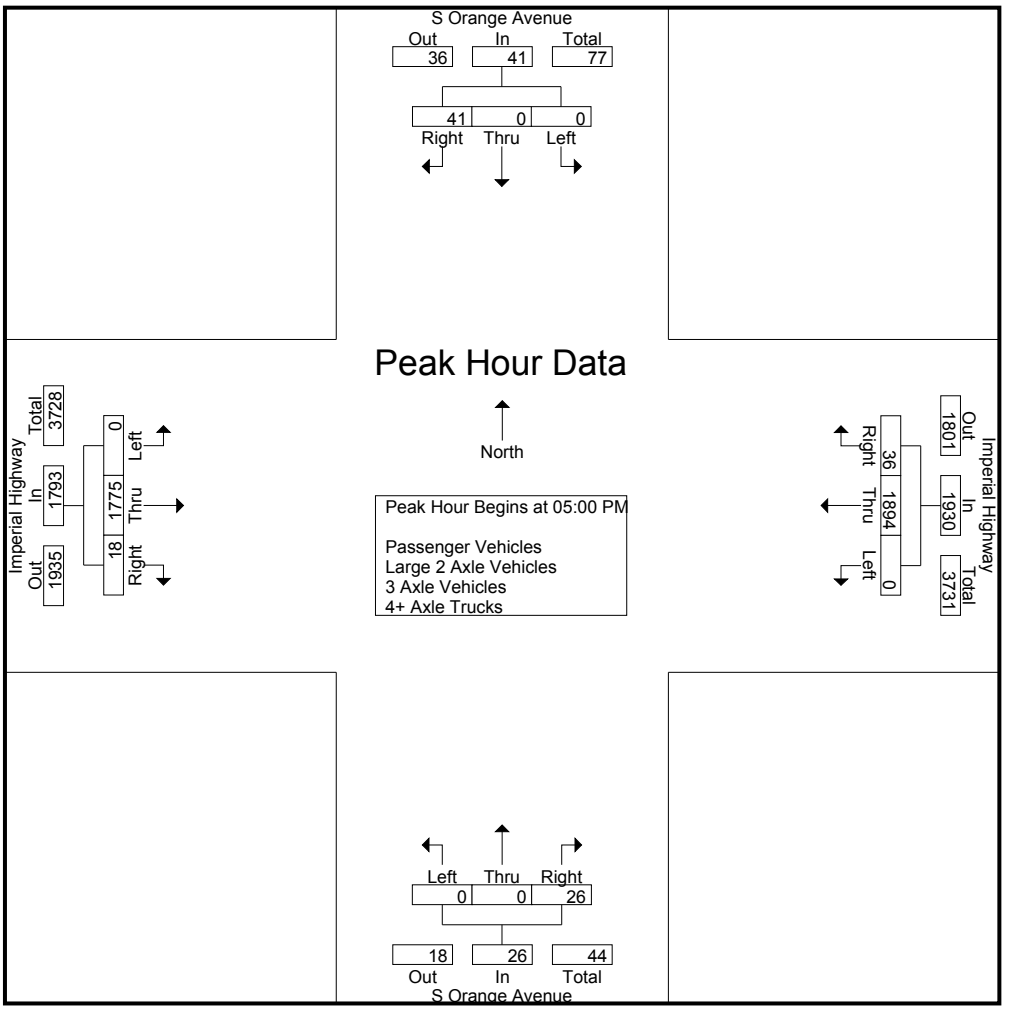
	S Orange Avenue Southbound				Imperial Highway Westbound				S Orange Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	2	2	0	395	7	402	0	0	5	5	0	411	3	414	823
04:15 PM	0	0	8	8	0	437	5	442	0	0	9	9	0	431	5	436	895
04:30 PM	0	0	8	8	0	493	8	501	0	0	3	3	0	459	2	461	973
04:45 PM	0	0	6	6	0	464	10	474	0	0	5	5	0	469	3	472	957
Total	0	0	24	24	0	1789	30	1819	0	0	22	22	0	1770	13	1783	3648
05:00 PM	0	0	8	8	0	458	9	467	0	0	5	5	0	462	3	465	945
05:15 PM	0	0	9	9	0	436	5	441	0	0	9	9	0	422	5	427	886
05:30 PM	0	0	11	11	0	498	11	509	0	0	7	7	0	461	4	465	992
05:45 PM	0	0	13	13	0	502	11	513	0	0	5	5	0	430	6	436	967
Total	0	0	41	41	0	1894	36	1930	0	0	26	26	0	1775	18	1793	3790
Grand Total	0	0	65	65	0	3683	66	3749	0	0	48	48	0	3545	31	3576	7438
Apprch %	0	0	100		0	98.2	1.8		0	0	100		0	99.1	0.9		
Total %	0	0	0.9	0.9	0	49.5	0.9	50.4	0	0	0.6	0.6	0	47.7	0.4	48.1	
Passenger Vehicles	0	0	65	65	0	3595	66	3661	0	0	46	46	0	3476	30	3506	7278
% Passenger Vehicles	0	0	100	100	0	97.6	100	97.7	0	0	95.8	95.8	0	98.1	96.8	98	97.8
Large 2 Axle Vehicles	0	0	0	0	0	56	0	56	0	0	1	1	0	26	1	27	84
% Large 2 Axle Vehicles	0	0	0	0	0	1.5	0	1.5	0	0	2.1	2.1	0	0.7	3.2	0.8	1.1
3 Axle Vehicles	0	0	0	0	0	3	0	3	0	0	1	1	0	11	0	11	15
% 3 Axle Vehicles	0	0	0	0	0	0.1	0	0.1	0	0	2.1	2.1	0	0.3	0	0.3	0.2
4+ Axle Trucks	0	0	0	0	0	29	0	29	0	0	0	0	0	32	0	32	61
% 4+ Axle Trucks	0	0	0	0	0	0.8	0	0.8	0	0	0	0	0	0.9	0	0.9	0.8

	S Orange Avenue Southbound				Imperial Highway Westbound				S Orange Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	8	8	0	458	9	467	0	0	5	5	0	**462**	3	**465**	945
05:15 PM	0	0	9	9	0	436	5	441	0	0	**9**	**9**	0	422	5	427	886
05:30 PM	0	0	11	11	0	498	**11**	509	0	0	7	7	0	461	4	465	**992**
05:45 PM	0	0	**13**	**13**	0	**502**	11	**513**	0	0	5	5	0	430	**6**	436	967
Total Volume	0	0	41	41	0	1894	36	1930	0	0	26	26	0	1775	18	1793	3790
% App. Total	0	0	100		0	98.1	1.9		0	0	100		0	99	1		
PHF	.000	.000	.788	.788	.000	.943	.818	.941	.000	.000	.722	.722	.000	.960	.750	.964	.955

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City of Brea
N/S: S Orange Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 01_BRE_Ora_Imp PM
Site Code : 221110
Start Date : 12/8/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				05:00 PM				04:45 PM				04:15 PM			
+0 mins.	0	0	8	8	0	458	9	467	0	0	5	5	0	431	**5**	436
+15 mins.	0	0	9	9	0	436	5	441	0	0	5	5	0	459	2	461
+30 mins.	0	0	11	11	0	498	**11**	509	0	0	**9**	**9**	0	**469**	3	**472**
+45 mins.	0	0	**13**	**13**	0	**502**	11	**513**	0	0	7	7	0	462	3	465
Total Volume	0	0	41	41	0	1894	36	1930	0	0	26	26	0	1821	13	1834
% App. Total	0	0	100		0	98.1	1.9		0	0	100		0	99.3	0.7	
PHF	.000	.000	.788	.788	.000	.943	.818	.941	.000	.000	.722	.722	.000	.971	.650	.971

Location: Brea
N/S: S Orange Avenue
E/W: Imperial Highway

Date: 12/8/2022
Day: Thursday

PEDESTRIANS

	North Leg S Orange Avenue	East Leg Imperial Highway	South Leg S Orange Avenue	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	0	2	0	2
7:15 AM	0	0	0	0	0
7:30 AM	0	0	1	0	1
7:45 AM	0	0	0	0	0
8:00 AM	0	0	1	0	1
8:15 AM	0	0	1	0	1
8:30 AM	0	0	4	0	4
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	0	9	0	9

	North Leg S Orange Avenue	East Leg Imperial Highway	South Leg S Orange Avenue	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
1:00 PM	0	0	0	0	0
1:15 PM	0	0	0	0	0
1:30 PM	0	0	0	0	0
1:45 PM	0	0	0	0	0
2:00 PM	0	0	0	0	0
2:15 PM	0	0	0	0	0
2:30 PM	0	0	0	0	0
2:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0

	North Leg S Orange Avenue	East Leg Imperial Highway	South Leg S Orange Avenue	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	0	0	0	0	0
4:15 PM	0	0	1	0	1
4:30 PM	0	0	0	0	0
4:45 PM	0	0	1	0	1
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	2	0	2

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Location: Brea
N/S: S Orange Avenue
E/W: Imperial Highway

Date: 12/8/2022
Day: Thursday

BICYCLES

	Southbound S Orange Avenue			Westbound Imperial Highway			Northbound S Orange Avenue			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	1	0	0	0	0	0	1

	Southbound S Orange Avenue			Westbound Imperial Highway			Northbound S Orange Avenue			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
TOTAL VOLUMES:	0	0	0	0	1	0	0	0	0	0	1	0	2

	Southbound S Orange Avenue			Westbound Imperial Highway			Northbound S Orange Avenue			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	1	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	1	0	0	0	0	0	0	1	2

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City of Brea
N/S: Flower Avenue
E/W: Birch Street
Weather: Clear

File Name : 03A_BRE_Flo_Birch AM
Site Code : 221110
Start Date : 12/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

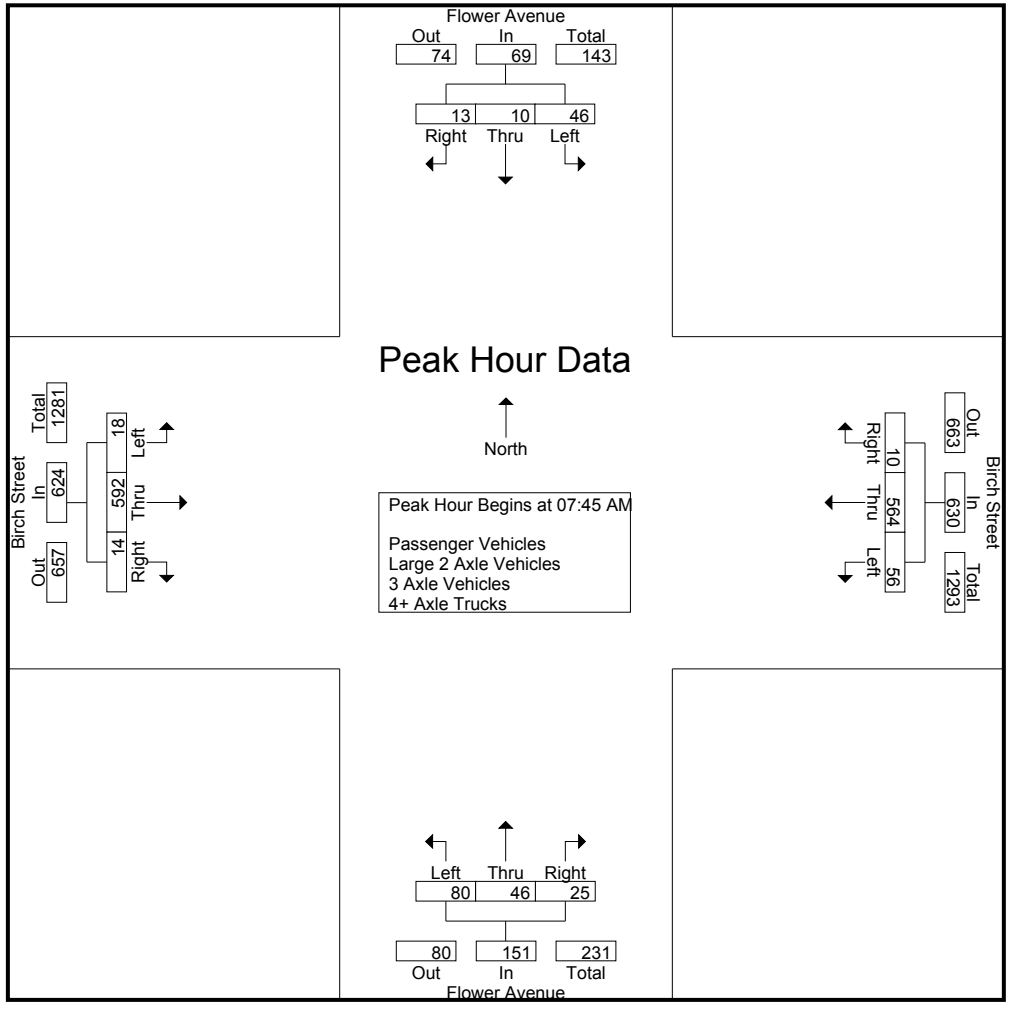
	Flower Avenue Southbound					Birch Street Westbound					Flower Avenue Northbound					Birch Street Eastbound							
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
07:00 AM	7	6	0	0	13	9	55	0	0	64	1	2	4	2	7	1	54	3	1	58	3	142	145
07:15 AM	4	0	0	0	4	23	83	2	1	108	2	2	11	5	15	2	64	3	1	69	7	196	203
07:30 AM	5	1	1	0	7	12	81	2	0	95	16	7	3	1	26	3	68	7	3	78	4	206	210
07:45 AM	12	4	2	0	18	18	131	4	0	153	55	27	1	0	83	6	161	11	1	178	1	432	433
Total	28	11	3	0	42	62	350	8	1	420	74	38	19	8	131	12	347	24	6	383	15	976	991
08:00 AM	15	3	5	4	23	8	154	4	0	166	21	14	3	0	38	2	162	2	0	166	4	393	397
08:15 AM	8	2	4	2	14	19	147	0	0	166	3	3	10	7	16	6	136	1	0	143	9	339	348
08:30 AM	11	1	2	1	14	11	132	2	0	145	1	2	11	6	14	4	133	0	0	137	7	310	317
08:45 AM	5	0	0	0	5	19	132	2	1	153	1	1	14	7	16	1	161	5	1	167	9	341	350
Total	39	6	11	7	56	57	565	8	1	630	26	20	38	20	84	13	592	8	1	613	29	1383	1412
Grand Total	67	17	14	7	98	119	915	16	2	1050	100	58	57	28	215	25	939	32	7	996	44	2359	2403
Apprch %	68.4	17.3	14.3			11.3	87.1	1.5			46.5	27	26.5			2.5	94.3	3.2					
Total %	2.8	0.7	0.6		4.2	5	38.8	0.7		44.5	4.2	2.5	2.4		9.1	1.1	39.8	1.4		42.2	1.8	98.2	
Passenger Vehicles	66	17	14		104	119	898	16		1035	99	56	54		235	23	919	32		981	0	0	2355
% Passenger Vehicles	98.5	100	100	100	99	100	98.1	100	100	98.4	99	96.6	94.7	92.9	96.7	92	97.9	100	100	97.8	0	0	98
Large 2 Axle Vehicles	1	0	0		1	0	16	0		16	1	2	2		6	2	18	0		20	0	0	43
% Large 2 Axle Vehicles	1.5	0	0	0	1	0	1.7	0	0	1.5	1	3.4	3.5	3.6	2.5	8	1.9	0	0	2	0	0	1.8
3 Axle Vehicles	0	0	0		0	0	1	0		1	0	0	1		2	0	1	0		1	0	0	4
% 3 Axle Vehicles	0	0	0	0	0	0	0.1	0	0	0.1	0	0	1.8	3.6	0.8	0	0.1	0	0	0.1	0	0	0.2
4+ Axle Trucks	0	0	0		0	0	0	0		0	0	0	0		0	0	1	0		1	0	0	1
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0

	Flower Avenue Southbound				Birch Street Westbound				Flower Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	12	**4**	2	18	18	131	**4**	153	**55**	**27**	1	**83**	**6**	161	**11**	**178**	**432**
08:00 AM	**15**	3	**5**	**23**	8	**154**	4	**166**	21	14	3	38	2	**162**	2	166	393
08:15 AM	8	2	4	14	**19**	147	0	166	3	3	10	16	6	136	1	143	339
08:30 AM	11	1	2	14	11	132	2	145	1	2	**11**	14	4	133	0	137	310
Total Volume	46	10	13	69	56	564	10	630	80	46	25	151	18	592	14	624	1474
% App. Total	66.7	14.5	18.8		8.9	89.5	1.6		53	30.5	16.6		2.9	94.9	2.2		
PHF	.767	.625	.650	.750	.737	.916	.625	.949	.364	.426	.568	.455	.750	.914	.318	.876	.853

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City of Brea
N/S: Flower Avenue
E/W: Birch Street
Weather: Clear

File Name : 03A_BRE_Flo_Birch AM
Site Code : 221110
Start Date : 12/21/2022
Page No : 2



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City of Brea
N/S: Flower Avenue
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File Name : 03A_BRE_Flo_Birch AM
Site Code : 221110
Start Date : 12/21/2022

	Flower Avenue Southbound				Birch Street Westbound				Flower Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	07:45 AM				07:45 AM				07:30 AM				07:45 AM				
+0 mins.	12	**4**	2	18	18	131	**4**	153	16	7	3	26	**6**	161	**11**	**178**	
+15 mins.	**15**	3	**5**	**23**	8	**154**	4	**166**	**55**	**27**	1	**83**	2	**162**	2	166	
+30 mins.	8	2	4	14	**19**	147	0	166	21	14	3	38	6	136	1	143	
+45 mins.	11	1	2	14	11	132	2	145	3	3	**10**	16	4	133	0	137	
Total Volume	46	10	13	69	56	564	10	630	95	51	17	163	18	592	14	624	
% App. Total	66.7	14.5	18.8		8.9	89.5	1.6		58.3	31.3	10.4		2.9	94.9	2.2		
PHF	.767	.625	.650	.750	.737	.916	.625	.949	.432	.472	.425	.491	.750	.914	.318	.876	

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Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

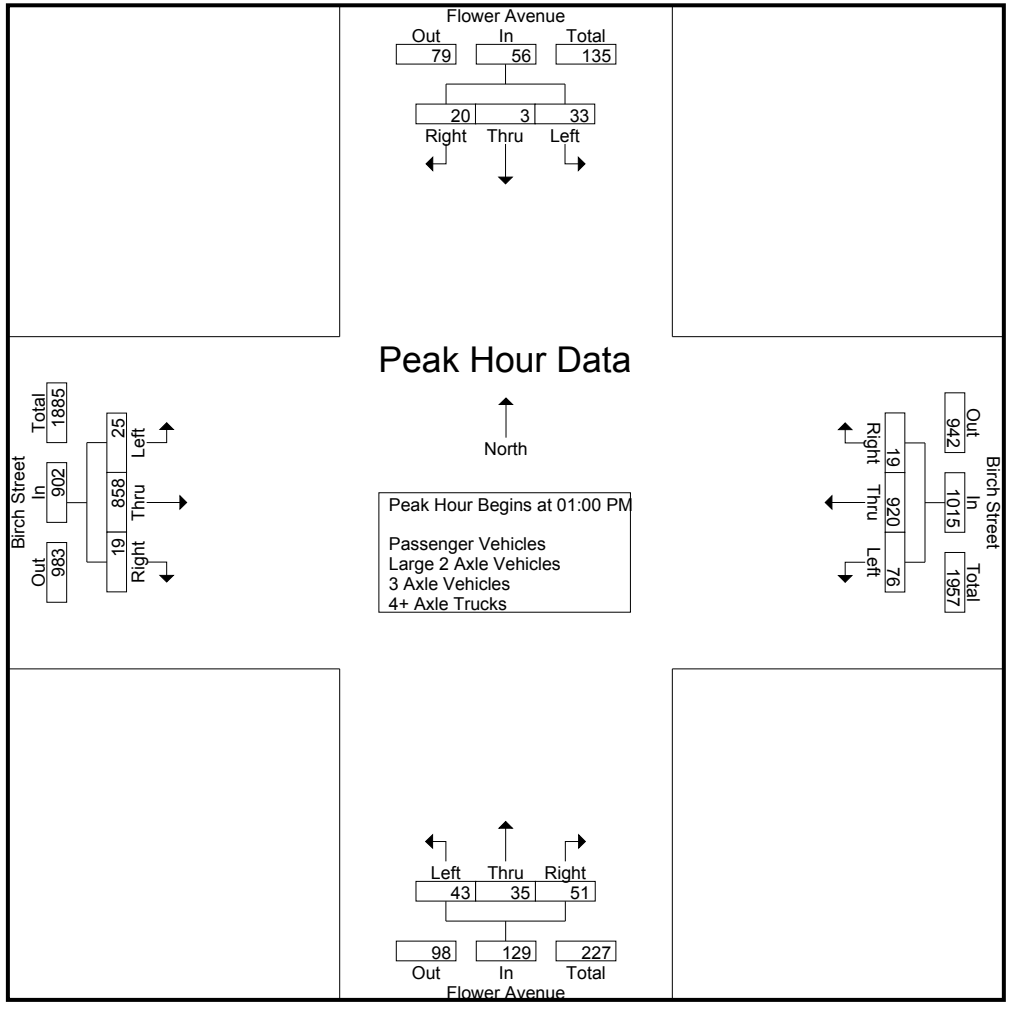
	Flower Avenue Southbound					Birch Street Westbound					Flower Avenue Northbound					Birch Street Eastbound							
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
12:00 PM	3	3	7	5	13	18	181	6	0	205	5	5	12	11	22	7	185	1	0	193	16	433	449
12:15 PM	7	2	7	3	16	13	215	5	1	233	2	3	14	10	19	5	165	2	0	172	14	440	454
12:30 PM	8	1	5	1	14	16	237	3	0	256	4	1	9	5	14	5	181	1	0	187	6	471	477
12:45 PM	4	0	3	1	7	20	196	5	0	221	5	4	18	13	27	7	184	5	0	196	14	451	465
Total	22	6	22	10	50	67	829	19	1	915	16	13	53	39	82	24	715	9	0	748	50	1795	1845
01:00 PM	9	0	1	1	10	23	201	5	1	229	5	4	14	9	23	8	198	3	0	209	11	471	482
01:15 PM	6	1	2	1	9	21	235	8	1	264	10	6	8	1	24	4	199	8	0	211	3	508	511
01:30 PM	12	2	13	8	27	15	245	4	0	264	22	20	11	4	53	9	234	5	0	248	12	592	604
01:45 PM	6	0	4	4	10	17	239	2	0	258	6	5	18	10	29	4	227	3	1	234	15	531	546
Total	33	3	20	14	56	76	920	19	2	1015	43	35	51	24	129	25	858	19	1	902	41	2102	2143
Grand Total	55	9	42	24	106	143	1749	38	3	1930	59	48	104	63	211	49	1573	28	1	1650	91	3897	3988
Apprch %	51.9	8.5	39.6			7.4	90.6	2			28	22.7	49.3			3	95.3	1.7					
Total %	1.4	0.2	1.1		2.7	3.7	44.9	1		49.5	1.5	1.2	2.7		5.4	1.3	40.4	0.7		42.3	2.3	97.7	
Passenger Vehicles	53	9	42		128	140	1724	37		1904	57	45	103		268	48	1558	27		1633	0	0	3933
% Passenger Vehicles	96.4	100	100	100	98.5	97.9	98.6	97.4	100	98.5	96.6	93.8	99	100	97.8	98	99	96.4	0	98.9	0	0	98.6
Large 2 Axle Vehicles	2	0	0		2	3	24	1		28	2	2	1		5	1	15	1		18	0	0	53
% Large 2 Axle Vehicles	3.6	0	0	0	1.5	2.1	1.4	2.6	0	1.4	3.4	4.2	1	0	1.8	2	1	3.6	100	1.1	0	0	1.3
3 Axle Vehicles	0	0	0		0	0	1	0		1	0	0	0		0	0	0	0		0	0	0	1
% 3 Axle Vehicles	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0		0	0	0	0		0	0	1	0		1	0	0	0		0	0	0	1
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	2.1	0	0	0.4	0	0	0	0	0	0	0	0

	Flower Avenue Southbound				Birch Street Westbound				Flower Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	9	0	1	10	**23**	201	5	229	5	4	14	23	8	198	3	209	471
01:15 PM	6	1	2	9	21	235	**8**	**264**	10	6	8	24	4	199	**8**	211	508
01:30 PM	**12**	**2**	**13**	**27**	15	**245**	4	264	**22**	**20**	11	**53**	**9**	**234**	5	**248**	**592**
01:45 PM	6	0	4	10	17	239	2	258	6	5	**18**	29	4	227	3	234	531
Total Volume	33	3	20	56	76	920	19	1015	43	35	51	129	25	858	19	902	2102
% App. Total	58.9	5.4	35.7		7.5	90.6	1.9		33.3	27.1	39.5		2.8	95.1	2.1		
PHF	.688	.375	.385	.519	.826	.939	.594	.961	.489	.438	.708	.608	.694	.917	.594	.909	.888

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Start Date : 12/21/2022



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	Flower Avenue Southbound				Birch Street Westbound				Flower Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	01:00 PM				01:00 PM				01:00 PM				01:00 PM				
+0 mins.	9	0	1	10	**23**	201	5	229	5	4	14	23	8	198	3	209	
+15 mins.	6	1	2	9	21	235	**8**	**264**	10	6	8	24	4	199	**8**	211	
+30 mins.	**12**	**2**	**13**	**27**	15	**245**	4	264	**22**	**20**	11	**53**	**9**	**234**	5	**248**	
+45 mins.	6	0	4	10	17	239	2	258	6	5	**18**	29	4	227	3	234	
Total Volume	33	3	20	56	76	920	19	1015	43	35	51	129	25	858	19	902	
% App. Total	58.9	5.4	35.7		7.5	90.6	1.9		33.3	27.1	39.5		2.8	95.1	2.1		
PHF	.688	.375	.385	.519	.826	.939	.594	.961	.489	.438	.708	.608	.694	.917	.594	.909	

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Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

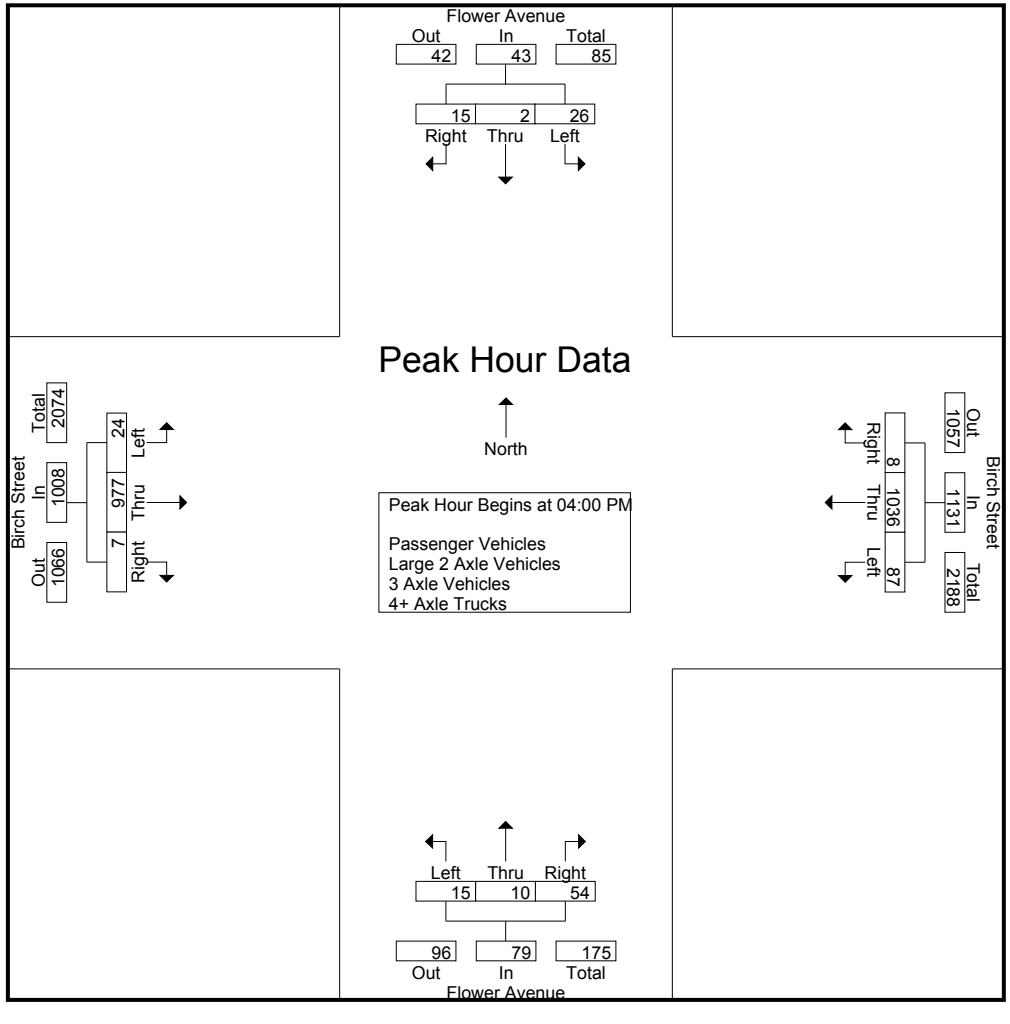
	Flower Avenue Southbound					Birch Street Westbound					Flower Avenue Northbound					Birch Street Eastbound							
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Exclu. Total	Inclu. Total	Int. Total
04:00 PM	9	2	5	3	16	23	254	1	0	278	6	3	5	3	14	3	256	3	1	262	7	570	577
04:15 PM	4	0	2	0	6	19	262	1	0	282	4	1	14	5	19	4	251	1	0	256	5	563	568
04:30 PM	7	0	7	1	14	21	248	4	0	273	4	3	20	11	27	10	235	2	0	247	12	561	573
04:45 PM	6	0	1	0	7	24	272	2	0	298	1	3	15	11	19	7	235	1	0	243	11	567	578
Total	26	2	15	4	43	87	1036	8	0	1131	15	10	54	30	79	24	977	7	1	1008	35	2261	2296
05:00 PM	3	0	1	1	4	13	263	2	0	278	6	7	10	4	23	7	225	0	0	232	5	537	542
05:15 PM	5	2	1	0	8	19	264	6	1	289	5	3	10	4	18	8	220	1	0	229	5	544	549
05:30 PM	12	0	3	3	15	31	277	7	1	315	3	2	11	4	16	6	250	4	1	260	9	606	615
05:45 PM	7	2	2	2	11	20	259	7	0	286	4	7	19	6	30	6	235	2	0	243	8	570	578
Total	27	4	7	6	38	83	1063	22	2	1168	18	19	50	18	87	27	930	7	1	964	27	2257	2284
Grand Total	53	6	22	10	81	170	2099	30	2	2299	33	29	104	48	166	51	1907	14	2	1972	62	4518	4580
Apprch %	65.4	7.4	27.2			7.4	91.3	1.3			19.9	17.5	62.7			2.6	96.7	0.7					
Total %	1.2	0.1	0.5		1.8	3.8	46.5	0.7		50.9	0.7	0.6	2.3		3.7	1.1	42.2	0.3		43.6	1.4	98.6	
Passenger Vehicles	53	5	22		90	169	2088	30		2289	32	29	104		213	51	1897	14		1964	0	0	4556
% Passenger Vehicles	100	83.3	100	100	98.9	99.4	99.5	100	100	99.5	97	100	100	100	99.5	100	99.5	100	100	99.5	0	0	99.5
Large 2 Axle Vehicles	0	1	0		1	1	10	0		11	1	0	0		1	0	9	0		9	0	0	22
% Large 2 Axle Vehicles	0	16.7	0	0	1.1	0.6	0.5	0	0	0.5	3	0	0	0	0.5	0	0.5	0	0	0.5	0	0	0.5
3 Axle Vehicles	0	0	0		0	0	1	0		1	0	0	0		0	0	0	0		0	0	0	1
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0		0	0	0	0		0	0	0	0		0	0	1	0		1	0	0	1
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0.1	0	0	0

	Flower Avenue Southbound				Birch Street Westbound				Flower Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	**9**	**2**	5	**16**	23	254	1	278	**6**	**3**	5	14	3	**256**	**3**	**262**	**570**
04:15 PM	4	0	2	6	19	262	1	282	4	1	14	19	4	251	1	256	563
04:30 PM	7	0	**7**	14	21	248	**4**	273	4	3	**20**	**27**	**10**	235	2	247	561
04:45 PM	6	0	1	7	**24**	**272**	2	**298**	1	3	15	19	7	235	1	243	567
Total Volume	26	2	15	43	87	1036	8	1131	15	10	54	79	24	977	7	1008	2261
% App. Total	60.5	4.7	34.9		7.7	91.6	0.7		19	12.7	68.4		2.4	96.9	0.7		
PHF	.722	.250	.536	.672	.906	.952	.500	.949	.625	.833	.675	.731	.600	.954	.583	.962	.992

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City of Brea
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File Name : 03A_BRE_Flo_Birch PM
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File Name : 03A_BRE_Flo_Birch PM
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Start Date : 12/21/2022

	Flower Avenue Southbound				Birch Street Westbound				Flower Avenue Northbound				Birch Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Each Approach Begins at:																	
	04:00 PM				04:45 PM				04:15 PM				04:00 PM				
+0 mins.	**9**	**2**	5	**16**	24	272	2	298	4	1	14	19	3	**256**	**3**	**262**	
+15 mins.	4	0	2	6	13	263	2	278	4	3	**20**	**27**	4	251	1	256	
+30 mins.	7	0	**7**	14	19	264	6	289	1	3	15	19	**10**	235	2	247	
+45 mins.	6	0	1	7	**31**	**277**	**7**	**315**	**6**	**7**	10	23	7	235	1	243	
Total Volume	26	2	15	43	87	1076	17	1180	15	14	59	88	24	977	7	1008	
% App. Total	60.5	4.7	34.9		7.4	91.2	1.4		17	15.9	67		2.4	96.9	0.7		
PHF	.722	.250	.536	.672	.702	.971	.607	.937	.625	.500	.738	.815	.600	.954	.583	.962	

Location: Brea
N/S: Flower Avenue
E/W: Birch Street

Date: 12/21/2022
Day: Wednesday

PEDESTRIANS

	North Leg Flower Avenue Pedestrians	East Leg Birch Street Pedestrians	South Leg Flower Avenue Pedestrians	West Leg Birch Street Pedestrians	
7:00 AM	0	0	0	0	0
7:15 AM	0	3	0	0	3
7:30 AM	0	8	0	0	8
7:45 AM	0	45	4	2	51
8:00 AM	1	8	2	0	11
8:15 AM	0	2	0	0	2
8:30 AM	3	0	1	1	5
8:45 AM	2	0	0	0	2
TOTAL VOLUMES:	6	66	7	3	82

	North Leg Flower Avenue Pedestrians	East Leg Birch Street Pedestrians	South Leg Flower Avenue Pedestrians	West Leg Birch Street Pedestrians	
12:00 PM	1	0	1	0	2
12:15 PM	0	0	0	0	0
12:30 PM	2	1	1	0	4
12:45 PM	1	0	0	0	1
1:00 PM	0	2	0	0	2
1:15 PM	0	18	3	0	21
1:30 PM	2	53	7	0	62
1:45 PM	2	1	0	0	3
TOTAL VOLUMES:	8	75	12	0	95

	North Leg Flower Avenue Pedestrians	East Leg Birch Street Pedestrians	South Leg Flower Avenue Pedestrians	West Leg Birch Street Pedestrians	
4:00 PM	1	0	1	1	3
4:15 PM	5	2	1	0	8
4:30 PM	2	2	1	1	6
4:45 PM	2	0	1	0	3
5:00 PM	1	0	6	3	10
5:15 PM	1	0	2	0	3
5:30 PM	1	0	0	1	2
5:45 PM	0	0	5	0	5
TOTAL VOLUMES:	13	4	17	6	40

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Location: Brea
N/S: Flower Avenue
E/W: Birch Street

Date: 12/21/2022
Day: Wednesday

BICYCLES

	Southbound Flower Avenue			Westbound Birch Street			Northbound Flower Avenue			Eastbound Birch Street			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	1	0	0	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	1	0	0	0	1	0	1	1	4
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	1	2	0	0	0	1	0	1	1	6

	Southbound Flower Avenue			Westbound Birch Street			Northbound Flower Avenue			Eastbound Birch Street			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
12:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	1	0	0	0	0	0	1	0	2

	Southbound Flower Avenue			Westbound Birch Street			Northbound Flower Avenue			Eastbound Birch Street			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	3	0	0	0	0	0	0	0	3

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 04_BRE_Flo_DW2 AM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

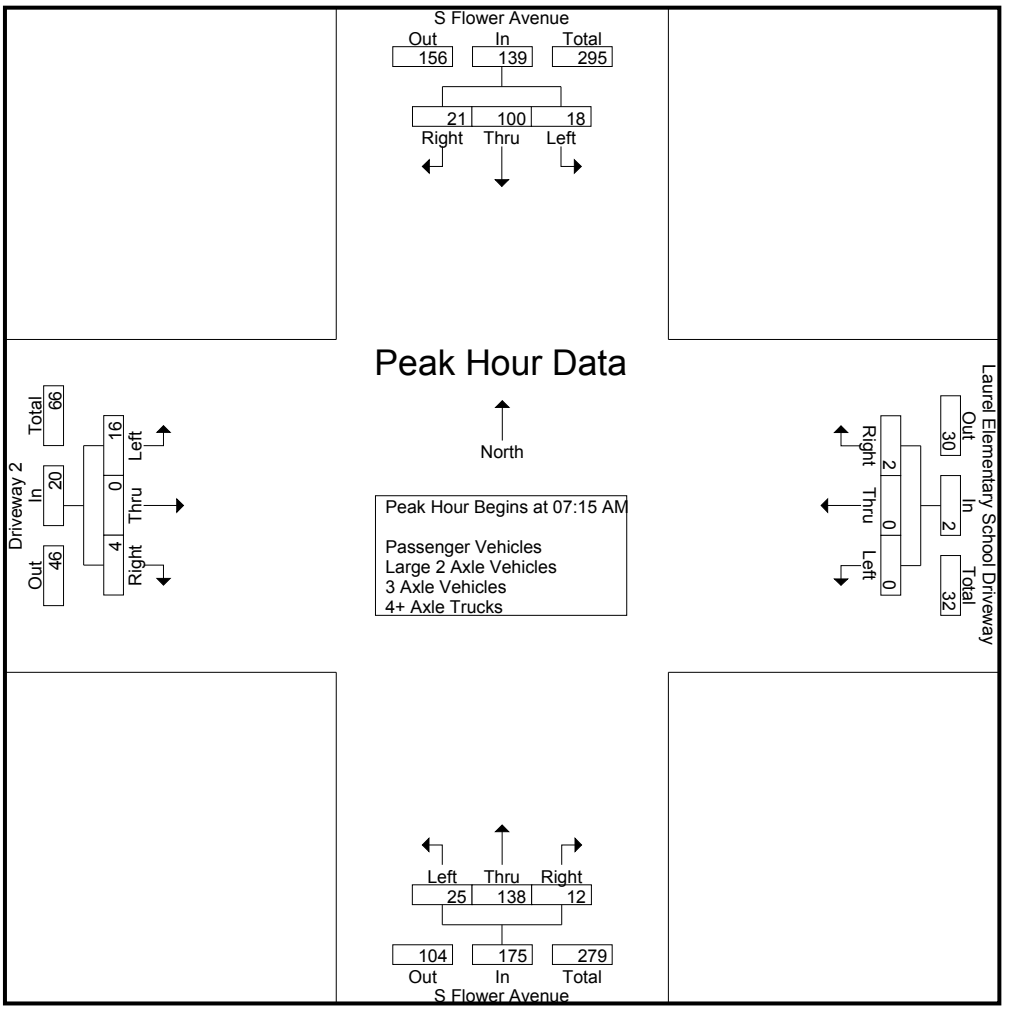
	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	3	20	0	23	0	0	1	1	0	1	5	6	0	0	0	0	30
07:15 AM	9	30	3	42	0	0	0	0	2	15	7	24	0	0	0	0	66
07:30 AM	5	22	0	27	0	0	0	0	7	19	4	30	4	0	1	5	62
07:45 AM	2	28	15	45	0	0	0	0	10	76	1	87	9	0	1	10	142
Total	19	100	18	137	0	0	1	1	19	111	17	147	13	0	2	15	300
08:00 AM	2	20	3	25	0	0	2	2	6	28	0	34	3	0	2	5	66
08:15 AM	0	22	0	22	0	0	0	0	1	7	1	9	1	0	1	2	33
08:30 AM	0	16	1	17	0	0	0	0	2	8	0	10	1	0	0	1	28
08:45 AM	2	29	1	32	0	0	2	2	1	13	0	14	1	0	0	1	49
Total	4	87	5	96	0	0	4	4	10	56	1	67	6	0	3	9	176
Grand Total	23	187	23	233	0	0	5	5	29	167	18	214	19	0	5	24	476
Apprch %	9.9	80.3	9.9		0	0	100		13.6	78	8.4		79.2	0	20.8		
Total %	4.8	39.3	4.8	48.9	0	0	1.1	1.1	6.1	35.1	3.8	45	4	0	1.1	5	
Passenger Vehicles	22	186	23	231	0	0	3	3	29	166	18	213	19	0	5	24	471
% Passenger Vehicles	95.7	99.5	100	99.1	0	0	60	60	100	99.4	100	99.5	100	0	100	100	98.9
Large 2 Axle Vehicles	1	1	0	2	0	0	2	2	0	1	0	1	0	0	0	0	5
% Large 2 Axle Vehicles	4.3	0.5	0	0.9	0	0	40	40	0	0.6	0	0.5	0	0	0	0	1.1
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	**9**	**30**	3	42	0	0	0	0	2	15	**7**	24	0	0	0	0	66
07:30 AM	5	22	0	27	0	0	0	0	7	19	4	30	4	0	1	5	62
07:45 AM	2	28	**15**	**45**	0	0	0	0	**10**	**76**	1	**87**	**9**	0	1	**10**	**142**
08:00 AM	2	20	3	25	0	0	**2**	**2**	6	28	0	34	3	0	**2**	5	66
Total Volume	18	100	21	139	0	0	2	2	25	138	12	175	16	0	4	20	336
% App. Total	12.9	71.9	15.1		0	0	100		14.3	78.9	6.9		80	0	20		
PHF	.500	.833	.350	.772	.000	.000	.250	.250	.625	.454	.429	.503	.444	.000	.500	.500	.592

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 04_BRE_Flo_DW2 AM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM				08:00 AM				07:15 AM				07:30 AM			
+0 mins.	**9**	**30**	3	42	0	0	**2**	**2**	2	15	**7**	24	4	0	1	5
+15 mins.	5	22	0	27	0	0	0	0	7	19	4	30	**9**	0	1	**10**
+30 mins.	2	28	**15**	**45**	0	0	0	0	**10**	**76**	1	**87**	3	0	**2**	5
+45 mins.	2	20	3	25	0	0	2	2	6	28	0	34	1	0	1	2
Total Volume	18	100	21	139	0	0	4	4	25	138	12	175	17	0	5	22
% App. Total	12.9	71.9	15.1		0	0	100		14.3	78.9	6.9		77.3	0	22.7	
PHF	.500	.833	.350	.772	.000	.000	.500	.500	.625	.454	.429	.503	.472	.000	.625	.550

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 04_BRE_Flo_DW2 MD 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

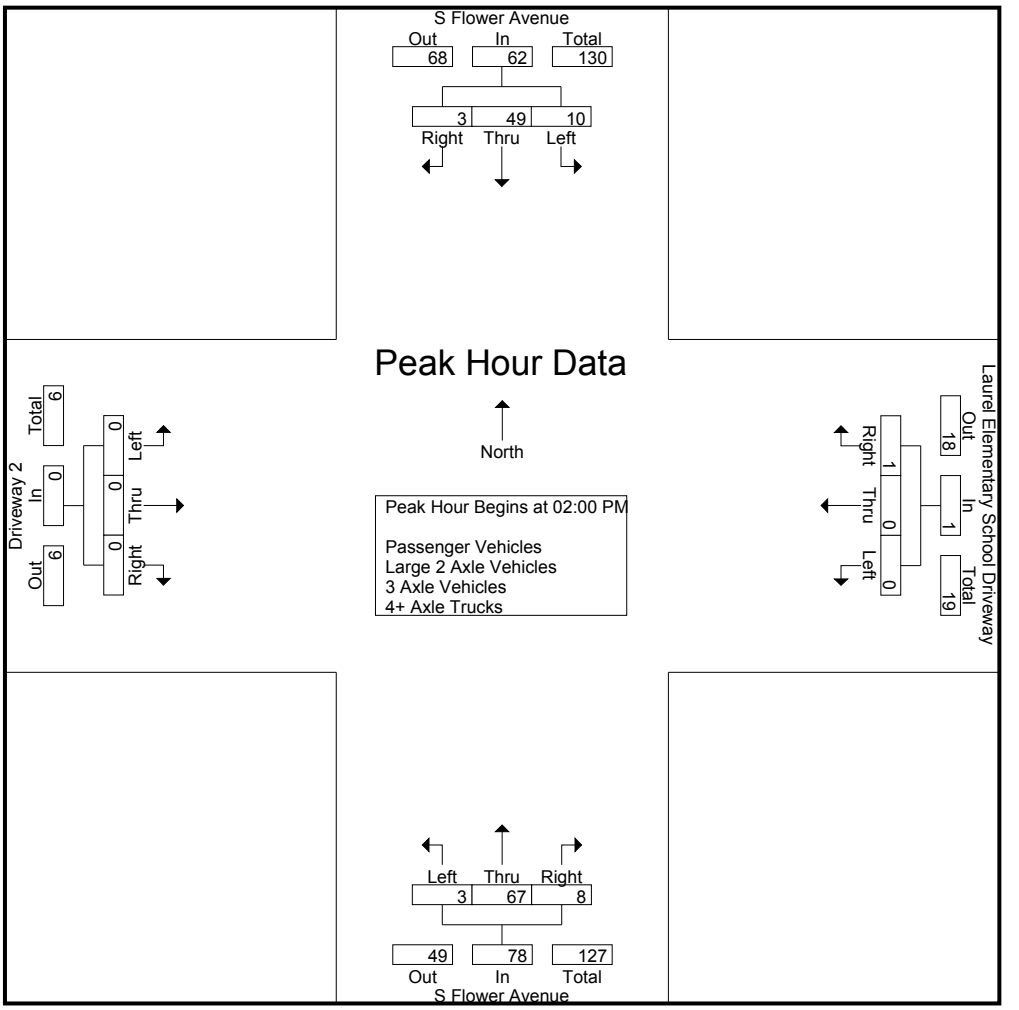
	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
01:00 PM	2	11	0	13	2	0	1	3	1	12	0	13	2	0	1	3	32
01:15 PM	2	15	0	17	1	0	0	1	1	11	0	12	1	0	5	6	36
01:30 PM	0	16	0	16	0	0	1	1	0	11	2	13	3	0	3	6	36
01:45 PM	0	17	0	17	0	0	0	0	0	9	0	9	0	0	0	0	26
Total	4	59	0	63	3	0	2	5	2	43	2	47	6	0	9	15	130
02:00 PM	2	8	2	12	0	0	0	0	0	15	0	15	0	0	0	0	27
02:15 PM	7	11	0	18	0	0	0	0	1	10	3	14	0	0	0	0	32
02:30 PM	0	18	1	19	0	0	1	1	1	21	3	25	0	0	0	0	45
02:45 PM	1	12	0	13	0	0	0	0	1	21	2	24	0	0	0	0	37
Total	10	49	3	62	0	0	1	1	3	67	8	78	0	0	0	0	141
Grand Total	14	108	3	125	3	0	3	6	5	110	10	125	6	0	9	15	271
Apprch %	11.2	86.4	2.4		50	0	50		4	88	8		40	0	60		
Total %	5.2	39.9	1.1	46.1	1.1	0	1.1	2.2	1.8	40.6	3.7	46.1	2.2	0	3.3	5.5	
Passenger Vehicles	14	106	3	123	3	0	3	6	5	109	10	124	6	0	9	15	268
% Passenger Vehicles	100	98.1	100	98.4	100	0	100	100	100	99.1	100	99.2	100	0	100	100	98.9
Large 2 Axle Vehicles	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
% Large 2 Axle Vehicles	0	0.9	0	0.8	0	0	0	0	0	0.9	0	0.8	0	0	0	0	0.7
3 Axle Vehicles	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
% 3 Axle Vehicles	0	0.9	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0	0.4
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:00 PM																	
02:00 PM	2	8	**2**	12	0	0	0	0	0	15	0	15	0	0	0	0	27
02:15 PM	**7**	11	0	18	0	0	0	0	**1**	10	**3**	14	0	0	0	0	32
02:30 PM	0	**18**	1	**19**	0	0	**1**	**1**	1	**21**	3	**25**	0	0	0	0	**45**
02:45 PM	1	12	0	13	0	0	0	0	1	21	2	24	0	0	0	0	37
Total Volume	10	49	3	62	0	0	1	1	3	67	8	78	0	0	0	0	141
% App. Total	16.1	79	4.8		0	0	100		3.8	85.9	10.3		0	0	0		
PHF	.357	.681	.375	.816	.000	.000	.250	.250	.750	.798	.667	.780	.000	.000	.000	.000	.783

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 04_BRE_Flo_DW2 MD 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 2



Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	01:45 PM				01:00 PM				02:00 PM				01:00 PM			
+0 mins.	0	17	0	17	**2**	0	**1**	**3**	0	15	0	15	2	0	1	3
+15 mins.	2	8	**2**	12	1	0	0	1	**1**	10	**3**	14	1	0	**5**	**6**
+30 mins.	**7**	11	0	18	0	0	1	1	1	**21**	3	**25**	**3**	0	3	6
+45 mins.	0	**18**	1	**19**	0	0	0	0	1	21	2	24	0	0	0	0
Total Volume	9	54	3	66	3	0	2	5	3	67	8	78	6	0	9	15
% App. Total	13.6	81.8	4.5		60	0	40		3.8	85.9	10.3		40	0	60	
PHF	.321	.750	.375	.868	.375	.000	.500	.417	.750	.798	.667	.780	.500	.000	.450	.625

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 04_BRE_Flo_DW2 PM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

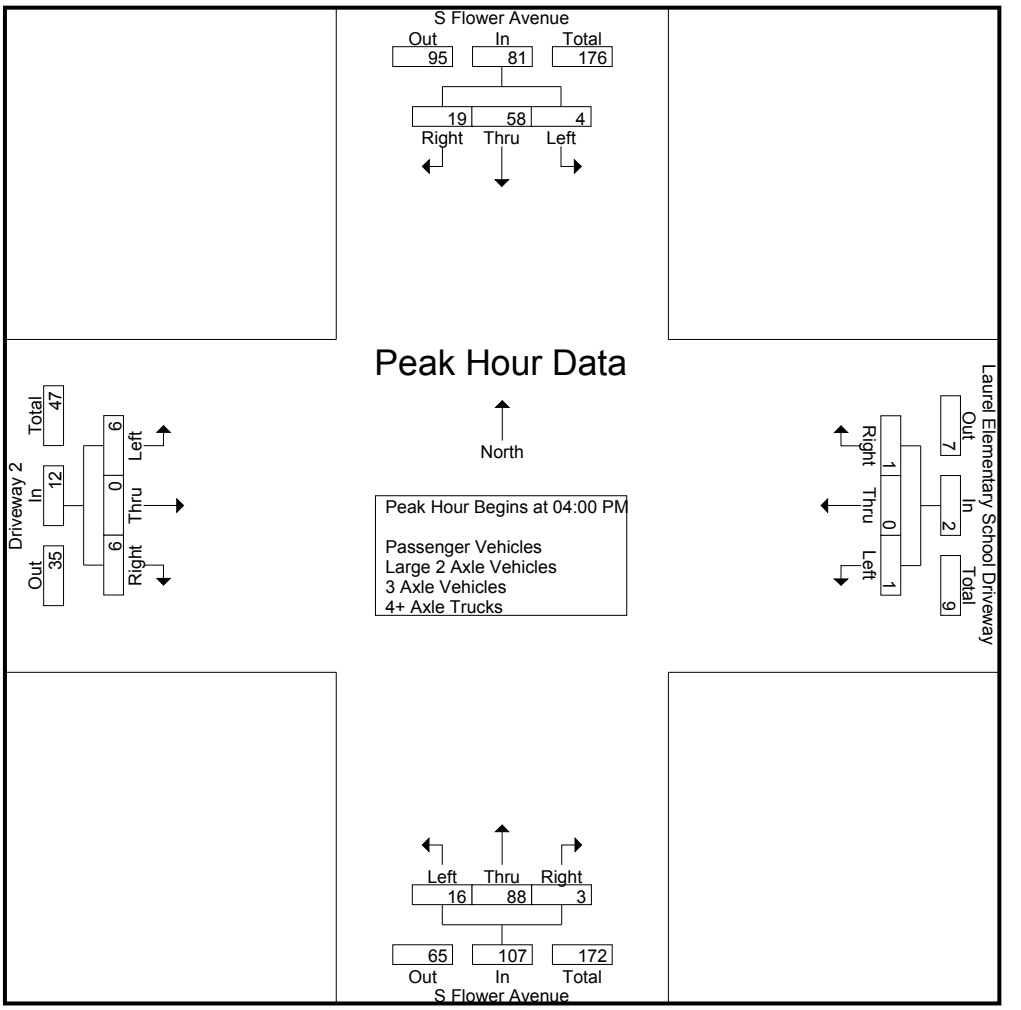
	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	3	15	1	19	0	0	1	1	3	17	0	20	2	0	0	2	42
04:15 PM	0	11	12	23	0	0	0	0	10	20	0	30	2	0	1	3	56
04:30 PM	0	15	5	20	1	0	0	1	2	41	2	45	2	0	2	4	70
04:45 PM	1	17	1	19	0	0	0	0	1	10	1	12	0	0	3	3	34
Total	4	58	19	81	1	0	1	2	16	88	3	107	6	0	6	12	202
05:00 PM	2	13	0	15	0	0	0	0	2	14	1	17	2	0	2	4	36
05:15 PM	0	13	0	13	1	0	0	1	1	14	1	16	0	0	1	1	31
05:30 PM	1	26	1	28	0	0	3	3	0	17	0	17	0	0	0	0	48
05:45 PM	3	10	0	13	0	0	1	1	5	14	1	20	0	0	0	0	34
Total	6	62	1	69	1	0	4	5	8	59	3	70	2	0	3	5	149
Grand Total	10	120	20	150	2	0	5	7	24	147	6	177	8	0	9	17	351
Apprch %	6.7	80	13.3		28.6	0	71.4		13.6	83.1	3.4		47.1	0	52.9		
Total %	2.8	34.2	5.7	42.7	0.6	0	1.4	2	6.8	41.9	1.7	50.4	2.3	0	2.6	4.8	
Passenger Vehicles	10	116	20	146	2	0	5	7	24	146	5	175	8	0	9	17	345
% Passenger Vehicles	100	96.7	100	97.3	100	0	100	100	100	99.3	83.3	98.9	100	0	100	100	98.3
Large 2 Axle Vehicles	0	4	0	4	0	0	0	0	0	0	1	1	0	0	0	0	5
% Large 2 Axle Vehicles	0	3.3	0	2.7	0	0	0	0	0	0	16.7	0.6	0	0	0	0	1.4
3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% 3 Axle Vehicles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+ Axle Trucks	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
% 4+ Axle Trucks	0	0	0	0	0	0	0	0	0	0.7	0	0.6	0	0	0	0	0.3

	S Flower Avenue Southbound				Laurel Elementary School Driveway Westbound				S Flower Avenue Northbound				Driveway 2 Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	**3**	15	1	19	0	0	**1**	**1**	3	17	0	20	**2**	0	0	2	42
04:15 PM	0	11	**12**	**23**	0	0	0	0	**10**	20	0	30	2	0	1	3	56
04:30 PM	0	15	5	20	**1**	0	0	1	2	**41**	**2**	**45**	2	0	2	**4**	**70**
04:45 PM	1	**17**	1	19	0	0	0	0	1	10	1	12	0	0	**3**	3	34
Total Volume	4	58	19	81	1	0	1	2	16	88	3	107	6	0	6	12	202
% App. Total	4.9	71.6	23.5		50	0	50		15	82.2	2.8		50	0	50		
PHF	.333	.853	.396	.880	.250	.000	.250	.500	.400	.537	.375	.594	.750	.000	.500	.750	.721

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City of Brea
N/S: S Flower Avenue
E/W: Driveway 2
Weather: Clear

File Name : 04_BRE_Flo_DW2 PM 21
Site Code : 221110
Start Date : 9/21/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				05:00 PM				04:00 PM				04:15 PM			
+0 mins.	**3**	15	1	19	0	0	0	0	3	17	0	20	**2**	0	1	3
+15 mins.	0	11	**12**	**23**	**1**	0	0	1	**10**	20	0	30	2	0	2	**4**
+30 mins.	0	15	5	20	0	0	**3**	**3**	2	**41**	**2**	**45**	0	0	**3**	3
+45 mins.	1	**17**	1	19	0	0	1	1	1	10	1	12	2	0	2	4
Total Volume	4	58	19	81	1	0	4	5	16	88	3	107	6	0	8	14
% App. Total	4.9	71.6	23.5		20	0	80		15	82.2	2.8		42.9	0	57.1	
PHF	.333	.853	.396	.880	.250	.000	.333	.417	.400	.537	.375	.594	.750	.000	.667	.875

Location: Brea
N/S: S Flower Avenue
E/W: Driveway 2

Date: 9/21/2022
Day: Wednesday

PEDESTRIANS

	North Leg S Flower Avenue	East Leg Laural Elementary DW	South Leg S Flower Avenue	West Leg Driveway 2	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	0	0	1	1
7:15 AM	0	1	0	2	3
7:30 AM	3	13	11	1	28
7:45 AM	38	21	29	1	89
8:00 AM	15	9	12	5	41
8:15 AM	1	0	0	0	1
8:30 AM	3	1	0	1	5
8:45 AM	1	0	0	0	1
TOTAL VOLUMES:	61	45	52	11	169

	North Leg S Flower Avenue	East Leg Laural Elementary DW	South Leg S Flower Avenue	West Leg Driveway 2	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
1:00 PM	0	1	1	0	2
1:15 PM	54	14	37	3	108
1:30 PM	34	28	18	14	94
1:45 PM	1	1	0	0	2
2:00 PM	0	0	0	1	1
2:15 PM	6	6	0	0	12
2:30 PM	0	5	0	0	5
2:45 PM	0	0	0	0	0
TOTAL VOLUMES:	95	55	56	18	224

	North Leg S Flower Avenue	East Leg Laural Elementary DW	South Leg S Flower Avenue	West Leg Driveway 2	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	0	0	0	1	1
4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	1	1

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Location: Brea
N/S: S Flower Avenue
E/W: Driveway 2

Date: 9/21/2022
Day: Wednesday

BICYCLES

	Southbound S Flower Avenue			Westbound Laural Elementary DW			Northbound S Flower Avenue			Eastbound Driveway 2			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	0	0	0	0	0

	Southbound S Flower Avenue			Westbound Laural Elementary DW			Northbound S Flower Avenue			Eastbound Driveway 2			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	1	0	0	0	0	0	1	0	0	0	0	2

	Southbound S Flower Avenue			Westbound Laural Elementary DW			Northbound S Flower Avenue			Eastbound Driveway 2			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	0	0	0	0	0

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City of Brea
N/S: S Flower Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 02_BRE_Flo_Imp AM
Site Code : 221110
Start Date : 12/8/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

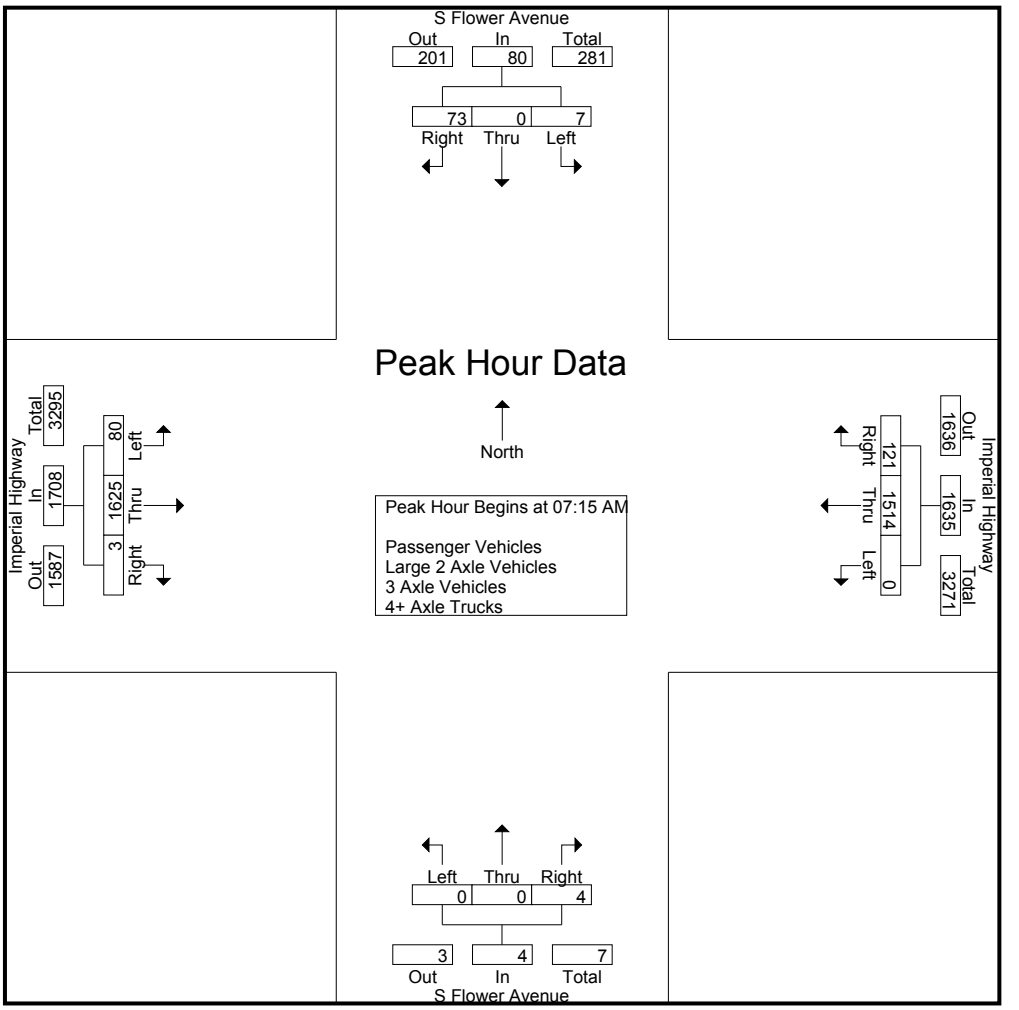
	S Flower Avenue Southbound				Imperial Highway Westbound				S Flower Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	16	16	0	275	3	278	0	0	4	4	5	344	0	349	647
07:15 AM	1	0	17	18	0	331	14	345	0	0	0	0	14	418	0	432	795
07:30 AM	0	0	19	19	0	346	31	377	0	0	1	1	16	412	1	429	826
07:45 AM	5	0	19	24	0	426	60	486	0	0	0	0	38	376	1	415	925
Total	6	0	71	77	0	1378	108	1486	0	0	5	5	73	1550	2	1625	3193
08:00 AM	1	0	18	19	0	411	16	427	0	0	3	3	12	419	1	432	881
08:15 AM	0	0	21	21	0	316	8	324	0	0	2	2	9	435	3	447	794
08:30 AM	2	0	19	21	0	361	2	363	0	0	1	1	9	383	2	394	779
08:45 AM	3	0	15	18	0	344	9	353	0	0	4	4	11	388	0	399	774
Total	6	0	73	79	0	1432	35	1467	0	0	10	10	41	1625	6	1672	3228
Grand Total	12	0	144	156	0	2810	143	2953	0	0	15	15	114	3175	8	3297	6421
Apprch %	7.7	0	92.3		0	95.2	4.8		0	0	100		3.5	96.3	0.2		
Total %	0.2	0	2.2	2.4	0	43.8	2.2	46	0	0	0.2	0.2	1.8	49.4	0.1	51.3	
Passenger Vehicles	12	0	141	153	0	2633	140	2773	0	0	14	14	114	2979	8	3101	6041
% Passenger Vehicles	100	0	97.9	98.1	0	93.7	97.9	93.9	0	0	93.3	93.3	100	93.8	100	94.1	94.1
Large 2 Axle Vehicles	0	0	1	1	0	86	1	87	0	0	1	1	0	111	0	111	200
% Large 2 Axle Vehicles	0	0	0.7	0.6	0	3.1	0.7	2.9	0	0	6.7	6.7	0	3.5	0	3.4	3.1
3 Axle Vehicles	0	0	1	1	0	16	2	18	0	0	0	0	0	31	0	31	50
% 3 Axle Vehicles	0	0	0.7	0.6	0	0.6	1.4	0.6	0	0	0	0	0	1	0	0.9	0.8
4+ Axle Trucks	0	0	1	1	0	75	0	75	0	0	0	0	0	54	0	54	130
% 4+ Axle Trucks	0	0	0.7	0.6	0	2.7	0	2.5	0	0	0	0	0	1.7	0	1.6	2

	S Flower Avenue Southbound				Imperial Highway Westbound				S Flower Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	1	0	17	18	0	331	14	345	0	0	0	0	14	418	0	**432**	795
07:30 AM	0	0	**19**	19	0	346	31	377	0	0	1	1	16	412	**1**	429	826
07:45 AM	**5**	0	19	**24**	0	**426**	**60**	**486**	0	0	0	0	**38**	376	1	415	**925**
08:00 AM	1	0	18	19	0	411	16	427	0	0	**3**	**3**	12	**419**	1	432	881
Total Volume	7	0	73	80	0	1514	121	1635	0	0	4	4	80	1625	3	1708	3427
% App. Total	8.8	0	91.2		0	92.6	7.4		0	0	100		4.7	95.1	0.2		
PHF	.350	.000	.961	.833	.000	.888	.504	.841	.000	.000	.333	.333	.526	.970	.750	.988	.926

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City of Brea
N/S: S Flower Avenue
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Weather: Clear

File Name : 02_BRE_Flo_Imp AM
Site Code : 221110
Start Date : 12/8/2022
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Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:15 AM				08:00 AM				07:30 AM			
+0 mins.	**5**	0	19	**24**	0	331	14	345	0	0	3	3	16	412	1	429
+15 mins.	1	0	18	19	0	346	31	377	0	0	2	2	**38**	376	1	415
+30 mins.	0	0	**21**	21	0	**426**	**60**	**486**	0	0	1	1	12	419	1	432
+45 mins.	2	0	19	21	0	411	16	427	0	0	**4**	**4**	9	**435**	**3**	**447**
Total Volume	8	0	77	85	0	1514	121	1635	0	0	10	10	75	1642	6	1723
% App. Total	9.4	0	90.6		0	92.6	7.4		0	0	100		4.4	95.3	0.3	
PHF	.400	.000	.917	.885	.000	.888	.504	.841	.000	.000	.625	.625	.493	.944	.500	.964

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City of Brea
N/S: S Flower Avenue
E/W: Imperial Highway
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File Name : 02_BRE_Flo_Imp MD
Site Code : 221110
Start Date : 12/8/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

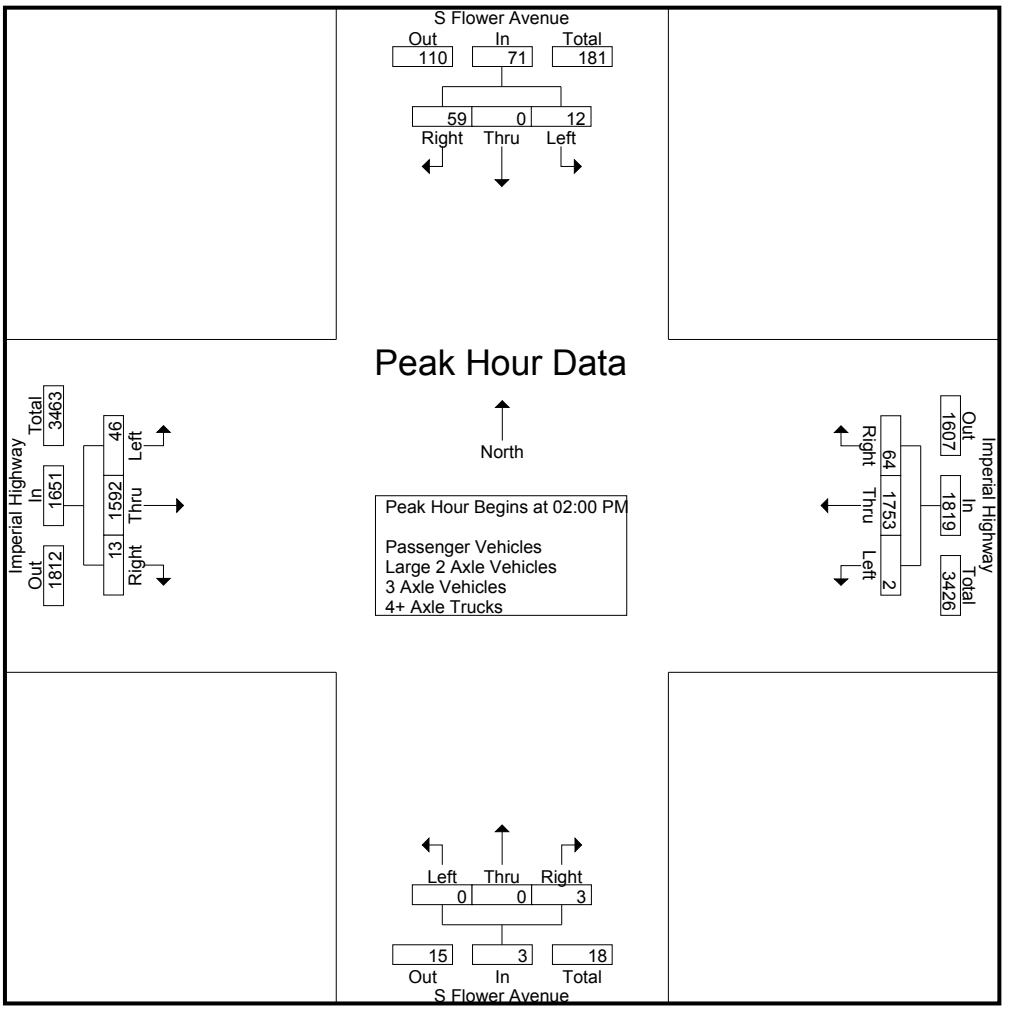
	S Flower Avenue Southbound				Imperial Highway Westbound				S Flower Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
01:00 PM	3	0	14	17	0	380	2	382	0	0	2	2	14	363	1	378	779
01:15 PM	3	0	9	12	0	383	9	392	0	0	1	1	10	391	0	401	806
01:30 PM	2	0	15	17	0	397	5	402	0	0	1	1	13	429	1	443	863
01:45 PM	5	0	7	12	0	373	15	388	0	0	2	2	17	397	2	416	818
Total	13	0	45	58	0	1533	31	1564	0	0	6	6	54	1580	4	1638	3266
02:00 PM	4	0	11	15	0	412	18	430	0	0	1	1	9	379	3	391	837
02:15 PM	4	0	17	21	0	453	25	478	0	0	1	1	11	388	3	402	902
02:30 PM	2	0	17	19	0	479	13	492	0	0	0	0	14	452	4	470	981
02:45 PM	2	0	14	16	2	409	8	419	0	0	1	1	12	373	3	388	824
Total	12	0	59	71	2	1753	64	1819	0	0	3	3	46	1592	13	1651	3544
Grand Total	25	0	104	129	2	3286	95	3383	0	0	9	9	100	3172	17	3289	6810
Apprch %	19.4	0	80.6		0.1	97.1	2.8		0	0	100		3	96.4	0.5		
Total %	0.4	0	1.5	1.9	0	48.3	1.4	49.7	0	0	0.1	0.1	1.5	46.6	0.2	48.3	
Passenger Vehicles	25	0	100	125	2	3082	95	3179	0	0	9	9	96	3013	16	3125	6438
% Passenger Vehicles	100	0	96.2	96.9	100	93.8	100	94	0	0	100	100	96	95	94.1	95	94.5
Large 2 Axle Vehicles	0	0	4	4	0	121	0	121	0	0	0	0	4	96	1	101	226
% Large 2 Axle Vehicles	0	0	3.8	3.1	0	3.7	0	3.6	0	0	0	0	4	3	5.9	3.1	3.3
3 Axle Vehicles	0	0	0	0	0	30	0	30	0	0	0	0	0	19	0	19	49
% 3 Axle Vehicles	0	0	0	0	0	0.9	0	0.9	0	0	0	0	0	0.6	0	0.6	0.7
4+ Axle Trucks	0	0	0	0	0	53	0	53	0	0	0	0	0	44	0	44	97
% 4+ Axle Trucks	0	0	0	0	0	1.6	0	1.6	0	0	0	0	0	1.4	0	1.3	1.4

	S Flower Avenue Southbound				Imperial Highway Westbound				S Flower Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:00 PM																	
02:00 PM	**4**	0	11	15	0	412	18	430	0	0	**1**	**1**	9	379	3	391	837
02:15 PM	4	0	**17**	**21**	0	453	**25**	478	0	0	1	1	11	388	3	402	902
02:30 PM	2	0	17	19	0	**479**	13	**492**	0	0	0	0	**14**	**452**	**4**	**470**	**981**
02:45 PM	2	0	14	16	**2**	409	8	419	0	0	1	1	12	373	3	388	824
Total Volume	12	0	59	71	2	1753	64	1819	0	0	3	3	46	1592	13	1651	3544
% App. Total	16.9	0	83.1		0.1	96.4	3.5		0	0	100		2.8	96.4	0.8		
PHF	.750	.000	.868	.845	.250	.915	.640	.924	.000	.000	.750	.750	.821	.881	.813	.878	.903

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City of Brea
N/S: S Flower Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 02_BRE_Flo_Imp MD
Site Code : 221110
Start Date : 12/8/2022
Page No : 2



Peak Hour Analysis From 01:00 PM to 02:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:00 PM				02:00 PM				01:00 PM				01:45 PM			
+0 mins.	**4**	0	11	15	0	412	18	430	0	0	**2**	**2**	**17**	397	2	416
+15 mins.	4	0	**17**	**21**	0	453	**25**	478	0	0	1	1	9	379	3	391
+30 mins.	2	0	17	19	0	**479**	13	**492**	0	0	1	1	11	388	3	402
+45 mins.	2	0	14	16	**2**	409	8	419	0	0	2	2	14	**452**	**4**	**470**
Total Volume	12	0	59	71	2	1753	64	1819	0	0	6	6	51	1616	12	1679
% App. Total	16.9	0	83.1		0.1	96.4	3.5		0	0	100		3	96.2	0.7	
PHF	.750	.000	.868	.845	.250	.915	.640	.924	.000	.000	.750	.750	.750	.894	.750	.893

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City of Brea
N/S: S Flower Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 02_BRE_Flo_Imp PM
Site Code : 221110
Start Date : 12/8/2022
Page No : 1

Groups Printed- Passenger Vehicles - Large 2 Axle Vehicles - 3 Axle Vehicles - 4+ Axle Trucks

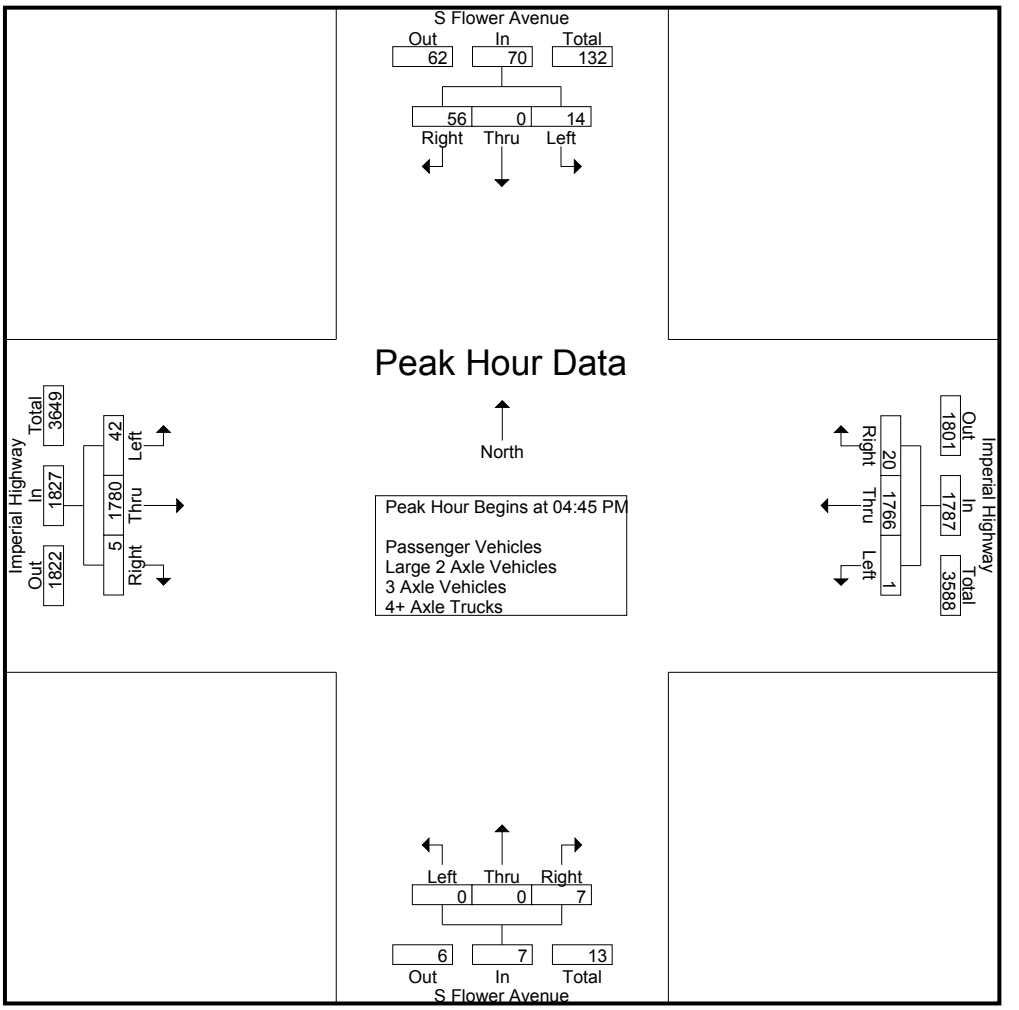
	S Flower Avenue Southbound				Imperial Highway Westbound				S Flower Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	2	0	25	27	0	407	7	414	0	0	1	1	7	396	4	407	849
04:15 PM	0	0	12	12	0	425	3	428	0	0	2	2	22	410	3	435	877
04:30 PM	1	0	17	18	0	460	4	464	0	0	4	4	25	429	3	457	943
04:45 PM	8	0	22	30	0	435	7	442	0	0	2	2	11	444	1	456	930
Total	11	0	76	87	0	1727	21	1748	0	0	9	9	65	1679	11	1755	3599
05:00 PM	1	0	14	15	0	429	2	431	0	0	1	1	16	456	4	476	923
05:15 PM	2	0	13	15	0	429	5	434	0	0	2	2	9	427	0	436	887
05:30 PM	3	0	7	10	1	473	6	480	0	0	2	2	6	453	0	459	951
05:45 PM	1	0	15	16	0	462	4	466	0	0	1	1	26	398	1	425	908
Total	7	0	49	56	1	1793	17	1811	0	0	6	6	57	1734	5	1796	3669
Grand Total	18	0	125	143	1	3520	38	3559	0	0	15	15	122	3413	16	3551	7268
Apprch %	12.6	0	87.4		0	98.9	1.1		0	0	100		3.4	96.1	0.5		
Total %	0.2	0	1.7	2	0	48.4	0.5	49	0	0	0.2	0.2	1.7	47	0.2	48.9	
Passenger Vehicles	18	0	121	139	1	3413	38	3452	0	0	14	14	118	3329	16	3463	7068
% Passenger Vehicles	100	0	96.8	97.2	100	97	100	97	0	0	93.3	93.3	96.7	97.5	100	97.5	97.2
Large 2 Axle Vehicles	0	0	4	4	0	71	0	71	0	0	1	1	4	39	0	43	119
% Large 2 Axle Vehicles	0	0	3.2	2.8	0	2	0	2	0	0	6.7	6.7	3.3	1.1	0	1.2	1.6
3 Axle Vehicles	0	0	0	0	0	2	0	2	0	0	0	0	0	10	0	10	12
% 3 Axle Vehicles	0	0	0	0	0	0.1	0	0.1	0	0	0	0	0	0.3	0	0.3	0.2
4+ Axle Trucks	0	0	0	0	0	34	0	34	0	0	0	0	0	35	0	35	69
% 4+ Axle Trucks	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0.9

	S Flower Avenue Southbound				Imperial Highway Westbound				S Flower Avenue Northbound				Imperial Highway Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**8**	0	**22**	**30**	0	435	**7**	442	0	0	**2**	**2**	11	444	1	456	930
05:00 PM	1	0	14	15	0	429	2	431	0	0	1	1	**16**	**456**	**4**	**476**	923
05:15 PM	2	0	13	15	0	429	5	434	0	0	2	2	9	427	0	436	887
05:30 PM	3	0	7	10	**1**	**473**	6	**480**	0	0	2	2	6	453	0	459	**951**
Total Volume	14	0	56	70	1	1766	20	1787	0	0	7	7	42	1780	5	1827	3691
% App. Total	20	0	80		0.1	98.8	1.1		0	0	100		2.3	97.4	0.3		
PHF	.438	.000	.636	.583	.250	.933	.714	.931	.000	.000	.875	.875	.656	.976	.313	.960	.970

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City of Brea
N/S: S Flower Avenue
E/W: Imperial Highway
Weather: Clear

File Name : 02_BRE_Flo_Imp PM
Site Code : 221110
Start Date : 12/8/2022
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				05:00 PM				04:00 PM				04:45 PM			
+0 mins.	2	0	**25**	27	0	429	2	431	0	0	1	1	11	444	1	456
+15 mins.	0	0	12	12	0	429	5	434	0	0	2	2	**16**	**456**	**4**	**476**
+30 mins.	1	0	17	18	**1**	**473**	**6**	**480**	0	0	**4**	**4**	9	427	0	436
+45 mins.	**8**	0	22	**30**	0	462	4	466	0	0	2	2	6	453	0	459
Total Volume	11	0	76	87	1	1793	17	1811	0	0	9	9	42	1780	5	1827
% App. Total	12.6	0	87.4		0.1	99	0.9		0	0	100		2.3	97.4	0.3	
PHF	.344	.000	.760	.725	.250	.948	.708	.943	.000	.000	.563	.563	.656	.976	.313	.960

Location: Brea
N/S: S Flower Avenue
E/W: Imperial Highway

Date: 12/8/2022
Day: Thursday

PEDESTRIANS

	North Leg S Flower Avenue	East Leg Imperial Highway	South Leg S Flower Avenue	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	2	0	0	0	2
7:15 AM	3	0	0	0	3
7:30 AM	0	0	1	0	1
7:45 AM	2	0	0	0	2
8:00 AM	0	0	1	0	1
8:15 AM	1	0	1	0	2
8:30 AM	0	0	4	0	4
8:45 AM	0	0	1	0	1
TOTAL VOLUMES:	8	0	8	0	16

	North Leg S Flower Avenue	East Leg Imperial Highway	South Leg S Flower Avenue	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
1:00 PM	0	0	0	0	0
1:15 PM	0	0	0	0	0
1:30 PM	0	0	0	0	0
1:45 PM	1	0	0	0	1
2:00 PM	2	0	0	0	2
2:15 PM	9	0	0	0	9
2:30 PM	0	0	1	0	1
2:45 PM	1	0	1	0	2
TOTAL VOLUMES:	13	0	2	0	15

	North Leg S Flower Avenue	East Leg Imperial Highway	South Leg S Flower Avenue	West Leg Imperial Highway	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
4:00 PM	1	0	1	0	2
4:15 PM	0	0	1	0	1
4:30 PM	2	0	0	0	2
4:45 PM	3	0	1	0	4
5:00 PM	0	0	0	0	0
5:15 PM	2	0	1	0	3
5:30 PM	0	0	1	0	1
5:45 PM	0	0	1	0	1
TOTAL VOLUMES:	8	0	6	0	14

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Location: Brea
N/S: S Flower Avenue
E/W: Imperial Highway

Date: 12/8/2022
Day: Thursday

BICYCLES

	Southbound S Flower Avenue			Westbound Imperial Highway			Northbound S Flower Avenue			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	1	0	0	0	0	0	1	0	2
8:45 AM	0	0	0	0	2	0	0	0	0	0	1	0	3
TOTAL VOLUMES:	0	0	0	0	4	0	0	0	0	0	2	0	6

	Southbound S Flower Avenue			Westbound Imperial Highway			Northbound S Flower Avenue			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	1	0	0	0	0	0	0	0	1

	Southbound S Flower Avenue			Westbound Imperial Highway			Northbound S Flower Avenue			Eastbound Imperial Highway			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
4:15 PM	0	0	0	0	1	0	0	0	0	0	0	0	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	1	0	0	0	0	0	1	0	2
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	3	0	0	0	0	0	2	0	5

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City of Brea
Flower Avenue
N/ Imperial Highway
24 Hour Directional Classification Count

BRE002
Site Code: 051-221110

Northbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
12/08/22	0	14	0	0	0	0	0	0	0	0	0	0	0	14
01:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
04:00	0	8	0	0	0	0	0	0	0	0	0	0	0	8
05:00	0	17	1	0	2	0	0	0	0	0	0	0	0	20
06:00	0	29	6	0	0	0	0	0	0	0	0	0	0	35
07:00	0	**162**	**12**	0	0	0	**2**	0	0	0	0	0	0	**176**
08:00	0	67	4	0	0	0	0	0	0	0	0	0	0	71
09:00	0	30	7	0	**4**	0	0	0	0	0	0	0	0	41
10:00	0	54	8	0	1	0	0	0	0	0	0	0	0	63
11:00	0	41	10	**1**	0	0	1	**1**	0	0	0	0	0	54
12 PM	0	40	6	0	0	**1**	0	0	0	0	0	0	0	47
13:00	0	70	8	**1**	1	0	0	0	0	0	0	0	0	80
14:00	0	**86**	**11**	0	0	0	0	0	0	0	0	0	0	**97**
15:00	**1**	54	7	0	0	0	0	0	0	0	0	0	0	62
16:00	0	63	8	0	**2**	0	0	0	0	0	0	0	0	73
17:00	0	61	5	0	0	0	0	0	0	0	0	0	0	66
18:00	0	78	3	0	0	0	0	0	0	0	0	0	0	81
19:00	0	59	5	0	0	0	0	0	0	0	0	0	0	64
20:00	0	37	2	0	0	0	0	0	0	0	0	0	0	39
21:00	0	36	1	0	0	0	0	0	0	0	0	0	0	37
22:00	0	28	0	0	0	0	0	0	0	0	0	0	0	28
23:00	0	14	0	0	0	0	0	0	0	0	0	0	0	14
Total	1	1054	104	2	10	1	3	1	0	0	0	0	0	1176
Percent	0.1%	89.6%	8.8%	0.2%	0.9%	0.1%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00	07:00	11:00	09:00		07:00	11:00						07:00
Vol.		162	12	1	4		2	1						176
PM Peak	15:00	14:00	14:00	13:00	16:00	12:00								14:00
Vol.	1	86	11	1	2	1								97
Grand Total	1	1054	104	2	10	1	3	1	0	0	0	0	0	1176
Percent	0.1%	89.6%	8.8%	0.2%	0.9%	0.1%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	

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City of Brea
Flower Avenue
N/ Imperial Highway
24 Hour Directional Classification Count

BRE002
Site Code: 051-221110

Southbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
12/08/22	0	9	0	0	0	0	0	0	0	0	0	0	0	9
01:00	0	4	0	0	0	0	0	0	0	0	0	0	0	4
02:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:00	0	4	1	0	0	0	0	0	0	0	0	0	0	5
04:00	0	6	2	0	2	0	0	0	0	0	0	0	0	10
05:00	0	11	3	0	0	0	0	0	0	0	0	0	0	14
06:00	0	34	4	0	0	0	0	0	0	0	0	0	0	38
07:00	0	67	**11**	0	0	**1**	0	0	0	0	0	0	0	79
08:00	0	**73**	6	0	1	0	0	0	**1**	0	0	0	0	**81**
09:00	0	49	9	0	**6**	0	0	0	0	0	0	0	0	64
10:00	0	51	8	0	1	0	0	**1**	0	0	0	0	0	61
11:00	0	52	10	**1**	1	0	0	0	0	0	0	0	0	64
12 PM	0	49	7	0	0	0	0	0	0	0	0	0	0	56
13:00	0	51	4	0	**3**	0	0	0	0	0	0	0	0	58
14:00	0	64	**9**	0	0	0	0	0	0	0	0	0	0	73
15:00	**1**	63	4	0	1	0	0	0	0	0	0	0	0	69
16:00	0	**78**	8	0	3	0	0	0	0	0	0	0	0	**89**
17:00	0	58	3	0	0	0	0	0	0	0	0	0	0	61
18:00	0	65	3	0	0	0	0	0	0	0	0	0	0	68
19:00	0	45	2	**1**	0	0	0	0	0	0	0	0	0	48
20:00	0	42	4	0	0	0	0	0	0	0	0	0	0	46
21:00	0	42	2	0	0	0	0	0	0	0	0	0	0	44
22:00	0	29	3	0	0	0	0	0	0	0	0	0	0	32
23:00	0	12	0	0	0	0	0	0	0	0	0	0	0	12
Total	1	958	104	2	18	1	0	1	1	0	0	0	0	1086
Percent	0.1%	88.2%	9.6%	0.2%	1.7%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak		08:00	07:00	11:00	09:00	07:00		10:00	08:00					08:00
Vol.		73	11	1	6	1		1	1					81
PM Peak	15:00	16:00	14:00	19:00	13:00									16:00
Vol.	1	78	9	1	3									89
Grand Total	1	958	104	2	18	1	0	1	1	0	0	0	0	1086
Percent	0.1%	88.2%	9.6%	0.2%	1.7%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	

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City of Brea
Flower Avenue
N/ Imperial Highway
24 Hour Directional Classification Count
Northbound, Southbound

BRE002
Site Code: 051-221110

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
12/08/22	0	23	0	0	0	0	0	0	0	0	0	0	0	23
01:00	0	6	0	0	0	0	0	0	0	0	0	0	0	6
02:00	0	0	1	0	0	0	0	0	0	0	0	0	0	1
03:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
04:00	0	14	2	0	2	0	0	0	0	0	0	0	0	18
05:00	0	28	4	0	2	0	0	0	0	0	0	0	0	34
06:00	0	63	10	0	0	0	0	0	0	0	0	0	0	73
07:00	0	**229**	**23**	0	0	**1**	**2**	0	0	0	0	0	0	**255**
08:00	0	140	10	0	1	0	0	0	**1**	0	0	0	0	152
09:00	0	79	16	0	**10**	0	0	0	0	0	0	0	0	105
10:00	0	105	16	0	2	0	0	**1**	0	0	0	0	0	124
11:00	0	93	20	**2**	1	0	1	1	0	0	0	0	0	118
12 PM	0	89	13	0	0	**1**	0	0	0	0	0	0	0	103
13:00	0	121	12	**1**	4	0	0	0	0	0	0	0	0	138
14:00	0	**150**	**20**	0	0	0	0	0	0	0	0	0	0	**170**
15:00	**2**	117	11	0	1	0	0	0	0	0	0	0	0	131
16:00	0	141	16	0	**5**	0	0	0	0	0	0	0	0	162
17:00	0	119	8	0	0	0	0	0	0	0	0	0	0	127
18:00	0	143	6	0	0	0	0	0	0	0	0	0	0	149
19:00	0	104	7	1	0	0	0	0	0	0	0	0	0	112
20:00	0	79	6	0	0	0	0	0	0	0	0	0	0	85
21:00	0	78	3	0	0	0	0	0	0	0	0	0	0	81
22:00	0	57	3	0	0	0	0	0	0	0	0	0	0	60
23:00	0	26	0	0	0	0	0	0	0	0	0	0	0	26
Total	2	2012	208	4	28	2	3	2	1	0	0	0	0	2262
Percent	0.1%	88.9%	9.2%	0.2%	1.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak		07:00	07:00	11:00	09:00	07:00	07:00	10:00	08:00					07:00
Vol.		229	23	2	10	1	2	1	1					255
PM Peak	15:00	14:00	14:00	13:00	16:00	12:00								14:00
Vol.	2	150	20	1	5	1								170
Grand Total	2	2012	208	4	28	2	3	2	1	0	0	0	0	2262
Percent	0.1%	88.9%	9.2%	0.2%	1.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	

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City of Brea
Imperial Highway
W/ Flower Avenue
24 Hour Directional Classification Count

BRE001
Site Code: 051-221110

Eastbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
12/08/22	0	201	3	1	5	0	0	1	14	0	0	0	0	225
01:00	2	126	2	0	0	0	0	1	6	0	0	0	0	137
02:00	0	70	6	0	2	0	0	0	20	0	0	**2**	0	100
03:00	0	114	2	0	5	1	0	1	26	0	0	0	0	149
04:00	0	254	19	0	31	0	0	0	32	0	0	0	0	336
05:00	1	422	88	0	57	2	1	0	34	0	0	1	0	606
06:00	2	764	229	2	38	7	3	5	**37**	0	0	0	0	1087
07:00	**3**	1281	198	**3**	36	5	9	2	30	0	0	0	0	1567
08:00	1	**1360**	**251**	3	45	7	6	2	26	0	0	0	0	**1701**
09:00	0	1148	224	2	**95**	6	12	6	28	**1**	**1**	0	**1**	1524
10:00	0	1215	248	2	54	**9**	**15**	**7**	23	1	1	0	0	1575
11:00	3	1234	212	3	37	3	7	4	25	0	0	1	0	1529
12 PM	**6**	1286	224	4	**45**	**6**	**11**	**9**	**33**	0	1	0	**1**	1626
13:00	2	1339	215	4	45	1	6	4	19	0	0	0	0	1635
14:00	0	1371	**244**	2	26	4	3	7	18	0	**2**	0	0	1677
15:00	3	1375	228	**6**	25	4	1	1	16	0	1	0	0	1660
16:00	6	1426	209	3	10	6	0	1	17	0	0	0	0	**1678**
17:00	1	**1514**	84	3	13	0	0	0	20	0	0	0	0	1635
18:00	3	1273	44	1	10	0	1	0	4	0	1	0	0	1337
19:00	0	956	34	1	5	1	0	0	10	0	0	0	0	1007
20:00	0	838	24	0	6	0	0	0	9	0	1	0	0	878
21:00	1	666	34	1	4	0	0	1	6	0	2	0	0	715
22:00	1	548	9	1	2	0	0	0	21	0	0	0	0	582
23:00	0	292	6	1	3	0	0	0	5	0	0	0	0	307
Total	35	21073	2837	43	599	62	75	52	479	2	10	4	2	25273
Percent	0.1%	83.4%	11.2%	0.2%	2.4%	0.2%	0.3%	0.2%	1.9%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	08:00	08:00	07:00	09:00	10:00	10:00	10:00	06:00	09:00	09:00	02:00	09:00	08:00
Vol.	3	1360	251	3	95	9	15	7	37	1	1	2	1	1701
PM Peak	12:00	17:00	14:00	15:00	12:00	12:00	12:00	12:00	12:00		14:00		12:00	16:00
Vol.	6	1514	244	6	45	6	11	9	33		2		1	1678
Grand Total	35	21073	2837	43	599	62	75	52	479	2	10	4	2	25273
Percent	0.1%	83.4%	11.2%	0.2%	2.4%	0.2%	0.3%	0.2%	1.9%	0.0%	0.0%	0.0%	0.0%	

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City of Brea
Imperial Highway
W/ Flower Avenue
24 Hour Directional Classification Count

BRE001
Site Code: 051-221110

Westbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
12/08/22	0	187	8	0	4	5	0	0	7	0	0	0	0	211
01:00	1	96	5	0	5	2	0	0	7	0	0	0	0	116
02:00	0	75	2	0	7	5	2	0	29	**3**	0	0	0	123
03:00	0	170	6	1	5	1	4	0	21	1	0	0	0	209
04:00	2	250	19	**4**	6	2	0	0	36	0	0	0	0	319
05:00	0	405	54	2	12	**7**	4	2	**47**	2	0	0	0	535
06:00	4	643	167	4	28	5	4	8	28	0	0	0	0	891
07:00	4	1139	**218**	4	28	3	2	5	41	0	0	0	**1**	1445
08:00	1	**1223**	213	0	34	6	2	**11**	30	0	**1**	0	0	**1521**
09:00	2	1051	217	2	58	5	**15**	5	31	1	0	0	0	1387
10:00	0	951	195	2	48	3	3	9	30	0	0	**2**	0	1243
11:00	**5**	1127	205	1	**61**	4	10	7	22	0	0	0	1	1443
12 PM	2	1279	196	1	**62**	**7**	**11**	11	22	**1**	**2**	0	0	1594
13:00	4	1266	212	1	53	7	6	6	22	1	1	**1**	0	1580
14:00	**7**	1460	**254**	1	55	4	9	**12**	22	0	0	0	**1**	1825
15:00	2	1349	230	**4**	35	2	2	10	**31**	0	0	0	0	1665
16:00	5	1503	221	2	22	0	0	9	16	0	1	0	0	1779
17:00	1	**1602**	223	1	19	0	0	5	8	0	0	0	0	**1859**
18:00	4	1511	154	2	22	0	1	5	9	0	0	0	0	1708
19:00	5	1246	125	2	16	0	0	2	19	0	1	0	0	1416
20:00	1	914	87	0	7	4	0	2	8	0	0	0	0	1023
21:00	1	728	44	0	3	1	0	4	10	0	2	1	0	794
22:00	0	465	40	1	5	0	0	2	10	0	0	0	0	523
23:00	0	264	25	1	5	0	0	0	19	0	0	1	0	315
Total	51	20904	3120	36	600	73	75	115	525	9	8	5	3	25524
Percent	0.2%	81.9%	12.2%	0.1%	2.4%	0.3%	0.3%	0.5%	2.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	08:00	07:00	04:00	11:00	05:00	09:00	08:00	05:00	02:00	08:00	10:00	07:00	08:00
Vol.	5	1223	218	4	61	7	15	11	47	3	1	2	1	1521
PM Peak	14:00	17:00	14:00	15:00	12:00	12:00	12:00	14:00	15:00	12:00	12:00	13:00	14:00	17:00
Vol.	7	1602	254	4	62	7	11	12	31	1	2	1	1	1859
Grand Total	51	20904	3120	36	600	73	75	115	525	9	8	5	3	25524
Percent	0.2%	81.9%	12.2%	0.1%	2.4%	0.3%	0.3%	0.5%	2.1%	0.0%	0.0%	0.0%	0.0%	

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
Phone: (951) 268-6268
email: counts@countsunlimited.com

City of Brea
Imperial Highway
W/ Flower Avenue
24 Hour Directional Classification Count

BRE001
Site Code: 051-221110

Eastbound, Westbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
12/08/22	0	388	11	1	9	5	0	1	21	0	0	0	0	436
01:00	3	222	7	0	5	2	0	1	13	0	0	0	0	253
02:00	0	145	8	0	9	5	2	0	49	**3**	0	**2**	0	223
03:00	0	284	8	1	10	2	4	1	47	1	0	0	0	358
04:00	2	504	38	4	37	2	0	0	68	0	0	0	0	655
05:00	1	827	142	2	69	9	5	2	**81**	2	0	1	0	1141
06:00	6	1407	396	6	66	12	7	13	65	0	0	0	0	1978
07:00	7	2420	416	**7**	64	8	11	7	71	0	0	0	**1**	3012
08:00	2	**2583**	**464**	3	79	**13**	8	13	56	0	**1**	0	0	**3222**
09:00	2	2199	441	4	**153**	11	**27**	11	59	2	1	0	1	2911
10:00	0	2166	443	4	102	12	18	**16**	53	1	1	2	0	2818
11:00	**8**	2361	417	4	98	7	17	11	47	0	0	1	1	2972
12 PM	8	2565	420	5	**107**	**13**	**22**	**20**	**55**	**1**	3	0	**1**	3220
13:00	6	2605	427	5	98	8	12	10	41	1	1	**1**	0	3215
14:00	7	2831	**498**	3	81	8	12	19	40	0	2	0	1	**3502**
15:00	5	2724	458	**10**	60	6	3	11	47	0	1	0	0	3325
16:00	**11**	2929	430	5	32	6	0	10	33	0	1	0	0	3457
17:00	2	**3116**	307	4	32	0	0	5	28	0	0	0	0	3494
18:00	7	2784	198	3	32	0	2	5	13	0	1	0	0	3045
19:00	5	2202	159	3	21	1	0	2	29	0	1	0	0	2423
20:00	1	1752	111	0	13	4	0	2	17	0	1	0	0	1901
21:00	2	1394	78	1	7	1	0	5	16	0	**4**	1	0	1509
22:00	1	1013	49	2	7	0	0	2	31	0	0	0	0	1105
23:00	0	556	31	2	8	0	0	0	24	0	0	1	0	622
Total	86	41977	5957	79	1199	135	150	167	1004	11	18	9	5	50797
Percent	0.2%	82.6%	11.7%	0.2%	2.4%	0.3%	0.3%	0.3%	2.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	08:00	08:00	07:00	09:00	08:00	09:00	10:00	05:00	02:00	08:00	02:00	07:00	08:00
Vol.	8	2583	464	7	153	13	27	16	81	3	1	2	1	3222
PM Peak	16:00	17:00	14:00	15:00	12:00	12:00	12:00	12:00	12:00	12:00	21:00	13:00	12:00	14:00
Vol.	11	3116	498	10	107	13	22	20	55	1	4	1	1	3502
Grand Total	86	41977	5957	79	1199	135	150	167	1004	11	18	9	5	50797
Percent	0.2%	82.6%	11.7%	0.2%	2.4%	0.3%	0.3%	0.3%	2.0%	0.0%	0.0%	0.0%	0.0%	

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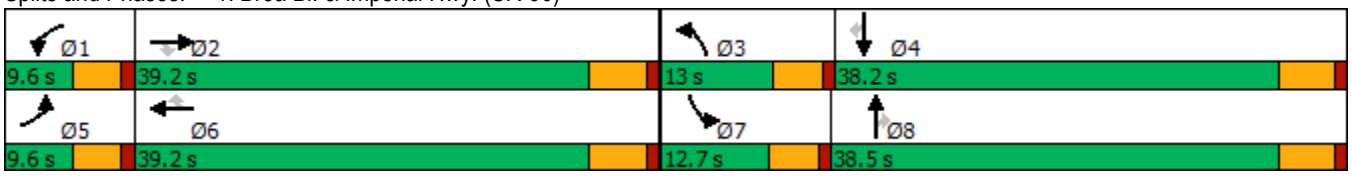
APPENDIX 3.2: EXISTING (2022) CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

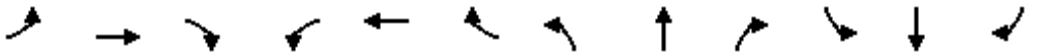
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	1350	348	145	1247	93	400	431	149	166	567	146
Future Volume (vph)	140	1350	348	145	1247	93	400	431	149	166	567	146
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	32.5	32.5	5.0	32.5	32.5	8.5	22.7	22.7	7.8	22.0	22.0
Actuated g/C Ratio	0.06	0.37	0.37	0.06	0.37	0.37	0.10	0.26	0.26	0.09	0.25	0.25
v/c Ratio	0.81	0.76	0.50	0.85	0.70	0.15	1.38	0.35	0.32	0.63	0.67	0.32
Control Delay	76.2	28.2	10.1	81.0	26.8	3.1	225.4	27.2	8.8	51.4	33.7	9.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	76.2	28.2	10.1	81.0	26.8	3.1	225.4	27.2	8.8	51.4	33.7	9.0
LOS	E	C	B	F	C	A	F	C	A	D	C	A
Approach Delay		28.4			30.6			105.3			32.9	
Approach LOS		C			C			F			C	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 88	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.38	
Intersection Signal Delay: 44.3	Intersection LOS: D
Intersection Capacity Utilization 78.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1350	348	145	1247	93	400	431	149	166	567	146
Future Volume (veh/h)	140	1350	348	145	1247	93	400	431	149	166	567	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	147	1421	358	153	1313	90	421	454	149	175	597	137
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	1845	563	189	1845	571	317	1366	417	244	869	383
Arrive On Green	0.06	0.36	0.36	0.06	0.36	0.36	0.10	0.27	0.27	0.08	0.24	0.24
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1566
Grp Volume(v), veh/h	147	1421	358	153	1313	90	421	454	149	175	597	137
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1566
Q Serve(g_s), s	3.8	20.7	16.1	4.0	18.6	3.2	8.4	6.0	6.5	4.5	12.8	6.1
Cycle Q Clear(g_c), s	3.8	20.7	16.1	4.0	18.6	3.2	8.4	6.0	6.5	4.5	12.8	6.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	1845	563	189	1845	571	317	1366	417	244	869	383
V/C Ratio(X)	0.78	0.77	0.64	0.81	0.71	0.16	1.33	0.33	0.36	0.72	0.69	0.36
Avail Cap(c_a), veh/h	189	2049	625	189	2049	634	317	2019	616	306	1392	613
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.1	23.8	22.3	39.1	23.1	18.2	37.9	24.8	25.0	38.0	28.9	26.3
Incr Delay (d2), s/veh	16.9	1.7	1.8	21.1	1.0	0.1	167.1	0.1	0.5	3.8	1.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	7.9	5.8	2.1	7.4	1.1	10.5	2.3	2.4	1.8	5.3	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.0	25.5	24.1	60.3	24.2	18.3	205.0	24.9	25.5	41.8	29.9	26.9
LnGrp LOS	E	C	C	E	C	B	F	C	C	D	C	C
Approach Vol, veh/h		1926			1556			1024			909	
Approach Delay, s/veh		27.6			27.4			99.0			31.7	
Approach LOS		C			C			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	35.8	13.0	25.8	9.6	35.8	11.1	27.7
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	6.0	22.7	10.4	14.8	5.8	20.6	6.5	8.5
Green Ext Time (p_c), s	0.0	7.5	0.0	4.2	0.0	8.0	0.0	3.6

Intersection Summary	
HCM 6th Ctrl Delay	41.7
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.639
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	32	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	400	431	149	166	567	146	132	1350	348	137	1247	93
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	400	431	149	166	567	146	132	1350	348	137	1247	93
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	400	431	149	166	567	146	132	1350	348	137	1247	93
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	400	431	149	166	567	146	132	1350	348	137	1247	93
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	400	431	149	166	567	146	132	1350	348	137	1247	93
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.08	0.09	0.05	0.17	0.09	0.04	0.26	0.20	0.04	0.24	0.05
Crit Moves:	****				****			****			****	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	579	15	15	652	5	6	1	16	0	0	15
Future Vol, veh/h	0	579	15	15	652	5	6	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	658	17	17	741	6	7	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	676	0	0	1064	1444	330	-	-	378
Stage 1	-	-	-	-	-	-	659	659	-	-	-	-
Stage 2	-	-	-	-	-	-	405	785	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	911	-	-	177	131	666	0	0	620
Stage 1	0	-	-	-	-	-	419	459	-	0	0	-
Stage 2	0	-	-	-	-	-	593	402	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	910	-	-	170	128	665	-	-	618
Mov Cap-2 Maneuver	-	-	-	-	-	-	295	251	-	-	-	-
Stage 1	-	-	-	-	-	-	419	459	-	-	-	-
Stage 2	-	-	-	-	-	-	566	393	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	13	11
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	475	-	-	910	-	-	618
HCM Lane V/C Ratio	0.055	-	-	0.019	-	-	0.028
HCM Control Delay (s)	13	-	-	9	-	-	11
HCM Lane LOS	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	15	18	1	28	18
Future Vol, veh/h	4	15	18	1	28	18
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	26	32	2	49	32

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	167	44	0	0	38	0
Stage 1	37	-	-	-	-	-
Stage 2	130	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	823	1026	-	-	1572	-
Stage 1	985	-	-	-	-	-
Stage 2	896	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	793	1015	-	-	1566	-
Mov Cap-2 Maneuver	793	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	867	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	4.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	959	1566	-
HCM Lane V/C Ratio	-	-	0.035	0.031	-
HCM Control Delay (s)	-	-	8.9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1711	13	0	1579	19	0	0	35	0	0	22
Future Vol, veh/h	0	1711	13	0	1579	19	0	0	35	0	0	22
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1764	13	0	1628	20	0	0	36	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	892	-	-	824
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	245	0	0	271
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	244	-	-	271
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

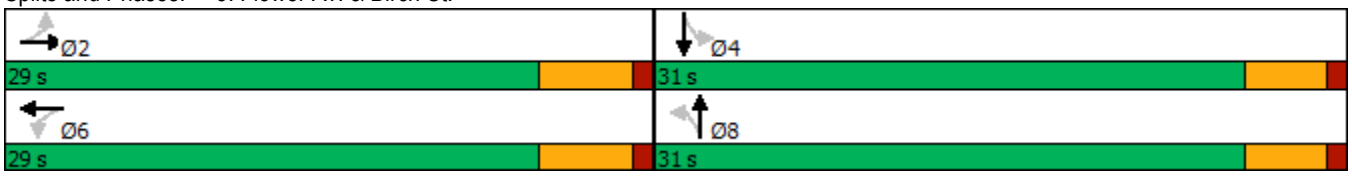
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.3	19.5
HCM LOS			C	C

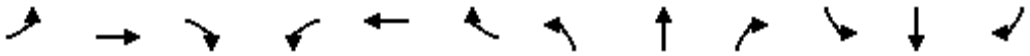
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	244	-	-	-	-	271
HCM Lane V/C Ratio	0.148	-	-	-	-	0.084
HCM Control Delay (s)	22.3	-	-	-	-	19.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	-	0.3

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	18	592	56	564	80	46	46	10
Future Volume (vph)	18	592	56	564	80	46	46	10
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	18.8	18.8	18.8	18.8		14.2		14.2
Actuated g/C Ratio	0.53	0.53	0.53	0.53		0.40		0.40
v/c Ratio	0.06	0.38	0.19	0.36		0.30		0.15
Control Delay	9.3	9.2	10.8	9.1		10.8		9.1
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	9.3	9.2	10.8	9.1		10.8		9.1
LOS	A	A	B	A		B		A
Approach Delay		9.2		9.2		10.8		9.1
Approach LOS		A		A		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 35.6	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.38	
Intersection Signal Delay: 9.4	Intersection LOS: A
Intersection Capacity Utilization 57.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	592	14	56	564	10	80	46	25	46	10	13
Future Volume (veh/h)	18	592	14	56	564	10	80	46	25	46	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	696	15	66	664	12	94	54	14	54	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	378	1388	30	365	1394	25	424	220	46	514	108	48
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	722	3554	77	698	3569	64	786	644	135	1002	316	140
Grp Volume(v), veh/h	21	348	363	66	330	346	162	0	0	73	0	0
Grp Sat Flow(s),veh/h/ln	722	1777	1854	698	1777	1857	1566	0	0	1457	0	0
Q Serve(g_s), s	0.8	5.4	5.4	2.9	5.1	5.1	1.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.9	5.4	5.4	8.3	5.1	5.1	2.5	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.58		0.09	0.74		0.10
Lane Grp Cap(c), veh/h	378	694	724	365	694	725	691	0	0	669	0	0
V/C Ratio(X)	0.06	0.50	0.50	0.18	0.48	0.48	0.23	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	565	1155	1205	546	1155	1206	1271	0	0	1191	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.6	8.5	8.5	11.6	8.4	8.4	8.7	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.5	0.2	0.5	0.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.6	1.7	0.4	1.4	1.4	0.8	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.6	9.0	9.0	11.9	8.9	8.8	8.9	0.0	0.0	8.3	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		732			742			162			73	
Approach Delay, s/veh		9.1			9.1			8.9			8.3	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.5		17.1		19.5		17.1				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		7.9		3.0		10.3		4.5				
Green Ext Time (p_c), s		4.4		0.3		3.8		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			9.0									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	16	0	4	0	0	2	25	164	12	18	100	21
Future Vol, veh/h	16	0	4	0	0	2	25	164	12	18	100	21
Conflicting Peds, #/hr	0	0	52	0	0	56	0	0	44	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	0	7	0	0	3	42	278	20	31	169	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	688	684	248	721	692	388	214	0	0	342	0	0
Stage 1	258	258	-	416	416	-	-	-	-	-	-	-
Stage 2	430	426	-	305	276	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	360	371	791	343	367	660	1356	-	-	1217	-	-
Stage 1	747	694	-	614	592	-	-	-	-	-	-	-
Stage 2	603	586	-	705	682	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	319	329	745	294	325	599	1344	-	-	1166	-	-
Mov Cap-2 Maneuver	319	329	-	294	325	-	-	-	-	-	-	-
Stage 1	713	667	-	566	546	-	-	-	-	-	-	-
Stage 2	546	540	-	644	655	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16	11	1	1.1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1344	-	-	360	599	1166	-	-
HCM Lane V/C Ratio	0.032	-	-	0.094	0.006	0.026	-	-
HCM Control Delay (s)	7.8	0	-	16	11	8.2	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0	0.1	-	-

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	1625	3	0	1525	121	0	0	4	7	0	73
Future Vol, veh/h	80	1625	3	0	1525	121	0	0	4	7	0	73
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	86	1747	3	0	1640	130	0	0	4	8	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1775	0	0	-	-	0	-	-	877	2581	-	890
Stage 1	-	-	-	-	-	-	-	-	-	1710	-	-
Stage 2	-	-	-	-	-	-	-	-	-	871	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	162	-	-	0	-	-	0	0	250	27	0	245
Stage 1	-	-	-	0	-	-	0	0	-	63	0	-
Stage 2	-	-	-	0	-	-	0	0	-	283	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	161	-	-	-	-	-	-	-	250	15	-	244
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	25	-	-
Stage 1	-	-	-	-	-	-	-	-	-	29	-	-
Stage 2	-	-	-	-	-	-	-	-	-	130	-	-

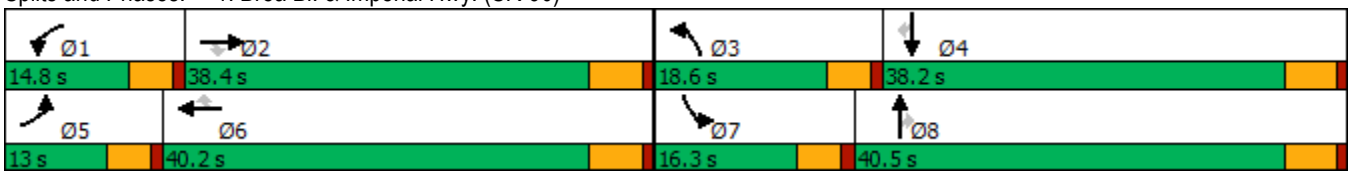
Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	0	19.7	42
HCM LOS			C	E

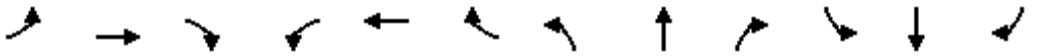
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	250	161	-	-	-	-	25	244
HCM Lane V/C Ratio	0.017	0.534	-	-	-	-	0.301	0.322
HCM Control Delay (s)	19.7	50.5	-	-	-	-	202.1	26.6
HCM Lane LOS	C	F	-	-	-	-	F	D
HCM 95th %tile Q(veh)	0.1	2.7	-	-	-	-	0.9	1.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	1187	329	272	1311	135	387	531	202	235	514	207
Future Volume (vph)	199	1187	329	272	1311	135	387	531	202	235	514	207
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	32.3	32.3	10.3	34.2	34.2	14.1	25.8	25.8	10.9	22.6	22.6
Actuated g/C Ratio	0.08	0.33	0.33	0.10	0.34	0.34	0.14	0.26	0.26	0.11	0.23	0.23
v/c Ratio	0.80	0.77	0.53	0.90	0.81	0.24	0.93	0.43	0.40	0.73	0.69	0.46
Control Delay	68.0	34.6	13.2	75.2	34.6	8.9	71.9	31.6	9.0	57.1	39.5	11.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.0	34.6	13.2	75.2	34.6	8.9	71.9	31.6	9.0	57.1	39.5	11.3
LOS	E	C	B	E	C	A	E	C	A	E	D	B
Approach Delay		34.3			39.0			41.4			37.7	
Approach LOS		C			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 99.2	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 37.8	Intersection LOS: D
Intersection Capacity Utilization 79.3%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	199	1187	329	272	1311	135	387	531	202	235	514	207
Future Volume (veh/h)	199	1187	329	272	1311	135	387	531	202	235	514	207
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	214	1276	212	292	1410	88	416	571	114	253	553	164
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	275	1621	493	338	1723	530	464	1379	419	317	795	350
Arrive On Green	0.09	0.32	0.32	0.11	0.34	0.34	0.15	0.27	0.27	0.10	0.22	0.22
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1562
Grp Volume(v), veh/h	214	1276	212	292	1410	88	416	571	114	253	553	164
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1562
Q Serve(g_s), s	6.3	21.8	10.4	8.7	24.2	3.8	12.3	8.8	5.6	7.5	13.7	8.7
Cycle Q Clear(g_c), s	6.3	21.8	10.4	8.7	24.2	3.8	12.3	8.8	5.6	7.5	13.7	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	275	1621	493	338	1723	530	464	1379	419	317	795	350
V/C Ratio(X)	0.78	0.79	0.43	0.86	0.82	0.17	0.90	0.41	0.27	0.80	0.70	0.47
Avail Cap(c_a), veh/h	279	1756	534	338	1852	570	464	1879	571	388	1222	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.9	29.8	25.9	42.2	29.1	22.3	40.2	28.8	27.6	42.2	34.2	32.3
Incr Delay (d2), s/veh	11.7	2.3	0.6	19.1	2.8	0.1	19.1	0.2	0.3	7.4	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.9	8.8	3.8	4.3	10.2	1.4	5.9	3.5	2.0	3.2	5.9	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	32.1	26.5	61.3	31.9	22.5	59.3	29.0	27.9	49.7	35.3	33.3
LnGrp LOS	D	C	C	E	C	C	E	C	C	D	D	C
Approach Vol, veh/h		1702			1790			1101			970	
Approach Delay, s/veh		34.2			36.3			40.3			38.7	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	35.9	18.6	26.7	12.9	37.8	14.2	31.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	10.7	23.8	14.3	15.7	8.3	26.2	9.5	10.8
Green Ext Time (p_c), s	0.0	5.8	0.0	3.9	0.0	6.0	0.1	4.3

Intersection Summary	
HCM 6th Ctrl Delay	36.9
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.730
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	41	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	199	1187	329	272	1311	135	387	531	202	235	514	207
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	199	1187	329	272	1311	135	387	531	202	235	514	207
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	199	1187	329	272	1311	135	387	531	202	235	514	207
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	199	1187	329	272	1311	135	387	531	202	235	514	207
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	199	1187	329	272	1311	135	387	531	202	235	514	207
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.06	0.23	0.19	0.08	0.39	0.08	0.11	0.10	0.12	0.07	0.10	0.12
Crit Moves:	****				****		****					****

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	814	36	23	936	20	14	1	67	0	0	21
Future Vol, veh/h	0	814	36	23	936	20	14	1	67	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	925	41	26	1064	23	16	1	76	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	975	0	0	1518	2076	472	-	-	547
Stage 1	-	-	-	-	-	-	934	934	-	-	-	-
Stage 2	-	-	-	-	-	-	584	1142	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	703	-	-	82	53	538	0	0	481
Stage 1	0	-	-	-	-	-	286	343	-	0	0	-
Stage 2	0	-	-	-	-	-	465	273	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	697	-	-	75	50	533	-	-	480
Mov Cap-2 Maneuver	-	-	-	-	-	-	189	157	-	-	-	-
Stage 1	-	-	-	-	-	-	286	340	-	-	-	-
Stage 2	-	-	-	-	-	-	425	262	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.8	12.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	398	-	-	697	-	-	480
HCM Lane V/C Ratio	0.234	-	-	0.037	-	-	0.05
HCM Control Delay (s)	16.8	-	-	10.4	-	-	12.9
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	19	28	6	22	48
Future Vol, veh/h	8	19	28	6	22	48
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	29	42	9	33	73

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	187	51	0	0	52	0
Stage 1	48	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	802	1017	-	-	1554	-
Stage 1	974	-	-	-	-	-
Stage 2	888	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	784	1013	-	-	1553	-
Mov Cap-2 Maneuver	784	-	-	-	-	-
Stage 1	973	-	-	-	-	-
Stage 2	868	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	932	1553	-
HCM Lane V/C Ratio	-	-	0.044	0.021	-
HCM Control Delay (s)	-	-	9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1648	21	0	1818	34	0	0	23	0	0	56
Future Vol, veh/h	0	1648	21	0	1818	34	0	0	23	0	0	56
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1916	24	0	2114	40	0	0	27	0	0	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	970	-	-	1077
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	357	0	0	319
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	357	-	-	319
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

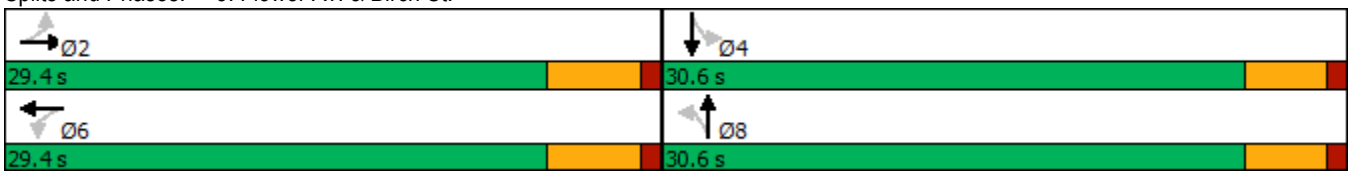
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	15.9	19.2
HCM LOS			C	C

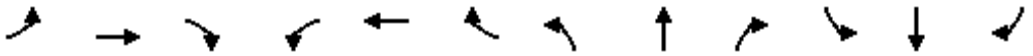
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	357	-	-	-	-	319
HCM Lane V/C Ratio	0.075	-	-	-	-	0.204
HCM Control Delay (s)	15.9	-	-	-	-	19.2
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.8

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	25	858	76	920	43	35	33	3
Future Volume (vph)	25	858	76	920	43	35	33	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	23.4	23.4	23.4	23.4		14.4		14.4
Actuated g/C Ratio	0.59	0.59	0.59	0.59		0.36		0.36
v/c Ratio	0.12	0.47	0.32	0.51		0.25		0.12
Control Delay	10.2	9.3	14.0	9.6		10.7		9.2
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.2	9.3	14.0	9.6		10.7		9.2
LOS	B	A	B	A		B		A
Approach Delay		9.3		10.0		10.7		9.2
Approach LOS		A		A		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 39.7	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 9.7	Intersection LOS: A
Intersection Capacity Utilization 67.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	858	19	76	920	19	43	35	51	33	3	20
Future Volume (veh/h)	25	858	19	76	920	19	43	35	51	33	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	964	20	85	1034	19	48	39	30	37	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	1655	34	301	1660	30	276	214	131	483	45	58
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	507	3559	74	541	3569	66	515	668	408	1063	139	180
Grp Volume(v), veh/h	28	481	503	85	515	538	117	0	0	46	0	0
Grp Sat Flow(s),veh/h/ln	507	1777	1856	541	1777	1858	1591	0	0	1382	0	0
Q Serve(g_s), s	2.0	9.1	9.1	6.3	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.0	9.1	9.1	15.4	10.0	10.0	2.2	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.04	0.41		0.26	0.80		0.13
Lane Grp Cap(c), veh/h	282	826	863	301	826	864	622	0	0	586	0	0
V/C Ratio(X)	0.10	0.58	0.58	0.28	0.62	0.62	0.19	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	315	939	981	335	939	982	1005	0	0	911	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.8	9.0	9.0	14.6	9.2	9.2	11.3	0.0	0.0	10.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.7	0.7	0.5	1.0	1.0	0.1	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	2.9	3.0	0.7	2.9	3.1	0.8	0.0	0.0	0.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.9	9.7	9.7	15.1	10.3	10.2	11.5	0.0	0.0	10.9	0.0	0.0
LnGrp LOS	B	A	A	B	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1012			1138			117			46	
Approach Delay, s/veh		9.8			10.6			11.5			10.9	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.5		19.3		26.5		19.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		14.0		2.8		17.4		4.2				
Green Ext Time (p_c), s		4.9		0.2		3.9		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	0	0	0	0	0	1	3	99	8	10	71	3
Future Vol, veh/h	0	0	0	0	0	1	3	99	8	10	71	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	1	4	127	10	13	91	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	260	264	93	259	261	132	95	0	0	137	0	0
Stage 1	119	119	-	140	140	-	-	-	-	-	-	-
Stage 2	141	145	-	119	121	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	693	641	964	694	644	917	1499	-	-	1447	-	-
Stage 1	885	797	-	863	781	-	-	-	-	-	-	-
Stage 2	862	777	-	885	796	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	685	633	964	688	636	917	1499	-	-	1447	-	-
Mov Cap-2 Maneuver	685	633	-	688	636	-	-	-	-	-	-	-
Stage 1	882	790	-	860	779	-	-	-	-	-	-	-
Stage 2	858	775	-	877	789	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.9	0.2	0.9
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1499	-	-	-	917	1447	-	-
HCM Lane V/C Ratio	0.003	-	-	-	0.001	0.009	-	-
HCM Control Delay (s)	7.4	0	-	0	8.9	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	1592	13	0	1793	64	0	0	3	12	0	59
Future Vol, veh/h	46	1592	13	0	1793	64	0	0	3	12	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	1769	14	0	1992	71	0	0	3	13	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2063	0	0	-	-	0	-	-	892	2838	-	1032
Stage 1	-	-	-	-	-	-	-	-	-	2028	-	-
Stage 2	-	-	-	-	-	-	-	-	-	810	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	116	-	-	0	-	-	0	0	245	19	0	197
Stage 1	-	-	-	0	-	-	0	0	-	37	0	-
Stage 2	-	-	-	0	-	-	0	0	-	308	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	116	-	-	-	-	-	-	-	245	~ 12	-	197
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	19	-	-
Stage 1	-	-	-	-	-	-	-	-	-	21	-	-
Stage 2	-	-	-	-	-	-	-	-	-	170	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	0	19.9	91.1
HCM LOS			C	F

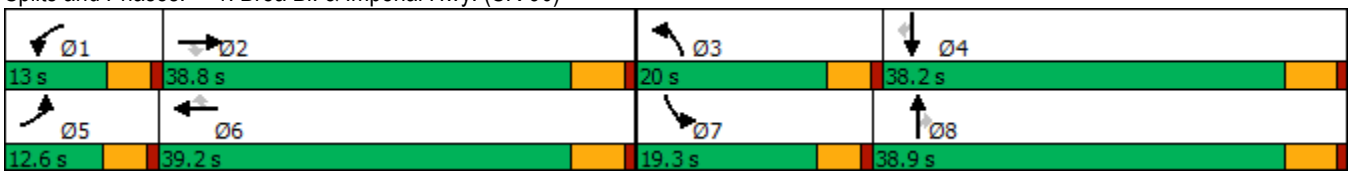
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	245	116	-	-	-	-	19	197
HCM Lane V/C Ratio	0.014	0.441	-	-	-	-	0.702	0.333
HCM Control Delay (s)	19.9	58.5	-	-	-	-	$ 381	32.1
HCM Lane LOS	C	F	-	-	-	-	F	D
HCM 95th %tile Q(veh)	0	1.9	-	-	-	-	1.9	1.4

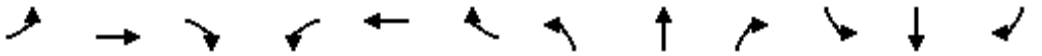
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	199	1465	430	250	1447	144	492	672	229	242	559	177
Future Volume (vph)	199	1465	430	250	1447	144	492	672	229	242	559	177
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.5	33.5	8.4	33.9	33.9	15.4	26.8	26.8	11.7	23.1	23.1
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.12	0.23	0.23
v/c Ratio	0.81	0.88	0.64	0.96	0.86	0.25	1.03	0.51	0.43	0.67	0.70	0.38
Control Delay	70.5	39.6	17.5	94.2	38.0	9.3	92.3	32.6	10.6	52.4	40.1	9.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	70.5	39.6	17.5	94.2	38.0	9.3	92.3	32.6	10.6	52.4	40.1	9.3
LOS	E	D	B	F	D	A	F	C	B	D	D	A
Approach Delay		38.0			43.4			50.1			37.6	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 100.3	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.03	
Intersection Signal Delay: 42.2	Intersection LOS: D
Intersection Capacity Utilization 84.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	199	1465	430	250	1447	144	492	672	229	242	559	177
Future Volume (veh/h)	199	1465	430	250	1447	144	492	672	229	242	559	177
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	203	1495	269	255	1477	87	502	686	130	247	570	140
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	262	1706	521	275	1727	533	505	1414	432	314	771	337
Arrive On Green	0.08	0.33	0.33	0.09	0.34	0.34	0.16	0.28	0.28	0.10	0.22	0.22
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1554
Grp Volume(v), veh/h	203	1495	269	255	1477	87	502	686	130	247	570	140
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1554
Q Serve(g_s), s	6.1	26.8	13.5	7.7	26.2	3.8	15.3	10.9	6.4	7.4	14.5	7.5
Cycle Q Clear(g_c), s	6.1	26.8	13.5	7.7	26.2	3.8	15.3	10.9	6.4	7.4	14.5	7.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	1706	521	275	1727	533	505	1414	432	314	771	337
V/C Ratio(X)	0.77	0.88	0.52	0.93	0.86	0.16	0.99	0.49	0.30	0.79	0.74	0.42
Avail Cap(c_a), veh/h	262	1756	536	275	1777	548	505	1772	542	482	1208	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.7	30.4	26.0	44.0	29.9	22.5	40.8	29.3	27.7	42.8	35.5	32.7
Incr Delay (d2), s/veh	12.3	5.2	0.8	34.7	4.2	0.1	38.5	0.3	0.4	2.1	1.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	11.1	4.9	4.4	11.2	1.4	8.5	4.4	2.4	2.9	6.3	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.9	35.7	26.8	78.7	34.2	22.6	79.3	29.6	28.1	44.9	36.9	33.5
LnGrp LOS	E	D	C	E	C	C	E	C	C	D	D	C
Approach Vol, veh/h		1967			1819			1318			957	
Approach Delay, s/veh		36.6			39.9			48.4			38.5	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	37.8	20.0	26.3	12.6	38.2	14.2	32.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	9.7	28.8	17.3	16.5	8.1	28.2	9.4	12.9
Green Ext Time (p_c), s	0.0	3.6	0.0	3.9	0.0	4.4	0.2	5.1

Intersection Summary	
HCM 6th Ctrl Delay	40.4
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.788
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	50	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	199	1465	430	250	1447	144	492	672	229	242	559	177
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	199	1465	430	250	1447	144	492	672	229	242	559	177
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	199	1465	430	250	1447	144	492	672	229	242	559	177
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	199	1465	430	250	1447	144	492	672	229	242	559	177
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	199	1465	430	250	1447	144	492	672	229	242	559	177
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.06	0.29	0.25	0.07	0.43	0.08	0.14	0.13	0.13	0.07	0.11	0.10
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑↱			↔				↱
Traffic Vol, veh/h	0	933	32	30	1059	19	5	6	41	0	0	26
Future Vol, veh/h	0	933	32	30	1059	19	5	6	41	0	0	26
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1014	35	33	1151	21	5	7	45	0	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1051	0	0	1658	2260	509	-	-	592
Stage 1	-	-	-	-	-	-	1016	1016	-	-	-	-
Stage 2	-	-	-	-	-	-	642	1244	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	658	-	-	64	40	509	0	0	449
Stage 1	0	-	-	-	-	-	255	314	-	0	0	-
Stage 2	0	-	-	-	-	-	429	244	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	657	-	-	58	38	508	-	-	446
Mov Cap-2 Maneuver	-	-	-	-	-	-	165	138	-	-	-	-
Stage 1	-	-	-	-	-	-	255	313	-	-	-	-
Stage 2	-	-	-	-	-	-	382	230	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	17.8	13.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	337	-	-	657	-	-	446
HCM Lane V/C Ratio	0.168	-	-	0.05	-	-	0.063
HCM Control Delay (s)	17.8	-	-	10.8	-	-	13.6
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	6	35	1	5	36
Future Vol, veh/h	5	6	35	1	5	36
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	8	49	1	7	51

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	115	50	0	0	50	0
Stage 1	50	-	-	-	-	-
Stage 2	65	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	881	1018	-	-	1557	-
Stage 1	972	-	-	-	-	-
Stage 2	958	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	877	1018	-	-	1557	-
Mov Cap-2 Maneuver	877	-	-	-	-	-
Stage 1	972	-	-	-	-	-
Stage 2	953	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	949	1557	-
HCM Lane V/C Ratio	-	-	0.016	0.005	-
HCM Control Delay (s)	-	-	8.9	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1775	18	0	1894	36	0	0	26	0	0	41
Future Vol, veh/h	0	1775	18	0	1894	36	0	0	26	0	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1849	19	0	1973	38	0	0	27	0	0	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	934	-	-	1006
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	308	0	0	283
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	308	-	-	283
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

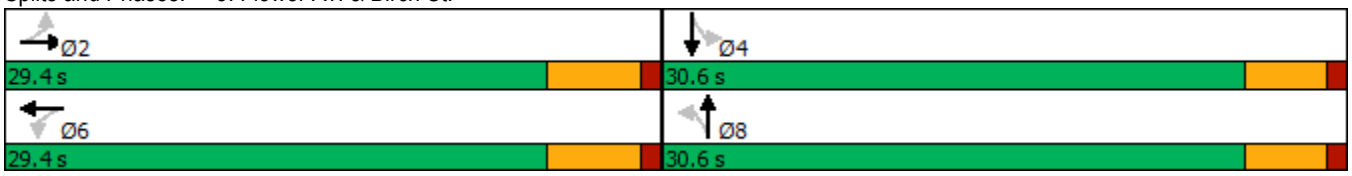
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.8	20
HCM LOS			C	C

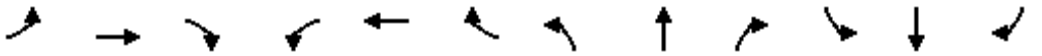
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	308	-	-	-	-	283
HCM Lane V/C Ratio	0.088	-	-	-	-	0.151
HCM Control Delay (s)	17.8	-	-	-	-	20
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.5

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	24	977	87	1036	15	10	26	2
Future Volume (vph)	24	977	87	1036	15	10	26	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	25.8	25.8	25.8	25.8		14.8		14.8
Actuated g/C Ratio	0.70	0.70	0.70	0.70		0.40		0.40
v/c Ratio	0.08	0.40	0.27	0.43		0.12		0.08
Control Delay	9.4	7.8	12.0	8.0		8.0		9.4
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	9.4	7.8	12.0	8.0		8.0		9.4
LOS	A	A	B	A		A		A
Approach Delay		7.8		8.3		8.0		9.4
Approach LOS		A		A		A		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 36.8	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.43	
Intersection Signal Delay: 8.1	Intersection LOS: A
Intersection Capacity Utilization 59.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	977	7	87	1036	8	15	10	54	26	2	15
Future Volume (veh/h)	24	977	7	87	1036	8	15	10	54	26	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	987	6	88	1046	8	15	10	25	26	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	424	2023	12	443	2019	15	194	58	101	290	40	53
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	506	3621	22	537	3614	28	341	462	803	768	316	426
Grp Volume(v), veh/h	24	484	509	88	514	540	50	0	0	39	0	0
Grp Sat Flow(s),veh/h/ln	506	1777	1866	537	1777	1864	1606	0	0	1510	0	0
Q Serve(g_s), s	1.0	5.1	5.1	3.7	5.6	5.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.5	5.1	5.1	8.8	5.6	5.6	0.8	0.0	0.0	0.6	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.30		0.50	0.67		0.28
Lane Grp Cap(c), veh/h	424	993	1043	443	993	1041	352	0	0	383	0	0
V/C Ratio(X)	0.06	0.49	0.49	0.20	0.52	0.52	0.14	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	536	1386	1456	562	1386	1454	1468	0	0	1408	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.3	4.2	4.2	6.8	4.3	4.3	12.2	0.0	0.0	12.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.2	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.9	0.9	0.3	0.6	0.6	0.3	0.0	0.0	0.2	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.3	4.5	4.5	7.0	4.7	4.7	12.4	0.0	0.0	12.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1017			1142			50			39	
Approach Delay, s/veh		4.6			4.8			12.4			12.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		8.5		22.5		8.5				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		8.5		2.6		10.8		2.8				
Green Ext Time (p_c), s		6.4		0.1		6.3		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.0									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	0	6	1	0	1	16	88	3	4	63	19
Future Vol, veh/h	6	0	6	1	0	1	16	88	3	4	63	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	8	1	0	1	22	122	4	6	88	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	283	284	102	285	295	124	115	0	0	126	0	0
Stage 1	114	114	-	168	168	-	-	-	-	-	-	-
Stage 2	169	170	-	117	127	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	669	625	953	667	616	927	1474	-	-	1460	-	-
Stage 1	891	801	-	834	759	-	-	-	-	-	-	-
Stage 2	833	758	-	888	791	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	657	612	952	651	603	927	1473	-	-	1460	-	-
Mov Cap-2 Maneuver	657	612	-	651	603	-	-	-	-	-	-	-
Stage 1	876	797	-	821	747	-	-	-	-	-	-	-
Stage 2	818	746	-	877	787	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	9.7	1.1	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1473	-	-	777	765	1460	-	-
HCM Lane V/C Ratio	0.015	-	-	0.021	0.004	0.004	-	-
HCM Control Delay (s)	7.5	0	-	9.7	9.7	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	1780	5	0	1874	65	0	0	7	14	0	56
Future Vol, veh/h	42	1780	5	0	1874	65	0	0	7	14	0	56
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	1835	5	0	1932	67	0	0	7	14	0	58

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2004	0	0	-	-	0	-	-	923	2791	-	1005
Stage 1	-	-	-	-	-	-	-	-	-	1971	-	-
Stage 2	-	-	-	-	-	-	-	-	-	820	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	124	-	-	0	-	-	0	0	233	20	0	206
Stage 1	-	-	-	0	-	-	0	0	-	40	0	-
Stage 2	-	-	-	0	-	-	0	0	-	304	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	123	-	-	-	-	-	-	-	232	~ 14	-	205
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	23	-	-
Stage 1	-	-	-	-	-	-	-	-	-	26	-	-
Stage 2	-	-	-	-	-	-	-	-	-	192	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0	21	84.2
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	232	123	-	-	-	-	23	205
HCM Lane V/C Ratio	0.031	0.352	-	-	-	-	0.628	0.282
HCM Control Delay (s)	21	49.4	-	-	-	-	$ 304	29.3
HCM Lane LOS	C	E	-	-	-	-	F	D
HCM 95th %tile Q(veh)	0.1	1.4	-	-	-	-	1.9	1.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

APPENDIX 3.3: EXISTING (2022) CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

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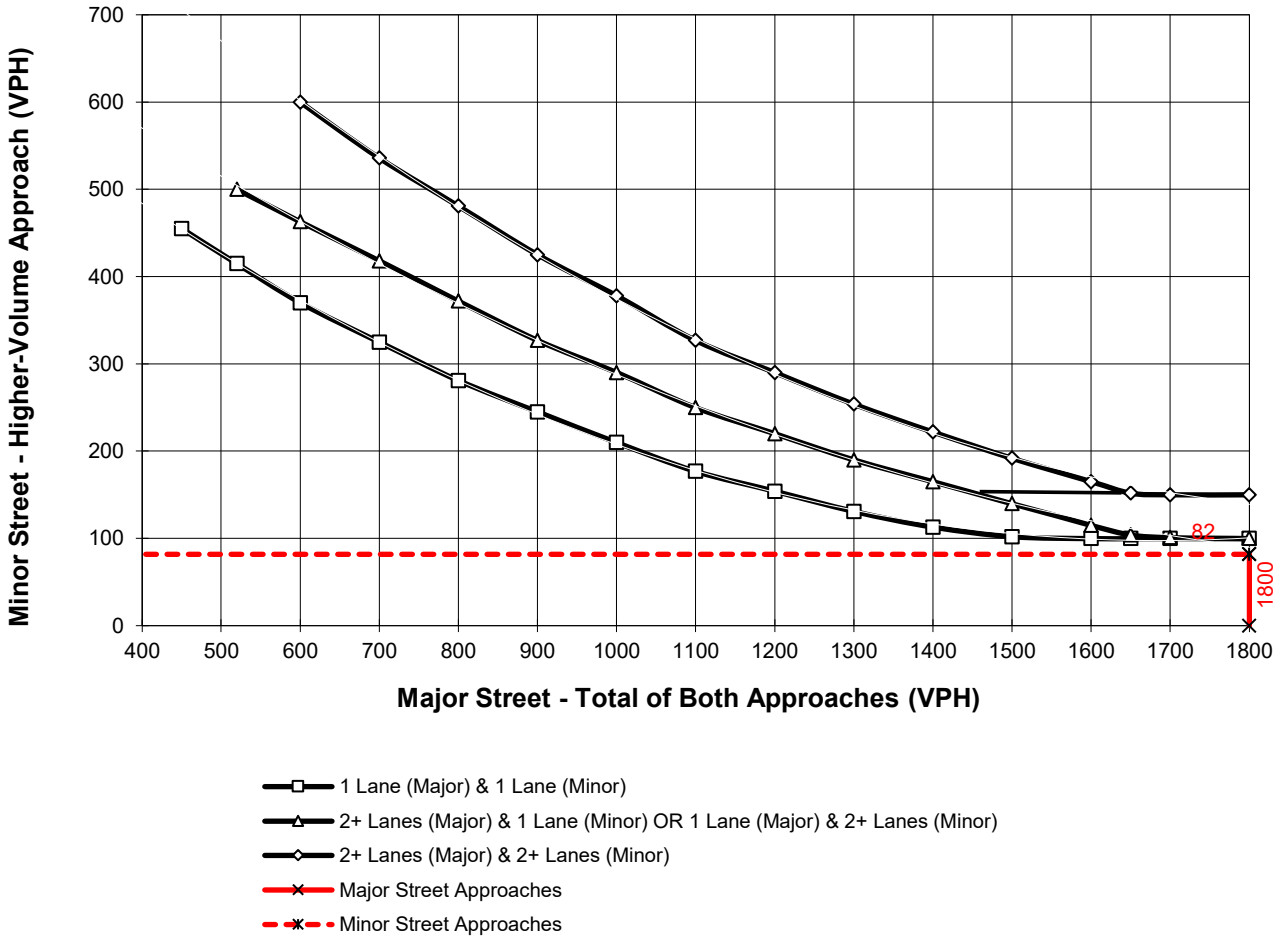
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **Existing (2022) Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Birch St.**
Total of Both Approaches (VPH) = **1829**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**
High Volume Approach (VPH) = **82**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

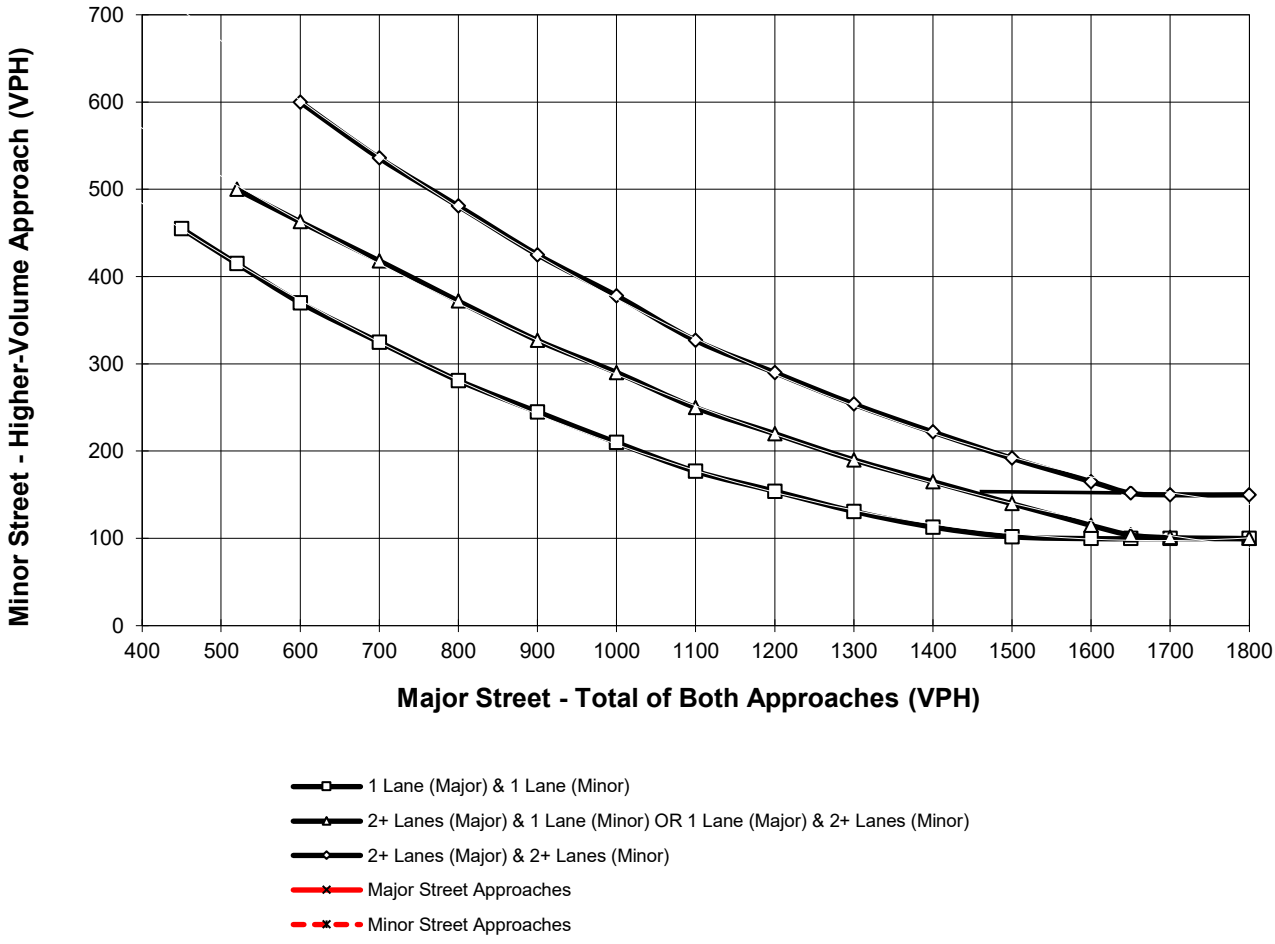
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **Existing (2022) Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **104**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **27**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

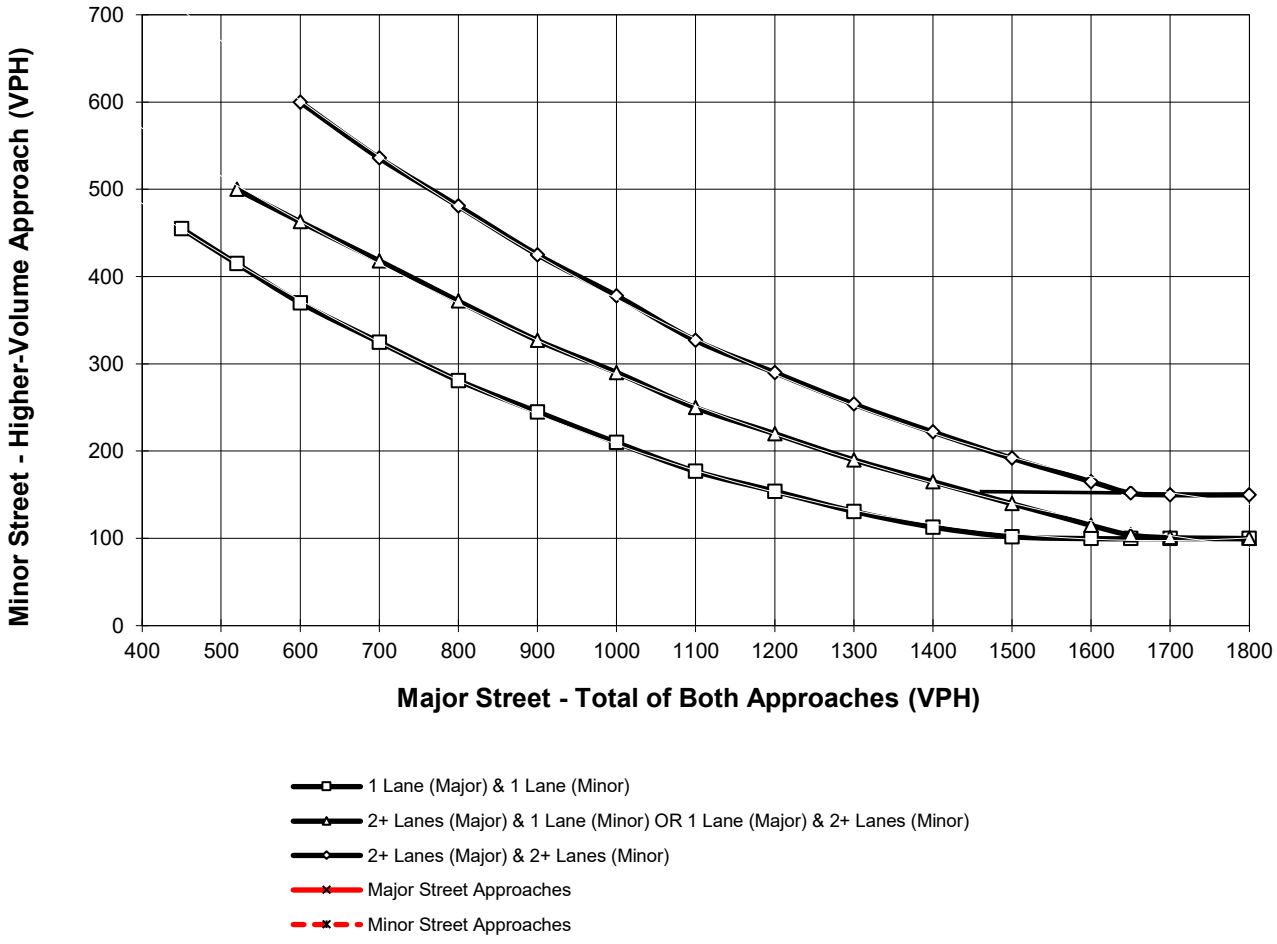
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **Existing (2022) Conditions - Weekday AM Peak Hour**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **340**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **20**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

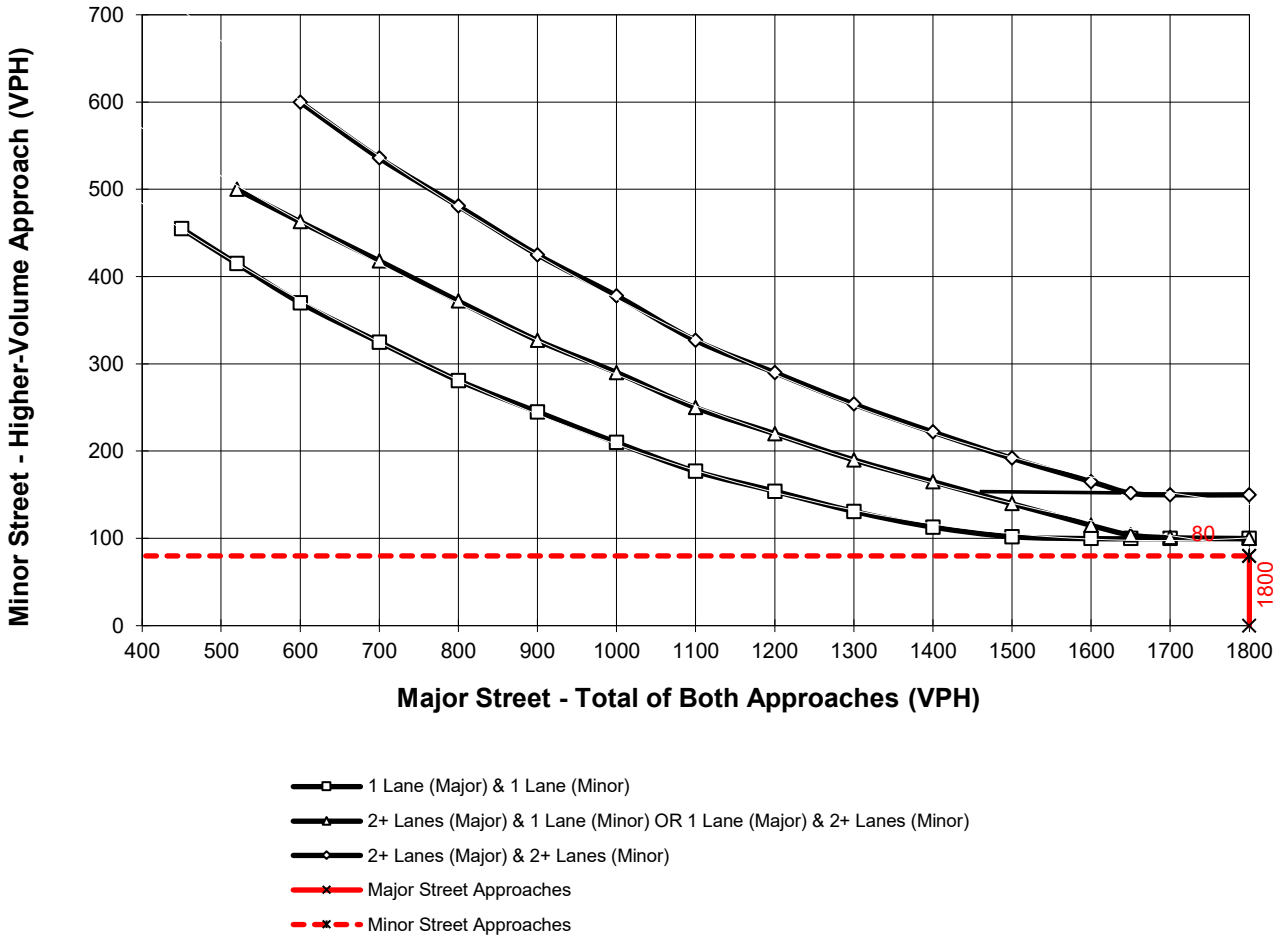
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **Existing (2022) Conditions - Weekday AM Peak Hour**

Major Street Name = **Imperial Hwy. (SR-90)** Total of Both Approaches (VPH) = **3354**
Number of Approach Lanes on Major Street = **3**

Minor Street Name = **Flower Av.** High Volume Approach (VPH) = **80**
Number of Approach Lanes On Minor Street = **1**

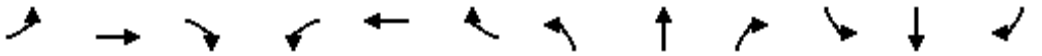
SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 3.4: EXISTING (2022) CONDITIONS QUEUING ANALYSIS WORKSHEETS

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	140	1350	348	145	1247	93	400	431	149	166	567	146
Future Volume (veh/h)	140	1350	348	145	1247	93	400	431	149	166	567	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	147	1421	358	153	1313	90	421	454	149	175	597	137
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	1845	563	189	1845	571	317	1366	417	244	869	383
Arrive On Green	0.06	0.36	0.36	0.06	0.36	0.36	0.10	0.27	0.27	0.08	0.24	0.24
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1566
Grp Volume(v), veh/h	147	1421	358	153	1313	90	421	454	149	175	597	137
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1566
Q Serve(g_s), s	3.8	20.7	16.1	4.0	18.6	3.2	8.4	6.0	6.5	4.5	12.8	6.1
Cycle Q Clear(g_c), s	3.8	20.7	16.1	4.0	18.6	3.2	8.4	6.0	6.5	4.5	12.8	6.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	189	1845	563	189	1845	571	317	1366	417	244	869	383
V/C Ratio(X)	0.78	0.77	0.64	0.81	0.71	0.16	1.33	0.33	0.36	0.72	0.69	0.36
Avail Cap(c_a), veh/h	189	2049	625	189	2049	634	317	2019	616	306	1392	613
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.1	23.8	22.3	39.1	23.1	18.2	37.9	24.8	25.0	38.0	28.9	26.3
Incr Delay (d2), s/veh	16.9	1.7	1.8	21.1	1.0	0.1	167.1	0.1	0.5	3.8	1.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.4	12.5	9.7	3.8	11.9	2.1	17.4	4.2	4.3	3.3	9.1	4.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.0	25.5	24.1	60.3	24.2	18.3	205.0	24.9	25.5	41.8	29.9	26.9
LnGrp LOS	E	C	C	E	C	B	F	C	C	D	C	C
Approach Vol, veh/h		1926			1556			1024			909	
Approach Delay, s/veh		27.6			27.4			99.0			31.7	
Approach LOS		C			C			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	35.8	13.0	25.8	9.6	35.8	11.1	27.7
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	6.0	22.7	10.4	14.8	5.8	20.6	6.5	8.5
Green Ext Time (p_c), s	0.0	7.5	0.0	4.2	0.0	8.0	0.0	3.6

Intersection Summary	
HCM 6th Ctrl Delay	41.7
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↱			↕				↱
Traffic Vol, veh/h	0	579	15	15	652	5	6	1	16	0	0	15
Future Vol, veh/h	0	579	15	15	652	5	6	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	658	17	17	741	6	7	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	676	0	0	1064	1444	330	-	-	378
Stage 1	-	-	-	-	-	-	659	659	-	-	-	-
Stage 2	-	-	-	-	-	-	405	785	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	911	-	-	177	131	666	0	0	620
Stage 1	0	-	-	-	-	-	419	459	-	0	0	-
Stage 2	0	-	-	-	-	-	593	402	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	910	-	-	170	128	665	-	-	618
Mov Cap-2 Maneuver	-	-	-	-	-	-	295	251	-	-	-	-
Stage 1	-	-	-	-	-	-	419	459	-	-	-	-
Stage 2	-	-	-	-	-	-	566	393	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	13	11
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	475	-	-	910	-	-	618
HCM Lane V/C Ratio	0.055	-	-	0.019	-	-	0.028
HCM Control Delay (s)	13	-	-	9	-	-	11
HCM Lane LOS	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-	0.1

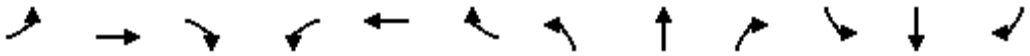
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1711	13	0	1579	19	0	0	35	0	0	22
Future Vol, veh/h	0	1711	13	0	1579	19	0	0	35	0	0	22
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1764	13	0	1628	20	0	0	36	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	892	-	-	824
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	245	0	0	271
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	244	-	-	271
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.3	19.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	244	-	-	-	-	271
HCM Lane V/C Ratio	0.148	-	-	-	-	0.084
HCM Control Delay (s)	22.3	-	-	-	-	19.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.5	-	-	-	-	0.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	592	14	56	564	10	80	46	25	46	10	13
Future Volume (veh/h)	18	592	14	56	564	10	80	46	25	46	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	696	15	66	664	12	94	54	14	54	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	378	1388	30	365	1394	25	424	220	46	514	108	48
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	722	3554	77	698	3569	64	786	644	135	1002	316	140
Grp Volume(v), veh/h	21	348	363	66	330	346	162	0	0	73	0	0
Grp Sat Flow(s),veh/h/ln	722	1777	1854	698	1777	1857	1566	0	0	1457	0	0
Q Serve(g_s), s	0.8	5.4	5.4	2.9	5.1	5.1	1.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	5.9	5.4	5.4	8.3	5.1	5.1	2.5	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.58		0.09	0.74		0.10
Lane Grp Cap(c), veh/h	378	694	724	365	694	725	691	0	0	669	0	0
V/C Ratio(X)	0.06	0.50	0.50	0.18	0.48	0.48	0.23	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	565	1155	1205	546	1155	1206	1271	0	0	1191	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.6	8.5	8.5	11.6	8.4	8.4	8.7	0.0	0.0	8.3	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.5	0.2	0.5	0.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.0	3.1	0.6	2.4	2.5	1.4	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.6	9.0	9.0	11.9	8.9	8.8	8.9	0.0	0.0	8.3	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		732			742			162			73	
Approach Delay, s/veh		9.1			9.1			8.9			8.3	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.5		17.1		19.5		17.1				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		7.9		3.0		10.3		4.5				
Green Ext Time (p_c), s		4.4		0.3		3.8		0.9				

Intersection Summary												
HCM 6th Ctrl Delay			9.0									
HCM 6th LOS			A									

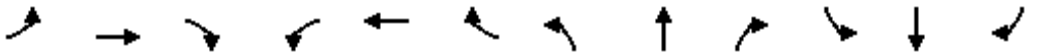
Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	80	1625	3	0	1525	121	0	0	4	7	0	73
Future Vol, veh/h	80	1625	3	0	1525	121	0	0	4	7	0	73
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	86	1747	3	0	1640	130	0	0	4	8	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1775	0	0	-	-	0	-	-	877	2581	-	890
Stage 1	-	-	-	-	-	-	-	-	-	1710	-	-
Stage 2	-	-	-	-	-	-	-	-	-	871	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	162	-	-	0	-	-	0	0	250	27	0	245
Stage 1	-	-	-	0	-	-	0	0	-	63	0	-
Stage 2	-	-	-	0	-	-	0	0	-	283	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	161	-	-	-	-	-	-	-	250	15	-	244
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	25	-	-
Stage 1	-	-	-	-	-	-	-	-	-	29	-	-
Stage 2	-	-	-	-	-	-	-	-	-	130	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.4	0	19.7	42
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	250	161	-	-	-	-	25	244
HCM Lane V/C Ratio	0.017	0.534	-	-	-	-	0.301	0.322
HCM Control Delay (s)	19.7	50.5	-	-	-	-	202.1	26.6
HCM Lane LOS	C	F	-	-	-	-	F	D
HCM 95th %tile Q(veh)	0.1	2.7	-	-	-	-	0.9	1.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	199	1187	329	272	1311	135	387	531	202	235	514	207
Future Volume (veh/h)	199	1187	329	272	1311	135	387	531	202	235	514	207
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	214	1276	212	292	1410	88	416	571	114	253	553	164
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	275	1621	493	338	1723	530	464	1379	419	317	795	350
Arrive On Green	0.09	0.32	0.32	0.11	0.34	0.34	0.15	0.27	0.27	0.10	0.22	0.22
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1562
Grp Volume(v), veh/h	214	1276	212	292	1410	88	416	571	114	253	553	164
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1562
Q Serve(g_s), s	6.3	21.8	10.4	8.7	24.2	3.8	12.3	8.8	5.6	7.5	13.7	8.7
Cycle Q Clear(g_c), s	6.3	21.8	10.4	8.7	24.2	3.8	12.3	8.8	5.6	7.5	13.7	8.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	275	1621	493	338	1723	530	464	1379	419	317	795	350
V/C Ratio(X)	0.78	0.79	0.43	0.86	0.82	0.17	0.90	0.41	0.27	0.80	0.70	0.47
Avail Cap(c_a), veh/h	279	1756	534	338	1852	570	464	1879	571	388	1222	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.9	29.8	25.9	42.2	29.1	22.3	40.2	28.8	27.6	42.2	34.2	32.3
Incr Delay (d2), s/veh	11.7	2.3	0.6	19.1	2.8	0.1	19.1	0.2	0.3	7.4	1.1	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.1	13.6	6.8	7.7	15.4	2.5	9.9	6.4	3.7	5.8	9.9	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.7	32.1	26.5	61.3	31.9	22.5	59.3	29.0	27.9	49.7	35.3	33.3
LnGrp LOS	D	C	C	E	C	C	E	C	C	D	D	C
Approach Vol, veh/h		1702			1790			1101			970	
Approach Delay, s/veh		34.2			36.3			40.3			38.7	
Approach LOS		C			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	35.9	18.6	26.7	12.9	37.8	14.2	31.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	10.7	23.8	14.3	15.7	8.3	26.2	9.5	10.8
Green Ext Time (p_c), s	0.0	5.8	0.0	3.9	0.0	6.0	0.1	4.3

Intersection Summary	
HCM 6th Ctrl Delay	36.9
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	814	36	23	936	20	14	1	67	0	0	21
Future Vol, veh/h	0	814	36	23	936	20	14	1	67	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	925	41	26	1064	23	16	1	76	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	975	0	0	1518	2076	472	-	-	547
Stage 1	-	-	-	-	-	-	934	934	-	-	-	-
Stage 2	-	-	-	-	-	-	584	1142	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	703	-	-	82	53	538	0	0	481
Stage 1	0	-	-	-	-	-	286	343	-	0	0	-
Stage 2	0	-	-	-	-	-	465	273	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	697	-	-	75	50	533	-	-	480
Mov Cap-2 Maneuver	-	-	-	-	-	-	189	157	-	-	-	-
Stage 1	-	-	-	-	-	-	286	340	-	-	-	-
Stage 2	-	-	-	-	-	-	425	262	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.8	12.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	398	-	-	697	-	-	480
HCM Lane V/C Ratio	0.234	-	-	0.037	-	-	0.05
HCM Control Delay (s)	16.8	-	-	10.4	-	-	12.9
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.9	-	-	0.1	-	-	0.2

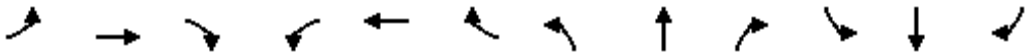
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1648	21	0	1818	34	0	0	23	0	0	56
Future Vol, veh/h	0	1648	21	0	1818	34	0	0	23	0	0	56
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1916	24	0	2114	40	0	0	27	0	0	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	970	-	-	1077
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	357	0	0	319
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	357	-	-	319
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	15.9	19.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	357	-	-	-	-	319
HCM Lane V/C Ratio	0.075	-	-	-	-	0.204
HCM Control Delay (s)	15.9	-	-	-	-	19.2
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.2	-	-	-	-	0.8



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	858	19	76	920	19	43	35	51	33	3	20
Future Volume (veh/h)	25	858	19	76	920	19	43	35	51	33	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	964	20	85	1034	19	48	39	30	37	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	282	1655	34	301	1660	30	276	214	131	483	45	58
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	507	3559	74	541	3569	66	515	668	408	1063	139	180
Grp Volume(v), veh/h	28	481	503	85	515	538	117	0	0	46	0	0
Grp Sat Flow(s),veh/h/ln	507	1777	1856	541	1777	1858	1591	0	0	1382	0	0
Q Serve(g_s), s	2.0	9.1	9.1	6.3	10.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.0	9.1	9.1	15.4	10.0	10.0	2.2	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.04	0.41		0.26	0.80		0.13
Lane Grp Cap(c), veh/h	282	826	863	301	826	864	622	0	0	586	0	0
V/C Ratio(X)	0.10	0.58	0.58	0.28	0.62	0.62	0.19	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	315	939	981	335	939	982	1005	0	0	911	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	13.8	9.0	9.0	14.6	9.2	9.2	11.3	0.0	0.0	10.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	0.7	0.7	0.5	1.0	1.0	0.1	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	5.2	5.4	1.2	5.3	5.5	1.4	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.9	9.7	9.7	15.1	10.3	10.2	11.5	0.0	0.0	10.9	0.0	0.0
LnGrp LOS	B	A	A	B	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1012			1138			117			46	
Approach Delay, s/veh		9.8			10.6			11.5			10.9	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		26.5		19.3		26.5		19.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		14.0		2.8		17.4		4.2				
Green Ext Time (p_c), s		4.9		0.2		3.9		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	2.6

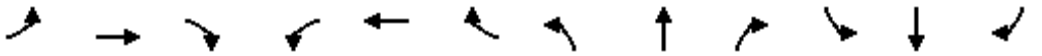
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	1592	13	0	1793	64	0	0	3	12	0	59
Future Vol, veh/h	46	1592	13	0	1793	64	0	0	3	12	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	1769	14	0	1992	71	0	0	3	13	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2063	0	0	-	-	0	-	-	892	2838	-	1032
Stage 1	-	-	-	-	-	-	-	-	-	2028	-	-
Stage 2	-	-	-	-	-	-	-	-	-	810	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	116	-	-	0	-	-	0	0	245	19	0	197
Stage 1	-	-	-	0	-	-	0	0	-	37	0	-
Stage 2	-	-	-	0	-	-	0	0	-	308	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	116	-	-	-	-	-	-	-	245	~ 12	-	197
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	19	-	-
Stage 1	-	-	-	-	-	-	-	-	-	21	-	-
Stage 2	-	-	-	-	-	-	-	-	-	170	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	0	19.9	91.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	245	116	-	-	-	-	19	197
HCM Lane V/C Ratio	0.014	0.441	-	-	-	-	0.702	0.333
HCM Control Delay (s)	19.9	58.5	-	-	-	-	$ 381	32.1
HCM Lane LOS	C	F	-	-	-	-	F	D
HCM 95th %tile Q(veh)	0	1.9	-	-	-	-	1.9	1.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	199	1465	430	250	1447	144	492	672	229	242	559	177
Future Volume (veh/h)	199	1465	430	250	1447	144	492	672	229	242	559	177
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	203	1495	269	255	1477	87	502	686	130	247	570	140
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	262	1706	521	275	1727	533	505	1414	432	314	771	337
Arrive On Green	0.08	0.33	0.33	0.09	0.34	0.34	0.16	0.28	0.28	0.10	0.22	0.22
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1554
Grp Volume(v), veh/h	203	1495	269	255	1477	87	502	686	130	247	570	140
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1554
Q Serve(g_s), s	6.1	26.8	13.5	7.7	26.2	3.8	15.3	10.9	6.4	7.4	14.5	7.5
Cycle Q Clear(g_c), s	6.1	26.8	13.5	7.7	26.2	3.8	15.3	10.9	6.4	7.4	14.5	7.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	262	1706	521	275	1727	533	505	1414	432	314	771	337
V/C Ratio(X)	0.77	0.88	0.52	0.93	0.86	0.16	0.99	0.49	0.30	0.79	0.74	0.42
Avail Cap(c_a), veh/h	262	1756	536	275	1777	548	505	1772	542	482	1208	528
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.7	30.4	26.0	44.0	29.9	22.5	40.8	29.3	27.7	42.8	35.5	32.7
Incr Delay (d2), s/veh	12.3	5.2	0.8	34.7	4.2	0.1	38.5	0.3	0.4	2.1	1.4	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	5.0	16.6	8.6	7.8	16.7	2.5	13.3	7.8	4.3	5.3	10.4	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.9	35.7	26.8	78.7	34.2	22.6	79.3	29.6	28.1	44.9	36.9	33.5
LnGrp LOS	E	D	C	E	C	C	E	C	C	D	D	C
Approach Vol, veh/h		1967			1819			1318			957	
Approach Delay, s/veh		36.6			39.9			48.4			38.5	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	37.8	20.0	26.3	12.6	38.2	14.2	32.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	9.7	28.8	17.3	16.5	8.1	28.2	9.4	12.9
Green Ext Time (p_c), s	0.0	3.6	0.0	3.9	0.0	4.4	0.2	5.1

Intersection Summary	
HCM 6th Ctrl Delay	40.4
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	933	32	30	1059	19	5	6	41	0	0	26
Future Vol, veh/h	0	933	32	30	1059	19	5	6	41	0	0	26
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1014	35	33	1151	21	5	7	45	0	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1051	0	0	1658	2260	509	-	-	592
Stage 1	-	-	-	-	-	-	1016	1016	-	-	-	-
Stage 2	-	-	-	-	-	-	642	1244	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	658	-	-	64	40	509	0	0	449
Stage 1	0	-	-	-	-	-	255	314	-	0	0	-
Stage 2	0	-	-	-	-	-	429	244	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	657	-	-	58	38	508	-	-	446
Mov Cap-2 Maneuver	-	-	-	-	-	-	165	138	-	-	-	-
Stage 1	-	-	-	-	-	-	255	313	-	-	-	-
Stage 2	-	-	-	-	-	-	382	230	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	17.8	13.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	337	-	-	657	-	-	446
HCM Lane V/C Ratio	0.168	-	-	0.05	-	-	0.063
HCM Control Delay (s)	17.8	-	-	10.8	-	-	13.6
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-	-	0.2

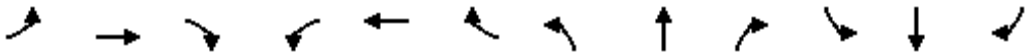
Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1775	18	0	1894	36	0	0	26	0	0	41
Future Vol, veh/h	0	1775	18	0	1894	36	0	0	26	0	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1849	19	0	1973	38	0	0	27	0	0	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	934	-	-	1006
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	308	0	0	283
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	308	-	-	283
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.8	20
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	308	-	-	-	-	283
HCM Lane V/C Ratio	0.088	-	-	-	-	0.151
HCM Control Delay (s)	17.8	-	-	-	-	20
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	977	7	87	1036	8	15	10	54	26	2	15
Future Volume (veh/h)	24	977	7	87	1036	8	15	10	54	26	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	987	6	88	1046	8	15	10	25	26	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	424	2023	12	443	2019	15	194	58	101	290	40	53
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	506	3621	22	537	3614	28	341	462	803	768	316	426
Grp Volume(v), veh/h	24	484	509	88	514	540	50	0	0	39	0	0
Grp Sat Flow(s),veh/h/ln	506	1777	1866	537	1777	1864	1606	0	0	1510	0	0
Q Serve(g_s), s	1.0	5.1	5.1	3.7	5.6	5.6	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.5	5.1	5.1	8.8	5.6	5.6	0.8	0.0	0.0	0.6	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.30		0.50	0.67		0.28
Lane Grp Cap(c), veh/h	424	993	1043	443	993	1041	352	0	0	383	0	0
V/C Ratio(X)	0.06	0.49	0.49	0.20	0.52	0.52	0.14	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	536	1386	1456	562	1386	1454	1468	0	0	1408	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.3	4.2	4.2	6.8	4.3	4.3	12.2	0.0	0.0	12.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.2	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.1	1.5	1.6	0.5	1.1	1.2	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.3	4.5	4.5	7.0	4.7	4.7	12.4	0.0	0.0	12.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1017			1142			50			39	
Approach Delay, s/veh		4.6			4.8			12.4			12.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		22.5		8.5		22.5		8.5				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		8.5		2.6		10.8		2.8				
Green Ext Time (p_c), s		6.4		0.1		6.3		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.0									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	1780	5	0	1874	65	0	0	7	14	0	56
Future Vol, veh/h	42	1780	5	0	1874	65	0	0	7	14	0	56
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	1835	5	0	1932	67	0	0	7	14	0	58

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2004	0	0	-	-	0	-	-	923	2791	-	1005
Stage 1	-	-	-	-	-	-	-	-	-	1971	-	-
Stage 2	-	-	-	-	-	-	-	-	-	820	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	124	-	-	0	-	-	0	0	233	20	0	206
Stage 1	-	-	-	0	-	-	0	0	-	40	0	-
Stage 2	-	-	-	0	-	-	0	0	-	304	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	123	-	-	-	-	-	-	-	232	~ 14	-	205
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	23	-	-
Stage 1	-	-	-	-	-	-	-	-	-	26	-	-
Stage 2	-	-	-	-	-	-	-	-	-	192	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.1	0	21	84.2
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	232	123	-	-	-	-	23	205
HCM Lane V/C Ratio	0.031	0.352	-	-	-	-	0.628	0.282
HCM Control Delay (s)	21	49.4	-	-	-	-	$ 304	29.3
HCM Lane LOS	C	E	-	-	-	-	F	D
HCM 95th %tile Q(veh)	0.1	1.4	-	-	-	-	1.9	1.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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APPENDIX 4.1: PROJECT ONLY VOLUME DEVELOPMENT

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Project Only Volume Development - AM Peak Hour

With Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	3	0	0	0	0	7	0	6	13	0	29
Pass-by:													0
Adjusted Project:	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**7**	**0**	**6**	**13**	**0**	**29**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	6	0	0	0	0	0	0	0	5	0	0	0	11
Pass-by:													0
Adjusted Project:	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**11**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	7	5	0	0	0	0	0	17	0	6	35
Pass-by:			21							21			42
Adjusted Project:	**0**	**0**	**28**	**5**	**0**	**0**	**0**	**0**	**0**	**38**	**0**	**6**	**77**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	17	0	10	0	0	2	7	36
Pass-by:						21					-21	21	21
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**38**	**0**	**10**	**0**	**0**	**-19**	**28**	**57**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	11	0	0	0	0	0	0	7	0	0	18
Pass-by:													0
Adjusted Project:	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**18**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	15	0	0	0	0	7	11	0	8	0	0	0	41
Pass-by:	21								21				42
Adjusted Project:	**36**	**0**	**0**	**0**	**0**	**7**	**11**	**0**	**29**	**0**	**0**	**0**	**83**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	6	0	2	10	0	0	0	7	5	30
Pass-by:						21					-21	21	21
Adjusted Project:	**0**	**0**	**0**	**6**	**0**	**23**	**10**	**0**	**0**	**0**	**-14**	**26**	**51**

Project Only Volume Development - Mid Day Peak Hour

With Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	1	0	0	0	0	2	0	1	3	0	7
Pass-by:													0
Adjusted Project:	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**1**	**3**	**0**	**7**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	1	0	0	0	0	0	0	0	2	0	0	0	3
Pass-by:													0
Adjusted Project:	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**3**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	2	2	0	0	0	0	0	4	0	1	9
Pass-by:			9							9			18
Adjusted Project:	**0**	**0**	**11**	**2**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**1**	**27**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	4	0	4	0	0	0	2	10
Pass-by:						9					-9	9	9
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**4**	**0**	**0**	**-9**	**11**	**19**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	2	0	0	0	0	0	0	2	0	0	4
Pass-by:													0
Adjusted Project:	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**4**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	5	0	0	0	0	2	2	0	2	0	0	0	11
Pass-by:	10								10				20
Adjusted Project:	**15**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**12**	**0**	**0**	**0**	**31**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	1	0	0	4	0	0	0	2	2	9
Pass-by:						10					-10	10	10
Adjusted Project:	**0**	**0**	**0**	**1**	**0**	**10**	**4**	**0**	**0**	**0**	**-8**	**12**	**19**

Project Only Volume Development - PM Peak Hour

With Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	3	0	0	0	0	6	0	2	4	0	15
Pass-by:													0
Adjusted Project:	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**6**	**0**	**2**	**4**	**0**	**15**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	2	0	0	0	0	0	0	0	5	0	0	0	7
Pass-by:													0
Adjusted Project:	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**5**	**0**	**0**	**0**	**7**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	6	5	0	0	0	0	0	6	0	2	19
Pass-by:			12							12			24
Adjusted Project:	**0**	**0**	**18**	**5**	**0**	**0**	**0**	**0**	**0**	**18**	**0**	**2**	**43**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	6	0	10	0	0	1	6	23
Pass-by:						12					-12	12	12
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**18**	**0**	**10**	**0**	**0**	**-11**	**18**	**35**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	4	0	0	0	0	0	0	6	0	0	10
Pass-by:													0
Adjusted Project:	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**10**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	14	0	0	0	0	6	4	0	3	0	0	0	27
Pass-by:	13								13				26
Adjusted Project:	**27**	**0**	**0**	**0**	**0**	**6**	**4**	**0**	**16**	**0**	**0**	**0**	**53**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	2	0	1	10	0	0	0	6	5	24
Pass-by:						13					-13	13	13
Adjusted Project:	**0**	**0**	**0**	**2**	**0**	**14**	**10**	**0**	**0**	**0**	**-7**	**18**	**37**

Project Only Volume Development - AM Peak Hour

Without Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	3	0	0	0	0	3	3	0	6	13	0	28
Pass-by:													0
Adjusted Project:	**0**	**3**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**6**	**13**	**0**	**28**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	6	0	0	0	0	0	0	0	12	0	0	0	18
Pass-by:													0
Adjusted Project:	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**18**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	10	12	0	0	0	0	0	19	0	6	47
Pass-by:			42							42			84
Adjusted Project:	**0**	**0**	**52**	**12**	**0**	**0**	**0**	**0**	**0**	**61**	**0**	**6**	**131**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	19	0	3	0	0	0	10	32
Pass-by:						42					-42	42	42
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**61**	**0**	**3**	**0**	**0**	**-42**	**52**	**74**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	17	0	0	0	0	0	0	12	0	0	29
Pass-by:													0
Adjusted Project:	**0**	**0**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**29**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	12	17	0	0	0	0	0	29
Pass-by:													0
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**12**	**17**	**0**	**0**	**0**	**0**	**0**	**29**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	0	0	3	0	0	10	0	13
Pass-by:													0
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**10**	**0**	**13**

Project Only Volume Development - Mid Day Peak Hour

Without Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	1	0	0	0	0	1	1	0	1	3	0	7
Pass-by:													0
Adjusted Project:	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**1**	**3**	**0**	**7**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	1	0	0	0	0	0	0	0	4	0	0	0	5
Pass-by:													0
Adjusted Project:	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**5**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	4	4	0	0	0	0	0	4	0	1	13
Pass-by:			19							19			38
Adjusted Project:	**0**	**0**	**23**	**4**	**0**	**0**	**0**	**0**	**0**	**23**	**0**	**1**	**51**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	4	0	1	0	0	0	4	9
Pass-by:						19					-19	19	19
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**23**	**0**	**1**	**0**	**0**	**-19**	**23**	**28**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	4	0	0	0	0	0	0	4	0	0	8
Pass-by:													0
Adjusted Project:	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**8**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	4	4	0	0	0	0	0	8
Pass-by:													0
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**8**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	0	0	1	0	0	3	0	4
Pass-by:													0
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**3**	**0**	**4**

Project Only Volume Development - PM Peak Hour

Without Flower Connection at Imperial Highway

Legend: NB = Northbound EB = Eastbound U = U-turn T = Through
SB = Southbound WB = Westbound L = Left R = Right

1. Brea Bl. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	3	0	0	0	0	3	3	0	2	4	0	15
Pass-by:													0
Adjusted Project:	**0**	**3**	**0**	**0**	**0**	**0**	**3**	**3**	**0**	**2**	**4**	**0**	**15**

2. Orange Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	2	0	0	0	0	0	0	0	11	0	0	0	13
Pass-by:													0
Adjusted Project:	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**0**	**13**

3. Orange Av. & Driveway 1

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	10	11	0	0	0	0	0	6	0	2	29
Pass-by:			25							25			50
Adjusted Project:	**0**	**0**	**35**	**11**	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**2**	**79**

4. Orange Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	6	0	3	0	0	0	10	19
Pass-by:						25					-25	25	25
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**31**	**0**	**3**	**0**	**0**	**-25**	**35**	**44**

5. Flower Av. & Birch St.

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	6	0	0	0	0	0	0	11	0	0	17
Pass-by:													0
Adjusted Project:	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**17**

6. Flower Av. & Driveway 2

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	11	6	0	0	0	0	0	17
Pass-by:													0
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**11**	**6**	**0**	**0**	**0**	**0**	**0**	**17**

7. Flower Av. & Imperial Hwy. (SR-90)

	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
Net New Project:	0	0	0	0	0	0	0	3	0	0	9	0	12
Pass-by:													0
Adjusted Project:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**9**	**0**	**12**

APPENDIX 4.2: POST PROCESSING WORKSHEETS

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Project:	Brea Gaslight Square	Job #:	14783
Scenario:	GPBO Without Project	Analyst:	CS
		Date:	1/5/23

LOCATION: Brea Bl. & Imperial Hwy. (SR-90)
FORECAST YEAR: 2045

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		AM PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	400	466	66	17%	492	545	53	11%
	Through	431	585	154	36%	672	839	167	25%
	Right	149	179	30	20%	229	236	7	3%
	NB Total	980	1,230	250	26%	1,393	1,620	227	16%
SOUTH BOUND	Left	166	200	34	20%	242	310	68	28%
	Through	567	720	153	27%	559	787	228	41%
	Right	146	170	24	16%	177	243	66	37%
	SB Total	879	1,090	211	24%	978	1,340	362	37%
EAST BOUND	Left	140	172	32	23%	199	242	43	22%
	Through	1,350	1,469	119	9%	1,465	1,472	7	0%
	Right	348	399	51	15%	430	475	45	10%
	EB Total	1,838	2,040	202	11%	2,094	2,189	95	5%
WEST BOUND	Left	145	164	19	13%	250	275	25	10%
	Through	1,247	1,293	46	4%	1,447	1,552	105	7%
	Right	93	112	19	20%	144	174	30	21%
	WB Total	1,485	1,569	84	6%	1,841	2,001	160	9%
TOTAL ENTERING VOLUME		5,182	5,929	747	14%	6,306	7,150	844	13%

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		AM	PM	AM	PM	ADT
North Leg	Inbound	1,090	1,340			
North Leg	Outbound	869	1,255			
North Leg	**TOTAL**	**1,959**	**2,595**	**6%**	**8%**	**33,498**
South Leg	Inbound	1,230	1,620			
South Leg	Outbound	1,283	1,537			
South Leg	**TOTAL**	**2,513**	**3,157**	**6%**	**8%**	**41,075**
East Leg	Inbound	1,569	2,001			
East Leg	Outbound	1,848	2,018			
East Leg	**TOTAL**	**3,417**	**4,019**	**6%**	**7%**	**56,001**
West Leg	Inbound	2,040	2,189			
West Leg	Outbound	1,929	2,340			
West Leg	**TOTAL**	**3,969**	**4,529**	**6%**	**7%**	**63,246**
OVERALL TOTAL		***11,858***	***14,300***	***6%***	***7%***	***193,820***

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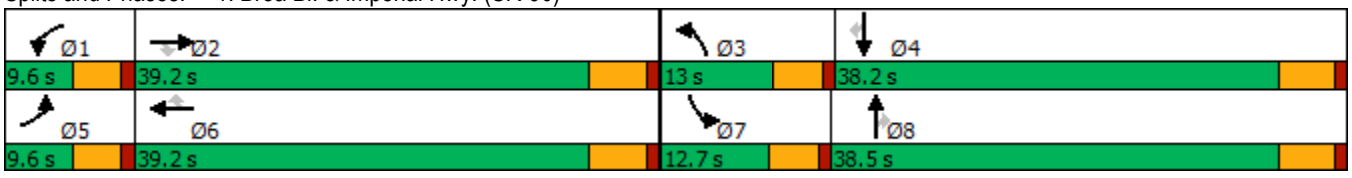
APPENDIX 5.1: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

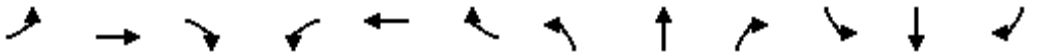
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	1425	357	167	1511	118	410	476	168	209	627	193
Future Volume (vph)	176	1425	357	167	1511	118	410	476	168	209	627	193
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.9	33.9	5.0	33.9	33.9	8.4	24.7	24.7	8.1	24.4	24.4
Actuated g/C Ratio	0.05	0.37	0.37	0.05	0.37	0.37	0.09	0.27	0.27	0.09	0.27	0.27
v/c Ratio	1.07	0.80	0.52	1.02	0.85	0.19	1.49	0.37	0.35	0.79	0.70	0.40
Control Delay	133.0	30.6	11.3	119.8	32.6	5.1	269.6	27.5	10.4	62.7	34.4	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	133.0	30.6	11.3	119.8	32.6	5.1	269.6	27.5	10.4	62.7	34.4	13.0
LOS	F	C	B	F	C	A	F	C	B	E	C	B
Approach Delay		36.3			38.9			119.0			36.1	
Approach LOS		D			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 91.6	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.49	
Intersection Signal Delay: 52.0	Intersection LOS: D
Intersection Capacity Utilization 84.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	176	1425	357	167	1511	118	410	476	168	209	627	193
Future Volume (veh/h)	176	1425	357	167	1511	118	410	476	168	209	627	193
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	185	1500	368	176	1591	116	432	501	169	220	660	186
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	1874	571	180	1874	580	302	1345	410	286	918	405
Arrive On Green	0.06	0.37	0.37	0.06	0.37	0.37	0.09	0.26	0.26	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	185	1500	368	176	1591	116	432	501	169	220	660	186
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	23.3	17.4	4.9	25.4	4.4	8.4	7.1	7.9	6.0	15.0	8.9
Cycle Q Clear(g_c), s	5.0	23.3	17.4	4.9	25.4	4.4	8.4	7.1	7.9	6.0	15.0	8.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	1874	571	180	1874	580	302	1345	410	286	918	405
V/C Ratio(X)	1.03	0.80	0.64	0.98	0.85	0.20	1.43	0.37	0.41	0.77	0.72	0.46
Avail Cap(c_a), veh/h	180	1947	594	180	1947	603	302	1919	585	291	1323	583
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.8	25.1	23.3	41.8	25.8	19.2	40.1	26.7	27.0	39.4	29.9	27.6
Incr Delay (d2), s/veh	75.3	2.4	2.3	60.9	3.7	0.2	212.5	0.2	0.7	10.5	1.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.8	14.0	10.5	6.2	15.9	2.8	20.0	5.0	5.3	4.9	10.4	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	117.1	27.6	25.5	102.7	29.5	19.3	252.6	26.8	27.6	50.0	31.0	28.5
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2053			1883			1102			1066	
Approach Delay, s/veh		35.3			35.7			115.5			34.5	
Approach LOS		D			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	37.9	13.0	28.1	9.6	37.9	12.6	28.5
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	6.9	25.3	10.4	17.0	7.0	27.4	8.0	9.9
Green Ext Time (p_c), s	0.0	6.3	0.0	4.6	0.0	5.1	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	49.7
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.703
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	37	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	410	476	168	209	627	193	176	1425	357	167	1511	118
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	410	476	168	209	627	193	176	1425	357	167	1511	118
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	410	476	168	209	627	193	176	1425	357	167	1511	118
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	410	476	168	209	627	193	176	1425	357	167	1511	118
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	410	476	168	209	627	193	176	1425	357	167	1511	118
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.09	0.10	0.06	0.18	0.11	0.05	0.28	0.21	0.05	0.30	0.07
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	640	15	15	739	5	6	1	16	0	0	15
Future Vol, veh/h	0	640	15	15	739	5	6	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	727	17	17	840	6	7	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	745	0	0	1182	1612	365	-	-	427
Stage 1	-	-	-	-	-	-	728	728	-	-	-	-
Stage 2	-	-	-	-	-	-	454	884	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	859	-	-	145	103	632	0	0	576
Stage 1	0	-	-	-	-	-	381	427	-	0	0	-
Stage 2	0	-	-	-	-	-	555	362	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	858	-	-	138	100	631	-	-	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	263	221	-	-	-	-
Stage 1	-	-	-	-	-	-	381	427	-	-	-	-
Stage 2	-	-	-	-	-	-	528	353	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	13.8	11.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	436	-	-	858	-	-	574
HCM Lane V/C Ratio	0.06	-	-	0.02	-	-	0.03
HCM Control Delay (s)	13.8	-	-	9.3	-	-	11.5
HCM Lane LOS	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	15	18	1	29	18
Future Vol, veh/h	4	15	18	1	29	18
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	26	32	2	51	32

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	171	44	0	0	38	0
Stage 1	37	-	-	-	-	-
Stage 2	134	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	819	1026	-	-	1572	-
Stage 1	985	-	-	-	-	-
Stage 2	892	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	789	1015	-	-	1566	-
Mov Cap-2 Maneuver	789	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	4.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	957	1566	-
HCM Lane V/C Ratio	-	-	0.035	0.032	-
HCM Control Delay (s)	-	-	8.9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1849	13	0	1892	19	0	0	36	0	0	22
Future Vol, veh/h	0	1849	13	0	1892	19	0	0	36	0	0	22
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1906	13	0	1951	20	0	0	37	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	963	-	-	986
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	220	0	0	212
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	219	-	-	212
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

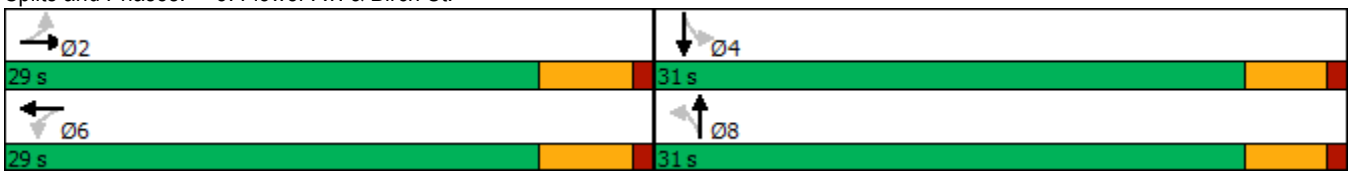
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	24.8	24
HCM LOS			C	C

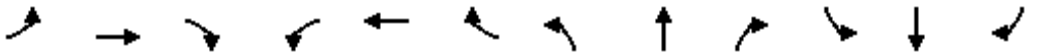
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	219	-	-	-	-	212
HCM Lane V/C Ratio	0.169	-	-	-	-	0.107
HCM Control Delay (s)	24.8	-	-	-	-	24
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	18	653	57	649	82	47	47	10
Future Volume (vph)	18	653	57	649	82	47	47	10
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	19.5	19.5	19.5	19.5		14.4		14.4
Actuated g/C Ratio	0.54	0.54	0.54	0.54		0.40		0.40
v/c Ratio	0.06	0.41	0.21	0.41		0.31		0.15
Control Delay	9.5	9.4	11.4	9.4		11.2		9.4
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	9.5	9.4	11.4	9.4		11.2		9.4
LOS	A	A	B	A		B		A
Approach Delay		9.4		9.6		11.2		9.4
Approach LOS		A		A		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 36.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 9.6	Intersection LOS: A
Intersection Capacity Utilization 59.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	14	57	649	10	82	47	26	47	10	13
Future Volume (veh/h)	18	653	14	57	649	10	82	47	26	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	15	67	764	12	96	55	16	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1466	29	350	1473	23	408	213	50	501	104	46
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	658	3563	70	653	3579	56	780	635	150	1012	310	138
Grp Volume(v), veh/h	21	383	400	67	379	397	167	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1855	653	1777	1858	1565	0	0	1459	0	0
Q Serve(g_s), s	1.0	6.2	6.2	3.3	6.2	6.2	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.1	6.2	6.2	9.6	6.2	6.2	2.8	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.57		0.10	0.74		0.09
Lane Grp Cap(c), veh/h	352	731	764	350	731	765	670	0	0	651	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.19	0.52	0.52	0.25	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	487	1095	1143	483	1095	1145	1205	0	0	1130	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.2	8.5	8.5	12.1	8.5	8.5	9.4	0.0	0.0	8.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.3	0.6	0.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.4	3.6	0.7	3.0	3.1	1.5	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.2	9.1	9.1	12.4	9.1	9.0	9.6	0.0	0.0	9.0	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		804			843			167			74	
Approach Delay, s/veh		9.1			9.3			9.6			9.0	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.1		17.5		21.1		17.5				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		9.1		3.1		11.6		4.8				
Green Ext Time (p_c), s		4.7		0.4		4.2		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			9.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	16	0	4	0	0	2	26	167	12	18	102	21
Future Vol, veh/h	16	0	4	0	0	2	26	167	12	18	102	21
Conflicting Peds, #/hr	0	0	52	0	0	56	0	0	44	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	0	7	0	0	3	44	283	20	31	173	36

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	701	697	252	734	705	393	218	0	0	347	0	0
Stage 1	262	262	-	425	425	-	-	-	-	-	-	-
Stage 2	439	435	-	309	280	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	353	365	787	336	361	656	1352	-	-	1212	-	-
Stage 1	743	691	-	607	586	-	-	-	-	-	-	-
Stage 2	597	580	-	701	679	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	312	323	742	287	319	595	1340	-	-	1161	-	-
Mov Cap-2 Maneuver	312	323	-	287	319	-	-	-	-	-	-	-
Stage 1	707	664	-	558	539	-	-	-	-	-	-	-
Stage 2	539	534	-	640	653	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.3	11.1	1	1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1340	-	-	353	595	1161	-	-
HCM Lane V/C Ratio	0.033	-	-	0.096	0.006	0.026	-	-
HCM Control Delay (s)	7.8	0	-	16.3	11.1	8.2	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.3	0	0.1	-	-

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	1762	3	0	1837	123	0	0	4	7	0	74
Future Vol, veh/h	82	1762	3	0	1837	123	0	0	4	7	0	74
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	88	1895	3	0	1975	132	0	0	4	8	0	80

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2112	0	0	-	-	0	-	-	951	2980	-	1059
Stage 1	-	-	-	-	-	-	-	-	-	2046	-	-
Stage 2	-	-	-	-	-	-	-	-	-	934	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	110	-	-	0	-	-	0	0	224	15	0	189
Stage 1	-	-	-	0	-	-	0	0	-	36	0	-
Stage 2	-	-	-	0	-	-	0	0	-	258	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	109	-	-	-	-	-	-	-	224	~ 5	-	188
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 6	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 7	-	-
Stage 2	-	-	-	-	-	-	-	-	-	49	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5	0	21.4	142
HCM LOS			C	F

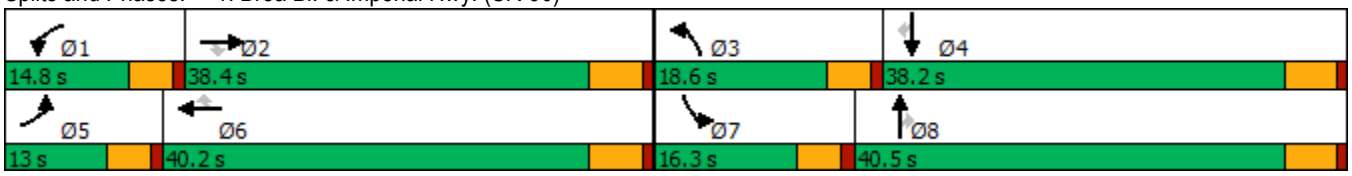
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	224	109	-	-	-	-	6	188
HCM Lane V/C Ratio	0.019	0.809	-	-	-	-	1.254	0.423
HCM Control Delay (s)	21.4	112.8	-	-	-	-	$ 1247.1	37.5
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	4.6	-	-	-	-	1.8	1.9

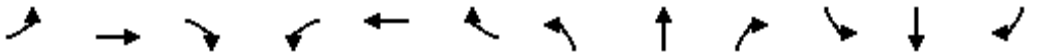
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	1332	338	296	1437	161	398	598	233	282	563	244
Future Volume (vph)	260	1332	338	296	1437	161	398	598	233	282	563	244
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	27.2	27.2	11.6	24.8	24.8
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
v/c Ratio	1.07	0.87	0.56	1.00	0.89	0.29	0.98	0.47	0.46	0.85	0.70	0.52
Control Delay	122.7	39.9	15.8	99.1	40.0	11.3	85.0	32.3	12.3	67.1	39.8	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	122.7	39.9	15.8	99.1	40.0	11.3	85.0	32.3	12.3	67.1	39.8	14.8
LOS	F	D	B	F	D	B	F	C	B	E	D	B
Approach Delay		46.9			46.8			45.6			41.3	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 45.6	Intersection LOS: D
Intersection Capacity Utilization 83.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1332	338	296	1437	161	398	598	233	282	563	244
Future Volume (veh/h)	260	1332	338	296	1437	161	398	598	233	282	563	244
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	280	1432	221	318	1545	116	428	643	148	303	605	203
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	1650	502	326	1742	536	447	1338	406	362	836	368
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	280	1432	221	318	1545	116	428	643	148	303	605	203
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	26.3	11.2	9.9	28.5	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Cycle Q Clear(g_c), s	8.4	26.3	11.2	9.9	28.5	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	268	1650	502	326	1742	536	447	1338	406	362	836	368
V/C Ratio(X)	1.04	0.87	0.44	0.98	0.89	0.22	0.96	0.48	0.36	0.84	0.72	0.55
Avail Cap(c_a), veh/h	268	1691	514	326	1784	549	447	1809	550	374	1177	518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	31.7	26.6	44.6	31.0	23.3	42.5	31.0	30.0	43.3	35.1	33.5
Incr Delay (d2), s/veh	66.7	5.0	0.6	43.0	5.7	0.2	31.4	0.3	0.5	14.1	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.8	16.4	7.4	9.8	18.2	3.5	11.4	7.7	5.2	7.7	11.0	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	112.3	36.7	27.2	87.6	36.7	23.5	73.9	31.3	30.5	57.3	36.4	34.8
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	C
Approach Vol, veh/h		1933			1979			1219			1111	
Approach Delay, s/veh		46.6			44.1			46.2			41.8	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.6	18.6	28.6	13.0	39.4	15.9	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	11.9	28.3	15.3	17.6	10.4	30.5	11.3	12.6
Green Ext Time (p_c), s	0.0	3.6	0.0	4.2	0.0	3.5	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	44.9
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.691
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	36	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	398	598	233	281	563	244	260	1332	338	296	1437	161
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	398	598	233	281	563	244	260	1332	338	296	1437	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	398	598	233	281	563	244	260	1332	338	296	1437	161
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	398	598	233	281	563	244	260	1332	338	296	1437	161
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	398	598	233	281	563	244	260	1332	338	296	1437	161
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.12	0.14	0.08	0.17	0.14	0.08	0.26	0.20	0.09	0.28	0.09
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	913	37	23	1011	20	14	1	68	0	0	21
Future Vol, veh/h	0	913	37	23	1011	20	14	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1038	42	26	1149	23	16	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1089	0	0	1674	2274	528	-	-	589
Stage 1	-	-	-	-	-	-	1047	1047	-	-	-	-
Stage 2	-	-	-	-	-	-	627	1227	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	636	-	-	62	40	495	0	0	452
Stage 1	0	-	-	-	-	-	244	303	-	0	0	-
Stage 2	0	-	-	-	-	-	438	249	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	631	-	-	56	38	491	-	-	451
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	138	-	-	-	-
Stage 1	-	-	-	-	-	-	244	300	-	-	-	-
Stage 2	-	-	-	-	-	-	398	238	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.6	13.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	358	-	-	631	-	-	451
HCM Lane V/C Ratio	0.263	-	-	0.041	-	-	0.053
HCM Control Delay (s)	18.6	-	-	11	-	-	13.4
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	19	29	6	22	49
Future Vol, veh/h	8	19	29	6	22	49
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	29	44	9	33	74

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	190	53	0	0	54	0
Stage 1	50	-	-	-	-	-
Stage 2	140	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	799	1014	-	-	1551	-
Stage 1	972	-	-	-	-	-
Stage 2	887	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	781	1010	-	-	1550	-
Mov Cap-2 Maneuver	781	-	-	-	-	-
Stage 1	971	-	-	-	-	-
Stage 2	867	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	929	1550	-
HCM Lane V/C Ratio	-	-	0.044	0.022	-
HCM Control Delay (s)	-	-	9.1	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1871	21	0	1997	35	0	0	23	0	0	57
Future Vol, veh/h	0	1871	21	0	1997	35	0	0	23	0	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2176	24	0	2322	41	0	0	27	0	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1100	-	-	1182
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	312	0	0	287
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	312	-	-	287
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

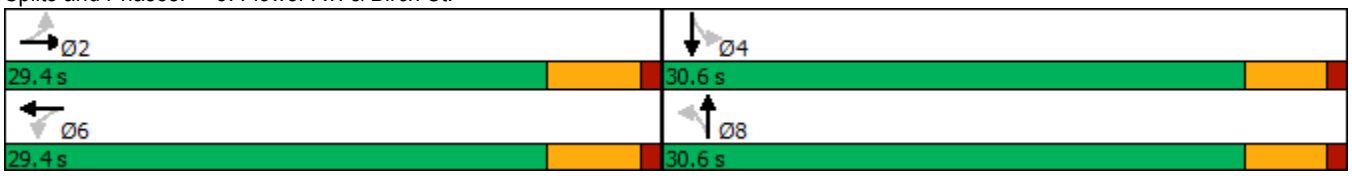
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.6	21.3
HCM LOS			C	C

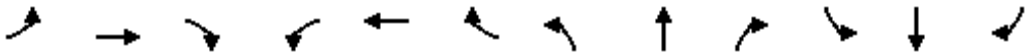
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	312	-	-	-	-	287
HCM Lane V/C Ratio	0.086	-	-	-	-	0.231
HCM Control Delay (s)	17.6	-	-	-	-	21.3
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.9

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	26	958	78	994	44	36	34	3
Future Volume (vph)	26	958	78	994	44	36	34	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.7	24.7	24.7	24.7		14.0		14.0
Actuated g/C Ratio	0.60	0.60	0.60	0.60		0.34		0.34
v/c Ratio	0.14	0.52	0.39	0.54		0.28		0.13
Control Delay	10.7	9.7	18.7	10.1		12.4		9.5
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.7	9.7	18.7	10.1		12.4		9.5
LOS	B	A	B	B		B		A
Approach Delay		9.7		10.7		12.4		9.5
Approach LOS		A		B		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 41.1	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 10.3	Intersection LOS: B
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	19	78	994	19	44	36	52	34	3	20
Future Volume (veh/h)	26	958	19	78	994	19	44	36	52	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	20	88	1117	19	49	40	31	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	1715	32	275	1719	29	268	209	129	473	42	56
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	469	3568	66	487	3575	61	515	664	411	1071	135	176
Grp Volume(v), veh/h	29	536	560	88	555	581	120	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1858	487	1777	1859	1590	0	0	1382	0	0
Q Serve(g_s), s	2.4	10.7	10.8	7.9	11.3	11.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	13.7	10.7	10.8	18.6	11.3	11.3	2.4	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.41		0.26	0.81		0.13
Lane Grp Cap(c), veh/h	265	854	893	275	854	894	606	0	0	571	0	0
V/C Ratio(X)	0.11	0.63	0.63	0.32	0.65	0.65	0.20	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	276	897	938	287	897	938	959	0	0	870	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.6	9.3	9.3	16.2	9.4	9.4	12.1	0.0	0.0	11.6	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.3	1.2	0.7	1.6	1.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	6.4	6.7	1.4	6.2	6.4	1.5	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	10.6	10.5	16.8	11.0	10.9	12.2	0.0	0.0	11.6	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1125			1224			120			47	
Approach Delay, s/veh		10.6			11.4			12.2			11.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.2		19.7		28.2		19.7				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		15.7		2.9		20.6		4.4				
Green Ext Time (p_c), s		4.8		0.2		2.4		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	1	3	101	8	10	72	3
Future Vol, veh/h	0	0	0	0	0	1	3	101	8	10	72	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	1	4	129	10	13	92	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	263	267	94	262	264	134	96	0	0	139	0	0
Stage 1	120	120	-	142	142	-	-	-	-	-	-	-
Stage 2	143	147	-	120	122	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	690	639	963	691	641	915	1498	-	-	1445	-	-
Stage 1	884	796	-	861	779	-	-	-	-	-	-	-
Stage 2	860	775	-	884	795	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	682	631	963	684	633	915	1498	-	-	1445	-	-
Mov Cap-2 Maneuver	682	631	-	684	633	-	-	-	-	-	-	-
Stage 1	881	788	-	858	777	-	-	-	-	-	-	-
Stage 2	856	773	-	875	787	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.9	0.2	0.9
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1498	-	-	-	915	1445	-	-
HCM Lane V/C Ratio	0.003	-	-	-	0.001	0.009	-	-
HCM Control Delay (s)	7.4	0	-	0	8.9	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	47	1814	13	0	1971	65	0	0	3	12	0	60
Future Vol, veh/h	47	1814	13	0	1971	65	0	0	3	12	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	2016	14	0	2190	72	0	0	3	13	0	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2262	0	0	-	-	0	-	-	1015	3136	-	1131
Stage 1	-	-	-	-	-	-	-	-	-	2226	-	-
Stage 2	-	-	-	-	-	-	-	-	-	910	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	92	-	-	0	-	-	0	0	203	~ 12	0	169
Stage 1	-	-	-	0	-	-	0	0	-	26	0	-
Stage 2	-	-	-	0	-	-	0	0	-	267	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	92	-	-	-	-	-	-	-	203	~ 7	-	169
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 10	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 11	-	-
Stage 2	-	-	-	-	-	-	-	-	-	114	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	0	23	184.7
HCM LOS			C	F

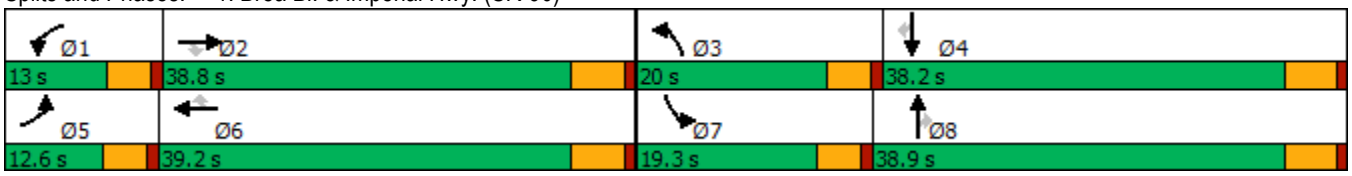
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	203	92	-	-	-	-	10	169
HCM Lane V/C Ratio	0.016	0.568	-	-	-	-	1.333	0.394
HCM Control Delay (s)	23	86.3	-	-	-	-	$ 910.8	39.5
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	2.6	-	-	-	-	2.5	1.7

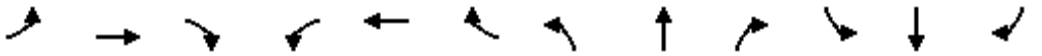
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	1615	441	274	1576	170	505	742	261	289	609	214
Future Volume (vph)	260	1615	441	274	1576	170	505	742	261	289	609	214
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.5	33.5	8.4	33.9	33.9	15.4	27.4	27.4	12.8	24.8	24.8
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.33	0.33	0.15	0.27	0.27	0.13	0.24	0.24
v/c Ratio	1.07	0.99	0.68	1.07	0.95	0.29	1.08	0.55	0.49	0.74	0.72	0.44
Control Delay	122.4	54.4	20.4	122.7	47.5	11.8	105.7	33.8	14.7	55.7	40.4	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	122.4	54.4	20.4	122.7	47.5	11.8	105.7	33.8	14.7	55.7	40.4	12.6
LOS	F	D	C	F	D	B	F	C	B	E	D	B
Approach Delay		55.6			54.7			54.6			39.1	
Approach LOS		E			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 52.5	Intersection LOS: D
Intersection Capacity Utilization 90.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1615	441	274	1576	170	505	742	261	289	609	214
Future Volume (veh/h)	260	1615	441	274	1576	170	505	742	261	289	609	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	265	1648	280	280	1608	113	515	757	162	295	621	177
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	265	1648	280	280	1608	113	515	757	162	295	621	177
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	31.7	14.6	8.4	30.4	5.1	15.4	12.7	8.4	9.1	16.3	9.9
Cycle Q Clear(g_c), s	8.0	31.7	14.6	8.4	30.4	5.1	15.4	12.7	8.4	9.1	16.3	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
V/C Ratio(X)	1.04	0.97	0.54	1.05	0.93	0.21	1.05	0.55	0.38	0.82	0.76	0.49
Avail Cap(c_a), veh/h	255	1705	520	267	1726	532	490	1721	526	468	1173	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	32.8	27.0	45.8	32.0	23.6	42.3	31.2	29.6	43.4	35.9	33.5
Incr Delay (d2), s/veh	67.4	14.6	1.1	68.0	9.7	0.2	54.6	0.3	0.6	6.8	1.8	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.4	20.9	9.2	10.0	20.0	3.4	15.1	8.8	5.7	6.9	11.4	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.5	47.4	28.1	113.8	41.7	23.8	96.9	31.5	30.2	50.2	37.7	34.5
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	C
Approach Vol, veh/h		2193			2001			1434			1093	
Approach Delay, s/veh		52.9			50.7			54.9			40.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	28.2	12.6	39.2	15.9	32.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	33.7	17.4	18.3	10.0	32.4	11.1	14.7
Green Ext Time (p_c), s	0.0	0.0	0.0	4.1	0.0	1.2	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	50.7
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.775
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	47	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	505	742	261	288	609	214	260	1615	441	274	1576	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	505	742	261	288	609	214	260	1615	441	274	1576	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	505	742	261	288	609	214	260	1615	441	274	1576	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	505	742	261	288	609	214	260	1615	441	274	1576	170
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	505	742	261	288	609	214	260	1615	441	274	1576	170
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.15	0.15	0.15	0.08	0.18	0.13	0.08	0.32	0.26	0.08	0.31	0.10
Crit Moves:	****				****			****			****	

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	33	31	1136	19	5	6	42	0	0	27
Future Vol, veh/h	0	1035	33	31	1136	19	5	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1125	36	34	1235	21	5	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1163	0	0	1813	2457	565	-	-	634
Stage 1	-	-	-	-	-	-	1127	1127	-	-	-	-
Stage 2	-	-	-	-	-	-	686	1330	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	596	-	-	49	30	468	0	0	422
Stage 1	0	-	-	-	-	-	218	278	-	0	0	-
Stage 2	0	-	-	-	-	-	404	222	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	595	-	-	44	28	467	-	-	420
Mov Cap-2 Maneuver	-	-	-	-	-	-	142	121	-	-	-	-
Stage 1	-	-	-	-	-	-	218	277	-	-	-	-
Stage 2	-	-	-	-	-	-	354	208	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	19.6	14.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	303	-	-	595	-	-	420
HCM Lane V/C Ratio	0.19	-	-	0.057	-	-	0.07
HCM Control Delay (s)	19.6	-	-	11.4	-	-	14.2
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	6	36	1	5	37
Future Vol, veh/h	5	6	36	1	5	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	8	51	1	7	52

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	118	52	0	0	52	0
Stage 1	52	-	-	-	-	-
Stage 2	66	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	878	1016	-	-	1554	-
Stage 1	970	-	-	-	-	-
Stage 2	957	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	874	1016	-	-	1554	-
Mov Cap-2 Maneuver	874	-	-	-	-	-
Stage 1	970	-	-	-	-	-
Stage 2	952	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	946	1554	-
HCM Lane V/C Ratio	-	-	0.016	0.005	-
HCM Control Delay (s)	-	-	8.9	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2001	18	0	2074	37	0	0	27	0	0	42
Future Vol, veh/h	0	2001	18	0	2074	37	0	0	27	0	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2084	19	0	2160	39	0	0	28	0	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1052	-	-	1100
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	267	0	0	252
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	267	-	-	252
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

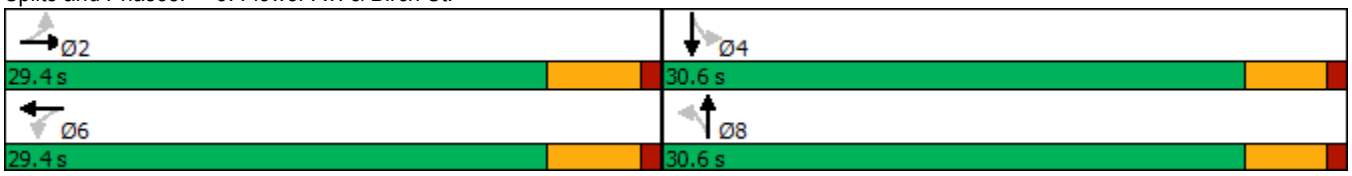
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.1	22.3
HCM LOS			C	C

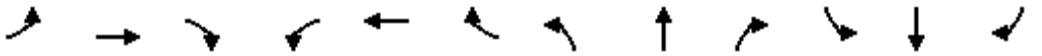
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	267	-	-	-	-	252
HCM Lane V/C Ratio	0.105	-	-	-	-	0.174
HCM Control Delay (s)	20.1	-	-	-	-	22.3
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.6

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	24	1080	89	1113	15	10	27	2
Future Volume (vph)	24	1080	89	1113	15	10	27	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	26.5	26.5	26.5	26.5		14.2		14.2
Actuated g/C Ratio	0.70	0.70	0.70	0.70		0.38		0.38
v/c Ratio	0.09	0.44	0.32	0.46		0.14		0.09
Control Delay	9.8	8.2	15.3	8.6		9.3		9.5
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	9.8	8.2	15.3	8.6		9.3		9.5
LOS	A	A	B	A		A		A
Approach Delay		8.2		9.0		9.3		9.5
Approach LOS		A		A		A		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 37.8	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	7	89	1113	8	15	10	55	27	2	15
Future Volume (veh/h)	24	1080	7	89	1113	8	15	10	55	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	6	90	1124	8	15	10	26	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	2087	11	411	2083	15	182	59	103	280	41	52
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	470	3624	20	487	3616	26	323	465	820	766	328	415
Grp Volume(v), veh/h	24	535	562	90	552	580	51	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1867	487	1777	1865	1609	0	0	1510	0	0
Q Serve(g_s), s	1.1	6.0	6.0	4.5	6.3	6.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.4	6.0	6.0	10.5	6.3	6.3	0.9	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.29		0.51	0.67		0.27
Lane Grp Cap(c), veh/h	400	1023	1075	411	1023	1074	344	0	0	373	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.22	0.54	0.54	0.15	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	476	1309	1375	489	1309	1373	1386	0	0	1329	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.6	4.2	4.2	7.4	4.3	4.3	12.9	0.0	0.0	12.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.3	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.1	1.9	2.0	0.5	1.3	1.4	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.6	4.6	4.6	7.7	4.7	4.7	13.1	0.0	0.0	13.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1121			1222			51			40	
Approach Delay, s/veh		4.7			4.9			13.1			13.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		24.1		8.7		24.1		8.7				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		9.4		2.7		12.5		2.9				
Green Ext Time (p_c), s		6.9		0.1		6.3		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.1									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	6	0	6	1	0	1	16	90	3	4	64	19
Future Vol, veh/h	6	0	6	1	0	1	16	90	3	4	64	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	8	1	0	1	22	125	4	6	89	26

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	287	288	103	289	299	127	116	0	0	129	0	0
Stage 1	115	115	-	171	171	-	-	-	-	-	-	-
Stage 2	172	173	-	118	128	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	665	622	952	663	613	923	1473	-	-	1457	-	-
Stage 1	890	800	-	831	757	-	-	-	-	-	-	-
Stage 2	830	756	-	887	790	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	653	609	951	647	600	923	1472	-	-	1457	-	-
Mov Cap-2 Maneuver	653	609	-	647	600	-	-	-	-	-	-	-
Stage 1	875	796	-	818	745	-	-	-	-	-	-	-
Stage 2	815	744	-	876	786	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	9.7	1.1	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1472	-	-	774	761	1457	-	-
HCM Lane V/C Ratio	0.015	-	-	0.022	0.004	0.004	-	-
HCM Control Delay (s)	7.5	0	-	9.8	9.7	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	2006	5	0	2054	66	0	0	7	14	0	57
Future Vol, veh/h	43	2006	5	0	2054	66	0	0	7	14	0	57
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	44	2068	5	0	2118	68	0	0	7	14	0	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2191	0	0	-	-	0	-	-	1040	3072	-	1098
Stage 1	-	-	-	-	-	-	-	-	-	2157	-	-
Stage 2	-	-	-	-	-	-	-	-	-	915	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	100	-	-	0	-	-	0	0	195	~ 13	0	178
Stage 1	-	-	-	0	-	-	0	0	-	30	0	-
Stage 2	-	-	-	0	-	-	0	0	-	266	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	100	-	-	-	-	-	-	-	194	~ 8	-	177
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	15	-	-
Stage 1	-	-	-	-	-	-	-	-	-	17	-	-
Stage 2	-	-	-	-	-	-	-	-	-	143	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0	24.3	138.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	194	100	-	-	-	-	15	177
HCM Lane V/C Ratio	0.037	0.443	-	-	-	-	0.962	0.332
HCM Control Delay (s)	24.3	67	-	-	-	-	$ 559	35.1
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	1.9	-	-	-	-	2.3	1.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

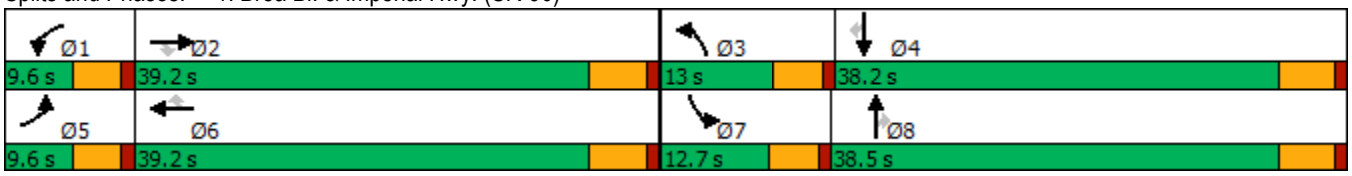
APPENDIX 5.2: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

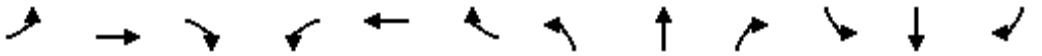
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	176	1432	357	173	1524	118	410	476	171	209	627	193
Future Volume (vph)	176	1432	357	173	1524	118	410	476	171	209	627	193
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.9	33.9	5.0	33.9	33.9	8.4	24.7	24.7	8.1	24.4	24.4
Actuated g/C Ratio	0.05	0.37	0.37	0.05	0.37	0.37	0.09	0.27	0.27	0.09	0.27	0.27
v/c Ratio	1.07	0.80	0.52	1.05	0.85	0.19	1.49	0.37	0.35	0.79	0.70	0.40
Control Delay	133.0	30.7	11.4	128.4	33.0	5.1	269.6	27.5	10.7	62.7	34.4	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	133.0	30.7	11.4	128.4	33.0	5.1	269.6	27.5	10.7	62.7	34.4	13.0
LOS	F	C	B	F	C	A	F	C	B	E	C	B
Approach Delay		36.4			40.3			118.7			36.1	
Approach LOS		D			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 91.6	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.49	
Intersection Signal Delay: 52.4	Intersection LOS: D
Intersection Capacity Utilization 84.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	176	1432	357	173	1524	118	410	476	171	209	627	193
Future Volume (veh/h)	176	1432	357	173	1524	118	410	476	171	209	627	193
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	185	1507	368	182	1604	116	432	501	172	220	660	186
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	179	1877	573	179	1877	581	301	1344	410	286	918	405
Arrive On Green	0.06	0.37	0.37	0.06	0.37	0.37	0.09	0.26	0.26	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	185	1507	368	182	1604	116	432	501	172	220	660	186
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	23.5	17.4	5.0	25.7	4.4	8.4	7.1	8.1	6.0	15.0	8.9
Cycle Q Clear(g_c), s	5.0	23.5	17.4	5.0	25.7	4.4	8.4	7.1	8.1	6.0	15.0	8.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	1877	573	179	1877	581	301	1344	410	286	918	405
V/C Ratio(X)	1.03	0.80	0.64	1.01	0.85	0.20	1.43	0.37	0.42	0.77	0.72	0.46
Avail Cap(c_a), veh/h	179	1945	593	179	1945	602	301	1916	584	290	1321	583
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	25.2	23.2	41.9	25.9	19.2	40.2	26.7	27.1	39.5	30.0	27.7
Incr Delay (d2), s/veh	75.8	2.5	2.3	71.2	3.9	0.2	213.4	0.2	0.7	10.6	1.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.8	14.1	10.5	6.7	16.1	2.9	20.0	5.0	5.4	4.9	10.4	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	117.6	27.6	25.5	113.0	29.7	19.3	253.6	26.9	27.8	50.1	31.1	28.5
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2060			1902			1105			1066	
Approach Delay, s/veh		35.3			37.1			115.6			34.5	
Approach LOS		D			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.0	13.0	28.1	9.6	38.0	12.6	28.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	25.5	10.4	17.0	7.0	27.7	8.0	10.1
Green Ext Time (p_c), s	0.0	6.2	0.0	4.6	0.0	4.9	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	50.2
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.706
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	38	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	410	476	168	209	627	193	176	1425	357	167	1511	118
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	410	476	168	209	627	193	176	1425	357	167	1511	118
Added Vol:	0	0	3	0	0	0	0	7	0	6	13	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	410	476	171	209	627	193	176	1432	357	173	1524	118
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	410	476	171	209	627	193	176	1432	357	173	1524	118
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	410	476	171	209	627	193	176	1432	357	173	1524	118
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	410	476	171	209	627	193	176	1432	357	173	1524	118
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.09	0.10	0.06	0.18	0.11	0.05	0.28	0.21	0.05	0.30	0.07
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	640	20	15	739	5	12	1	16	0	0	15
Future Vol, veh/h	0	640	20	15	739	5	12	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	727	23	17	840	6	14	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	751	0	0	1182	1612	365	-	-	427
Stage 1	-	-	-	-	-	-	728	728	-	-	-	-
Stage 2	-	-	-	-	-	-	454	884	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	854	-	-	145	103	632	0	0	576
Stage 1	0	-	-	-	-	-	381	427	-	0	0	-
Stage 2	0	-	-	-	-	-	555	362	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	853	-	-	138	100	631	-	-	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	263	221	-	-	-	-
Stage 1	-	-	-	-	-	-	381	427	-	-	-	-
Stage 2	-	-	-	-	-	-	528	353	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	15.3	11.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	384	-	-	853	-	-	574
HCM Lane V/C Ratio	0.086	-	-	0.02	-	-	0.03
HCM Control Delay (s)	15.3	-	-	9.3	-	-	11.5
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	5.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	42	21	18	29	34	18
Future Vol, veh/h	42	21	18	29	34	18
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	37	32	51	60	32

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	214	69	0	0	87	0
Stage 1	62	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	774	994	-	-	1509	-
Stage 1	961	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	739	984	-	-	1503	-
Mov Cap-2 Maneuver	739	-	-	-	-	-
Stage 1	957	-	-	-	-	-
Stage 2	840	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.2	0	4.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	806	1503	-
HCM Lane V/C Ratio	-	-	0.137	0.04	-
HCM Control Delay (s)	-	-	10.2	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1859	13	0	1873	47	0	0	36	0	0	60
Future Vol, veh/h	0	1859	13	0	1873	47	0	0	36	0	0	60
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1916	13	0	1931	48	0	0	37	0	0	62

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	968	-	-	990
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	218	0	0	211
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	217	-	-	211
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

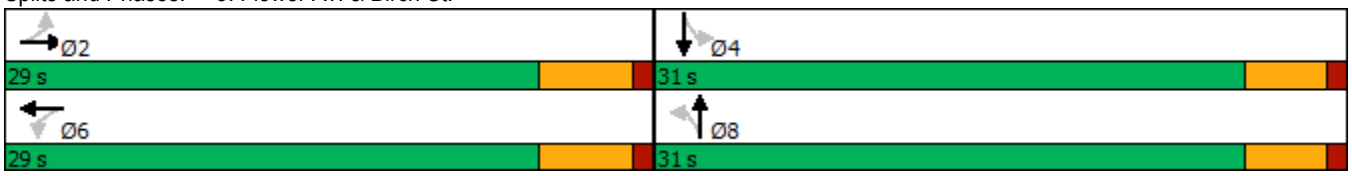
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25	29
HCM LOS			D	D

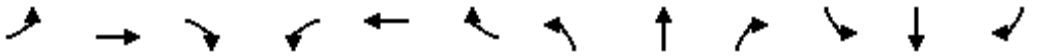
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	217	-	-	-	-	211
HCM Lane V/C Ratio	0.171	-	-	-	-	0.293
HCM Control Delay (s)	25	-	-	-	-	29
HCM Lane LOS	D	-	-	-	-	D
HCM 95th %tile Q(veh)	0.6	-	-	-	-	1.2

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	18	653	64	649	82	47	47	10
Future Volume (vph)	18	653	64	649	82	47	47	10
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	19.6	19.6	19.6	19.6		14.5		14.5
Actuated g/C Ratio	0.54	0.54	0.54	0.54		0.40		0.40
v/c Ratio	0.06	0.41	0.23	0.41		0.33		0.14
Control Delay	9.5	9.5	11.8	9.4		10.9		9.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	9.5	9.5	11.8	9.4		10.9		9.3
LOS	A	A	B	A		B		A
Approach Delay		9.5		9.6		10.9		9.3
Approach LOS		A		A		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 36.5	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.41	
Intersection Signal Delay: 9.7	Intersection LOS: A
Intersection Capacity Utilization 59.3%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	14	64	649	10	82	47	37	47	10	13
Future Volume (veh/h)	18	653	14	64	649	10	82	47	37	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	15	75	764	12	96	55	29	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1483	29	350	1490	23	377	203	84	498	103	46
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	658	3563	70	653	3579	56	708	605	252	1012	308	138
Grp Volume(v), veh/h	21	383	400	75	379	397	180	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1855	653	1777	1859	1565	0	0	1458	0	0
Q Serve(g_s), s	1.0	6.3	6.3	3.8	6.2	6.2	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.2	6.3	6.3	10.1	6.2	6.2	3.1	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.53		0.16	0.74		0.09
Lane Grp Cap(c), veh/h	352	739	772	350	739	773	664	0	0	648	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.21	0.51	0.51	0.27	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	476	1073	1121	472	1073	1123	1177	0	0	1104	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.2	8.6	8.6	12.3	8.5	8.5	9.7	0.0	0.0	9.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.5	0.3	0.6	0.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.5	3.6	0.8	3.1	3.2	1.7	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.3	9.1	9.1	12.6	9.1	9.1	9.9	0.0	0.0	9.2	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		804			851			180			74	
Approach Delay, s/veh		9.2			9.4			9.9			9.2	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.6		17.8		21.6		17.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		9.2		3.1		12.1		5.1				
Green Ext Time (p_c), s		4.7		0.4		4.1		1.0				

Intersection Summary												
HCM 6th Ctrl Delay			9.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	27	0	33	0	0	2	62	167	12	18	102	28
Future Vol, veh/h	27	0	33	0	0	2	62	167	12	18	102	28
Conflicting Peds, #/hr	0	0	52	0	0	56	0	0	44	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	46	0	56	0	0	3	105	283	20	31	173	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	829	825	258	886	838	393	229	0	0	347	0	0
Stage 1	268	268	-	547	547	-	-	-	-	-	-	-
Stage 2	561	557	-	339	291	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	290	308	781	265	302	656	1339	-	-	1212	-	-
Stage 1	738	687	-	521	517	-	-	-	-	-	-	-
Stage 2	512	512	-	676	672	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	245	257	736	202	252	595	1328	-	-	1161	-	-
Mov Cap-2 Maneuver	245	257	-	202	252	-	-	-	-	-	-	-
Stage 1	662	660	-	452	448	-	-	-	-	-	-	-
Stage 2	436	444	-	575	645	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.6	11.1	2	1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1328	-	-	387	595	1161	-	-
HCM Lane V/C Ratio	0.079	-	-	0.263	0.006	0.026	-	-
HCM Control Delay (s)	7.9	0	-	17.6	11.1	8.2	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1	0	0.1	-	-

Intersection	
Int Delay, s/veh	17

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	92	1762	3	0	1823	149	0	0	4	13	0	97
Future Vol, veh/h	92	1762	3	0	1823	149	0	0	4	13	0	97
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	99	1895	3	0	1960	160	0	0	4	14	0	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2125	0	0	-	-	0	-	-	951	3001	-	1065
Stage 1	-	-	-	-	-	-	-	-	-	2045	-	-
Stage 2	-	-	-	-	-	-	-	-	-	956	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	108	-	-	0	-	-	0	0	224	15	0	188
Stage 1	-	-	-	0	-	-	0	0	-	36	0	-
Stage 2	-	-	-	0	-	-	0	0	-	250	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	107	-	-	-	-	-	-	-	224	~ 3	-	187
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 3	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 3	-	-
Stage 2	-	-	-	-	-	-	-	-	-	18	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7	0	21.4	$ 491.6
HCM LOS			C	F

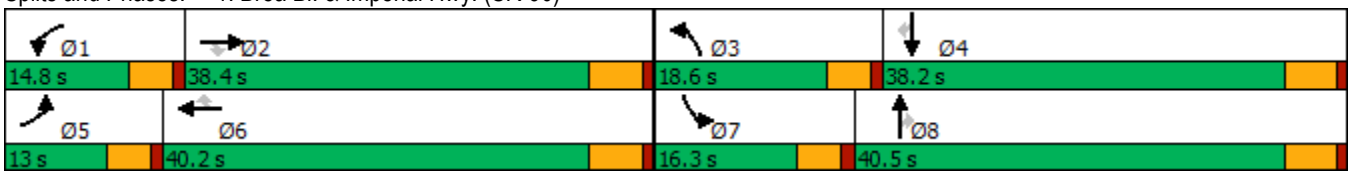
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	224	107	-	-	-	-	3	187
HCM Lane V/C Ratio	0.019	0.925	-	-	-	-	4.659	0.558
HCM Control Delay (s)	21.4	141.2	-	-	-	-	$ 3815.6	46.1
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	5.6	-	-	-	-	3.1	2.9

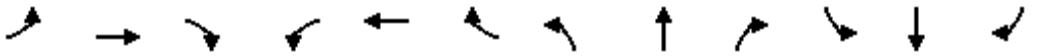
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	1334	338	297	1440	161	398	598	234	282	563	244
Future Volume (vph)	260	1334	338	297	1440	161	398	598	234	282	563	244
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	27.2	27.2	11.6	24.8	24.8
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
v/c Ratio	1.07	0.87	0.56	1.01	0.89	0.29	0.98	0.47	0.46	0.85	0.70	0.52
Control Delay	122.7	40.0	15.8	99.8	40.1	11.3	85.0	32.3	12.4	67.1	39.8	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	122.7	40.0	15.8	99.8	40.1	11.3	85.0	32.3	12.4	67.1	39.8	14.8
LOS	F	D	B	F	D	B	F	C	B	E	D	B
Approach Delay		46.9			47.0			45.6			41.3	
Approach LOS		D			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.07	
Intersection Signal Delay: 45.7	Intersection LOS: D
Intersection Capacity Utilization 83.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1334	338	297	1440	161	398	598	234	282	563	244
Future Volume (veh/h)	260	1334	338	297	1440	161	398	598	234	282	563	244
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	280	1434	221	319	1548	116	428	643	149	303	605	203
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	1651	502	326	1743	536	447	1338	406	362	836	367
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	280	1434	221	319	1548	116	428	643	149	303	605	203
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	26.3	11.2	10.0	28.6	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Cycle Q Clear(g_c), s	8.4	26.3	11.2	10.0	28.6	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	268	1651	502	326	1743	536	447	1338	406	362	836	367
V/C Ratio(X)	1.04	0.87	0.44	0.98	0.89	0.22	0.96	0.48	0.37	0.84	0.72	0.55
Avail Cap(c_a), veh/h	268	1691	514	326	1783	549	447	1809	549	374	1177	518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	31.7	26.6	44.6	31.0	23.3	42.5	31.0	30.0	43.3	35.1	33.5
Incr Delay (d2), s/veh	66.8	5.1	0.6	43.9	5.8	0.2	31.5	0.3	0.6	14.1	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.8	16.4	7.4	9.9	18.3	3.5	11.4	7.7	5.3	7.7	11.0	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	112.4	36.8	27.2	88.5	36.8	23.5	74.0	31.3	30.6	57.3	36.5	34.8
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	C
Approach Vol, veh/h		1935			1983			1220			1111	
Approach Delay, s/veh		46.6			44.4			46.2			41.8	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.6	18.6	28.6	13.0	39.4	15.9	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.0	28.3	15.3	17.6	10.4	30.6	11.3	12.6
Green Ext Time (p_c), s	0.0	3.5	0.0	4.2	0.0	3.5	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	45.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.691
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	36	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	398	598	233	281	563	244	260	1332	338	296	1437	161
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	398	598	233	281	563	244	260	1332	338	296	1437	161
Added Vol:	0	0	1	0	0	0	0	2	0	1	3	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	398	598	234	281	563	244	260	1334	338	297	1440	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	398	598	234	281	563	244	260	1334	338	297	1440	161
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	398	598	234	281	563	244	260	1334	338	297	1440	161
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	398	598	234	281	563	244	260	1334	338	297	1440	161
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.12	0.14	0.08	0.17	0.14	0.08	0.26	0.20	0.09	0.28	0.09
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	913	39	23	1011	20	15	1	68	0	0	21
Future Vol, veh/h	0	913	39	23	1011	20	15	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1038	44	26	1149	23	17	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1091	0	0	1674	2274	528	-	-	589
Stage 1	-	-	-	-	-	-	1047	1047	-	-	-	-
Stage 2	-	-	-	-	-	-	627	1227	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	635	-	-	62	40	495	0	0	452
Stage 1	0	-	-	-	-	-	244	303	-	0	0	-
Stage 2	0	-	-	-	-	-	438	249	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	630	-	-	56	38	491	-	-	451
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	138	-	-	-	-
Stage 1	-	-	-	-	-	-	244	300	-	-	-	-
Stage 2	-	-	-	-	-	-	398	238	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	19	13.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	352	-	-	630	-	-	451
HCM Lane V/C Ratio	0.271	-	-	0.041	-	-	0.053
HCM Control Delay (s)	19	-	-	11	-	-	13.4
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	21	20	29	17	24	49
Future Vol, veh/h	21	20	29	17	24	49
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	30	44	26	36	74

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	204	61	0	0	71	0
Stage 1	58	-	-	-	-	-
Stage 2	146	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	784	1004	-	-	1529	-
Stage 1	965	-	-	-	-	-
Stage 2	881	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	764	1000	-	-	1528	-
Mov Cap-2 Maneuver	764	-	-	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	859	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.5	0	2.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	863	1528	-
HCM Lane V/C Ratio	-	-	0.072	0.024	-
HCM Control Delay (s)	-	-	9.5	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1875	21	0	1988	46	0	0	23	0	0	70
Future Vol, veh/h	0	1875	21	0	1988	46	0	0	23	0	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2180	24	0	2312	53	0	0	27	0	0	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1102	-	-	1183
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	311	0	0	286
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	311	-	-	286
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

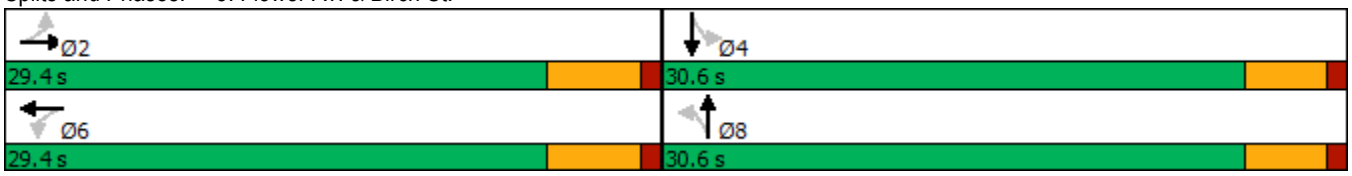
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.7	22.5
HCM LOS			C	C

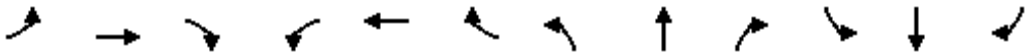
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	311	-	-	-	-	286
HCM Lane V/C Ratio	0.086	-	-	-	-	0.285
HCM Control Delay (s)	17.7	-	-	-	-	22.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	1.1

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	26	958	80	994	44	36	34	3
Future Volume (vph)	26	958	80	994	44	36	34	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	25.0	25.0	25.0	25.0		14.0		14.0
Actuated g/C Ratio	0.60	0.60	0.60	0.60		0.34		0.34
v/c Ratio	0.14	0.52	0.39	0.54		0.29		0.13
Control Delay	10.7	9.7	18.9	10.1		12.5		9.5
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.7	9.7	18.9	10.1		12.5		9.5
LOS	B	A	B	B		B		A
Approach Delay		9.7		10.8		12.5		9.5
Approach LOS		A		B		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 41.4	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	19	80	994	19	44	36	54	34	3	20
Future Volume (veh/h)	26	958	19	80	994	19	44	36	54	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	20	90	1117	19	49	40	34	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	1717	32	275	1720	29	261	205	138	473	42	56
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	469	3568	66	487	3575	61	497	651	439	1071	134	176
Grp Volume(v), veh/h	29	536	560	90	555	581	123	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1858	487	1777	1859	1588	0	0	1382	0	0
Q Serve(g_s), s	2.4	10.8	10.8	8.1	11.3	11.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	13.7	10.8	10.8	18.9	11.3	11.3	2.5	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.40		0.28	0.81		0.13
Lane Grp Cap(c), veh/h	265	855	894	275	855	895	605	0	0	571	0	0
V/C Ratio(X)	0.11	0.63	0.63	0.33	0.65	0.65	0.20	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	275	893	934	285	893	935	954	0	0	866	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.6	9.3	9.3	16.3	9.4	9.4	12.1	0.0	0.0	11.6	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.3	1.3	0.7	1.6	1.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	6.5	6.7	1.4	6.2	6.5	1.6	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	10.6	10.5	17.0	11.0	10.9	12.3	0.0	0.0	11.6	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1125			1226			123			47	
Approach Delay, s/veh		10.7			11.4			12.3			11.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.4		19.8		28.4		19.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		15.7		2.9		20.9		4.5				
Green Ext Time (p_c), s		4.8		0.2		2.3		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	2	0	12	0	0	1	18	101	8	10	72	5
Future Vol, veh/h	2	0	12	0	0	1	18	101	8	10	72	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	0	15	0	0	1	23	129	10	13	92	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	302	306	95	309	304	134	98	0	0	139	0	0
Stage 1	121	121	-	180	180	-	-	-	-	-	-	-
Stage 2	181	185	-	129	124	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	650	608	962	643	609	915	1495	-	-	1445	-	-
Stage 1	883	796	-	822	750	-	-	-	-	-	-	-
Stage 2	821	747	-	875	793	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	636	592	962	620	593	915	1495	-	-	1445	-	-
Mov Cap-2 Maneuver	636	592	-	620	593	-	-	-	-	-	-	-
Stage 1	868	788	-	808	737	-	-	-	-	-	-	-
Stage 2	806	734	-	852	785	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.1	8.9	1.1	0.9
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1495	-	-	896	915	1445	-	-
HCM Lane V/C Ratio	0.015	-	-	0.02	0.001	0.009	-	-
HCM Control Delay (s)	7.4	0	-	9.1	8.9	7.5	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	1814	13	0	1963	77	0	0	3	13	0	70
Future Vol, veh/h	51	1814	13	0	1963	77	0	0	3	13	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	2016	14	0	2181	86	0	0	3	14	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2267	0	0	-	-	0	-	-	1015	3144	-	1134
Stage 1	-	-	-	-	-	-	-	-	-	2224	-	-
Stage 2	-	-	-	-	-	-	-	-	-	920	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	91	-	-	0	-	-	0	0	203	~ 12	0	169
Stage 1	-	-	-	0	-	-	0	0	-	26	0	-
Stage 2	-	-	-	0	-	-	0	0	-	264	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	91	-	-	-	-	-	-	-	203	~ 6	-	169
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 9	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 10	-	-
Stage 2	-	-	-	-	-	-	-	-	-	97	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0	23	208.1
HCM LOS			C	F

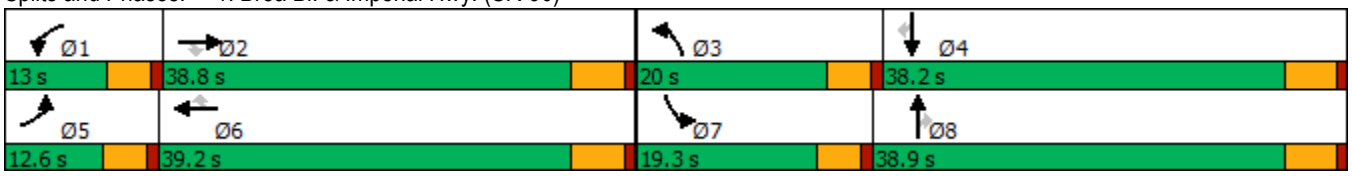
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	203	91	-	-	-	-	9	169
HCM Lane V/C Ratio	0.016	0.623	-	-	-	-	1.605	0.46
HCM Control Delay (s)	23	94.9	-	-	-	-	$ 1095.6	43.3
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	2.9	-	-	-	-	2.7	2.2

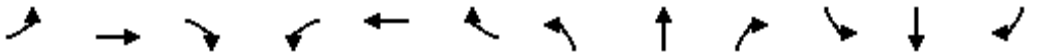
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	1621	441	276	1580	170	505	742	264	289	609	214
Future Volume (vph)	260	1621	441	276	1580	170	505	742	264	289	609	214
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.5	33.5	8.4	33.9	33.9	15.4	27.4	27.4	12.8	24.8	24.8
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.33	0.33	0.15	0.27	0.27	0.13	0.24	0.24
v/c Ratio	1.07	0.99	0.68	1.08	0.95	0.29	1.08	0.55	0.49	0.74	0.72	0.44
Control Delay	122.4	55.2	20.5	124.8	47.9	11.8	105.7	33.8	14.9	55.7	40.4	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	122.4	55.2	20.5	124.8	47.9	11.8	105.7	33.8	14.9	55.7	40.4	12.6
LOS	F	E	C	F	D	B	F	C	B	E	D	B
Approach Delay		56.1			55.3			54.5			39.1	
Approach LOS		E			E			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.08	
Intersection Signal Delay: 52.8	Intersection LOS: D
Intersection Capacity Utilization 90.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1621	441	276	1580	170	505	742	264	289	609	214
Future Volume (veh/h)	260	1621	441	276	1580	170	505	742	264	289	609	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	265	1654	280	282	1612	113	515	757	165	295	621	177
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	265	1654	280	282	1612	113	515	757	165	295	621	177
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	31.9	14.6	8.4	30.5	5.1	15.4	12.7	8.6	9.1	16.3	9.9
Cycle Q Clear(g_c), s	8.0	31.9	14.6	8.4	30.5	5.1	15.4	12.7	8.6	9.1	16.3	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
V/C Ratio(X)	1.04	0.97	0.54	1.05	0.93	0.21	1.05	0.55	0.39	0.82	0.76	0.49
Avail Cap(c_a), veh/h	255	1705	520	267	1726	532	490	1721	526	468	1173	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	32.8	27.0	45.8	32.0	23.6	42.3	31.2	29.7	43.4	35.9	33.5
Incr Delay (d2), s/veh	67.4	15.2	1.1	70.2	9.9	0.2	54.6	0.3	0.6	6.8	1.8	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.4	21.1	9.2	10.1	20.1	3.4	15.1	8.8	5.8	6.9	11.4	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.5	48.1	28.1	116.0	42.0	23.8	96.9	31.5	30.3	50.2	37.7	34.5
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	C
Approach Vol, veh/h		2199			2007			1437			1093	
Approach Delay, s/veh		53.4			51.3			54.8			40.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	28.2	12.6	39.2	15.9	32.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	33.9	17.4	18.3	10.0	32.5	11.1	14.7
Green Ext Time (p_c), s	0.0	0.0	0.0	4.1	0.0	1.1	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	51.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.777
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	48	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	505	742	261	288	609	214	260	1615	441	274	1576	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	505	742	261	288	609	214	260	1615	441	274	1576	170
Added Vol:	0	0	3	0	0	0	0	6	0	2	4	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	505	742	264	288	609	214	260	1621	441	276	1580	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	505	742	264	288	609	214	260	1621	441	276	1580	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	505	742	264	288	609	214	260	1621	441	276	1580	170
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	505	742	264	288	609	214	260	1621	441	276	1580	170
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.15	0.15	0.16	0.08	0.18	0.13	0.08	0.32	0.26	0.08	0.31	0.10
Crit Moves:	****			****			****			****		

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	38	31	1136	19	7	6	42	0	0	27
Future Vol, veh/h	0	1035	38	31	1136	19	7	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1125	41	34	1235	21	8	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1168	0	0	1813	2457	565	-	-	634
Stage 1	-	-	-	-	-	-	1127	1127	-	-	-	-
Stage 2	-	-	-	-	-	-	686	1330	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	594	-	-	49	30	468	0	0	422
Stage 1	0	-	-	-	-	-	218	278	-	0	0	-
Stage 2	0	-	-	-	-	-	404	222	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	593	-	-	44	28	467	-	-	420
Mov Cap-2 Maneuver	-	-	-	-	-	-	142	121	-	-	-	-
Stage 1	-	-	-	-	-	-	218	277	-	-	-	-
Stage 2	-	-	-	-	-	-	354	208	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	20.5	14.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	291	-	-	593	-	-	420
HCM Lane V/C Ratio	0.205	-	-	0.057	-	-	0.07
HCM Control Delay (s)	20.5	-	-	11.4	-	-	14.2
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	23	8	36	19	10	37
Future Vol, veh/h	23	8	36	19	10	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	32	11	51	27	14	52

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	145	65	0	0	78	0
Stage 1	65	-	-	-	-	-
Stage 2	80	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	847	999	-	-	1520	-
Stage 1	958	-	-	-	-	-
Stage 2	943	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	839	999	-	-	1520	-
Mov Cap-2 Maneuver	839	-	-	-	-	-
Stage 1	958	-	-	-	-	-
Stage 2	935	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	1.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	875	1520	-
HCM Lane V/C Ratio	-	-	0.05	0.009	-
HCM Control Delay (s)	-	-	9.3	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2011	18	0	2063	55	0	0	27	0	0	60
Future Vol, veh/h	0	2011	18	0	2063	55	0	0	27	0	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2095	19	0	2149	57	0	0	28	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1057	-	-	1103
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	266	0	0	251
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	266	-	-	251
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

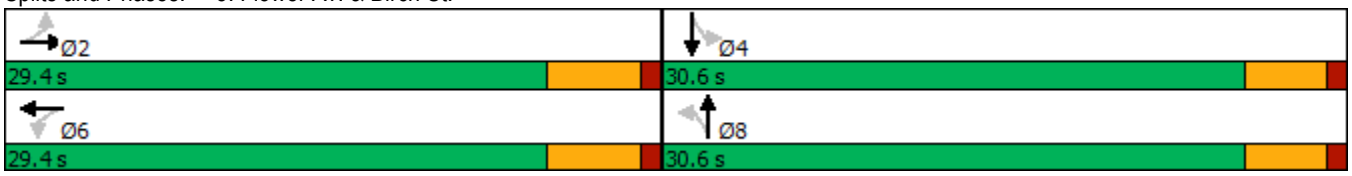
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.1	24
HCM LOS			C	C

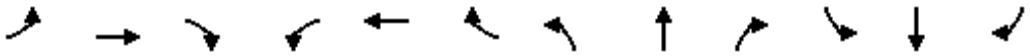
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	266	-	-	-	-	251
HCM Lane V/C Ratio	0.106	-	-	-	-	0.249
HCM Control Delay (s)	20.1	-	-	-	-	24
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	24	1080	95	1113	15	10	27	2
Future Volume (vph)	24	1080	95	1113	15	10	27	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	27.3	27.3	27.3	27.3		13.7		13.7
Actuated g/C Ratio	0.70	0.70	0.70	0.70		0.35		0.35
v/c Ratio	0.09	0.44	0.34	0.46		0.15		0.09
Control Delay	9.8	8.2	16.2	8.6		9.6		9.5
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	9.8	8.2	16.2	8.6		9.6		9.5
LOS	A	A	B	A		A		A
Approach Delay		8.2		9.2		9.6		9.5
Approach LOS		A		A		A		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 38.9	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 8.8	Intersection LOS: A
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	7	95	1113	8	15	10	59	27	2	15
Future Volume (veh/h)	24	1080	7	95	1113	8	15	10	59	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	6	96	1124	8	15	10	30	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	396	2088	11	406	2083	15	174	59	116	282	42	55
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	470	3624	20	487	3616	26	287	444	878	779	315	415
Grp Volume(v), veh/h	24	535	562	96	552	580	55	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1867	487	1777	1865	1610	0	0	1510	0	0
Q Serve(g_s), s	1.1	6.1	6.1	5.0	6.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.5	6.1	6.1	11.1	6.4	6.4	1.0	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.27		0.55	0.67		0.27
Lane Grp Cap(c), veh/h	396	1024	1075	406	1024	1074	349	0	0	379	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.24	0.54	0.54	0.16	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	464	1281	1346	477	1281	1345	1356	0	0	1300	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.7	4.3	4.3	7.7	4.4	4.4	13.1	0.0	0.0	12.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.3	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	2.0	2.1	0.6	1.4	1.5	0.6	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.8	4.7	4.7	8.0	4.8	4.8	13.3	0.0	0.0	13.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1121			1228			55			40	
Approach Delay, s/veh		4.8			5.1			13.3			13.1	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		24.5		9.0		24.5		9.0				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		9.5		2.7		13.1		3.0				
Green Ext Time (p_c), s		6.9		0.1		6.1		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.2									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	0	22	1	0	1	43	90	3	4	64	25
Future Vol, veh/h	10	0	22	1	0	1	43	90	3	4	64	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	14	0	31	1	0	1	60	125	4	6	89	35

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	368	369	108	381	384	127	125	0	0	129	0	0
Stage 1	120	120	-	247	247	-	-	-	-	-	-	-
Stage 2	248	249	-	134	137	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	588	560	946	577	550	923	1462	-	-	1457	-	-
Stage 1	884	796	-	757	702	-	-	-	-	-	-	-
Stage 2	756	701	-	869	783	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	565	533	945	538	523	923	1461	-	-	1457	-	-
Mov Cap-2 Maneuver	565	533	-	538	523	-	-	-	-	-	-	-
Stage 1	844	792	-	724	671	-	-	-	-	-	-	-
Stage 2	722	670	-	838	779	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.9	10.3	2.4	0.3
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1461	-	-	781	680	1457	-	-
HCM Lane V/C Ratio	0.041	-	-	0.057	0.004	0.004	-	-
HCM Control Delay (s)	7.6	0	-	9.9	10.3	7.5	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0	0	-	-

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	53	2006	5	0	2047	84	0	0	7	16	0	71
Future Vol, veh/h	53	2006	5	0	2047	84	0	0	7	16	0	71
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	2068	5	0	2110	87	0	0	7	16	0	73

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2202	0	0	-	-	0	-	-	1040	3096	-	1104
Stage 1	-	-	-	-	-	-	-	-	-	2159	-	-
Stage 2	-	-	-	-	-	-	-	-	-	937	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	99	-	-	0	-	-	0	0	195	~ 13	0	177
Stage 1	-	-	-	0	-	-	0	0	-	29	0	-
Stage 2	-	-	-	0	-	-	0	0	-	257	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	99	-	-	-	-	-	-	-	194	~ 7	-	176
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 12	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 13	-	-
Stage 2	-	-	-	-	-	-	-	-	-	110	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0	24.3	184.4
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	194	99	-	-	-	-	12	176
HCM Lane V/C Ratio	0.037	0.552	-	-	-	-	1.375	0.416
HCM Control Delay (s)	24.3	79.1	-	-	-	-	$ 828.2	39.3
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	2.5	-	-	-	-	2.8	1.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

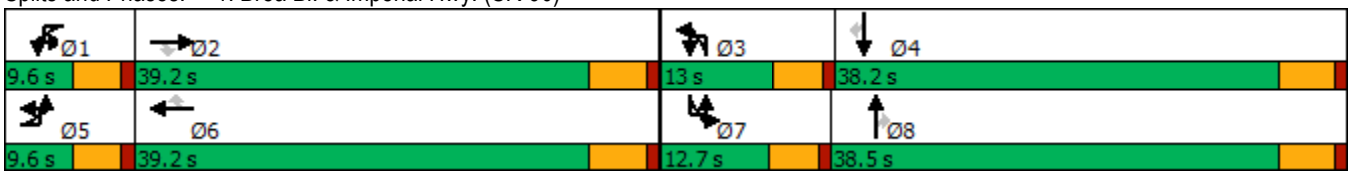
APPENDIX 5.3: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

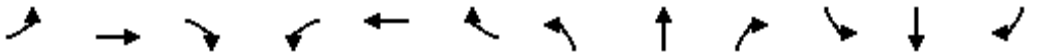
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	1344	357	167	1437	118	410	476	168	209	627	267
Future Volume (vph)	257	1344	357	167	1437	118	410	476	168	209	627	267
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.5	33.5	5.0	33.5	33.5	8.4	24.7	24.7	8.1	24.4	24.4
Actuated g/C Ratio	0.05	0.37	0.37	0.05	0.37	0.37	0.09	0.27	0.27	0.09	0.27	0.27
v/c Ratio	1.56	0.76	0.52	1.01	0.81	0.19	1.48	0.36	0.34	0.78	0.70	0.55
Control Delay	310.5	29.3	11.4	118.2	31.1	5.1	265.6	27.3	10.4	62.1	34.2	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	310.5	29.3	11.4	118.2	31.1	5.1	265.6	27.3	10.4	62.1	34.2	19.4
LOS	F	C	B	F	C	A	F	C	B	E	C	B
Approach Delay		63.0			37.8			117.4			35.9	
Approach LOS		E			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 91.2	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.56	
Intersection Signal Delay: 60.2	Intersection LOS: E
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	1344	357	167	1437	118	410	476	168	209	627	267
Future Volume (veh/h)	257	1344	357	167	1437	118	410	476	168	209	627	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	271	1415	368	176	1513	116	432	501	169	220	660	264
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	181	1845	563	181	1845	571	304	1363	416	286	929	410
Arrive On Green	0.06	0.36	0.36	0.06	0.36	0.36	0.10	0.27	0.27	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	271	1415	368	176	1513	116	432	501	169	220	660	264
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	21.6	17.4	4.9	23.7	4.5	8.4	7.0	7.9	6.0	14.8	13.2
Cycle Q Clear(g_c), s	5.0	21.6	17.4	4.9	23.7	4.5	8.4	7.0	7.9	6.0	14.8	13.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	181	1845	563	181	1845	571	304	1363	416	286	929	410
V/C Ratio(X)	1.50	0.77	0.65	0.97	0.82	0.20	1.42	0.37	0.41	0.77	0.71	0.64
Avail Cap(c_a), veh/h	181	1960	598	181	1960	606	304	1931	589	293	1332	587
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	24.8	23.5	41.5	25.5	19.4	39.8	26.2	26.5	39.2	29.5	28.9
Incr Delay (d2), s/veh	251.5	1.8	2.4	58.8	2.8	0.2	208.4	0.2	0.6	10.3	1.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.3	13.0	10.5	6.1	14.9	2.9	19.8	5.0	5.2	4.8	10.3	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	293.0	26.6	25.9	100.3	28.3	19.5	248.3	26.4	27.2	49.5	30.5	30.6
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2054			1805			1102			1144	
Approach Delay, s/veh		61.6			34.7			113.5			34.2	
Approach LOS		E			C			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	37.2	13.0	28.2	9.6	37.2	12.5	28.7
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	6.9	23.6	10.4	16.8	7.0	25.7	8.0	9.9
Green Ext Time (p_c), s	0.0	7.1	0.0	4.9	0.0	6.1	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	57.9
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1

Cycle (sec):	100	Critical Vol./Cap.(X):	0.710
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	38	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	410	484	160	209	638	282	249	1352	357	157	1422	118
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	410	484	160	209	638	282	249	1352	357	157	1422	118
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	410	484	160	209	638	282	249	1352	357	157	1422	118
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	410	484	160	209	638	282	249	1352	357	157	1422	118
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	410	484	160	209	638	282	249	1352	357	157	1422	118
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.09	0.09	0.06	0.19	0.17	0.07	0.27	0.21	0.05	0.28	0.07
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↔				↱
Traffic Vol, veh/h	0	721	15	15	814	5	6	1	16	0	0	15
Future Vol, veh/h	0	721	15	15	814	5	6	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	819	17	17	925	6	7	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	837	0	0	1317	1789	411	-	-	470
Stage 1	-	-	-	-	-	-	820	820	-	-	-	-
Stage 2	-	-	-	-	-	-	497	969	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	793	-	-	115	80	590	0	0	540
Stage 1	0	-	-	-	-	-	335	387	-	0	0	-
Stage 2	0	-	-	-	-	-	523	330	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	792	-	-	109	78	589	-	-	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	230	196	-	-	-	-
Stage 1	-	-	-	-	-	-	335	387	-	-	-	-
Stage 2	-	-	-	-	-	-	496	322	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	14.8	11.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	394	-	-	792	-	-	538
HCM Lane V/C Ratio	0.066	-	-	0.022	-	-	0.032
HCM Control Delay (s)	14.8	-	-	9.6	-	-	11.9
HCM Lane LOS	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	15	18	1	29	18
Future Vol, veh/h	4	15	18	1	29	18
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	26	32	2	51	32

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	171	44	0	0	38	0
Stage 1	37	-	-	-	-	-
Stage 2	134	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	819	1026	-	-	1572	-
Stage 1	985	-	-	-	-	-
Stage 2	892	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	789	1015	-	-	1566	-
Mov Cap-2 Maneuver	789	-	-	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	863	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	4.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	957	1566	-
HCM Lane V/C Ratio	-	-	0.035	0.032	-
HCM Control Delay (s)	-	-	8.9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1768	13	0	1817	19	0	0	36	0	0	22
Future Vol, veh/h	0	1768	13	0	1817	19	0	0	36	0	0	22
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1823	13	0	1873	20	0	0	37	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	921	-	-	947
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	234	0	0	225
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	233	-	-	225
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

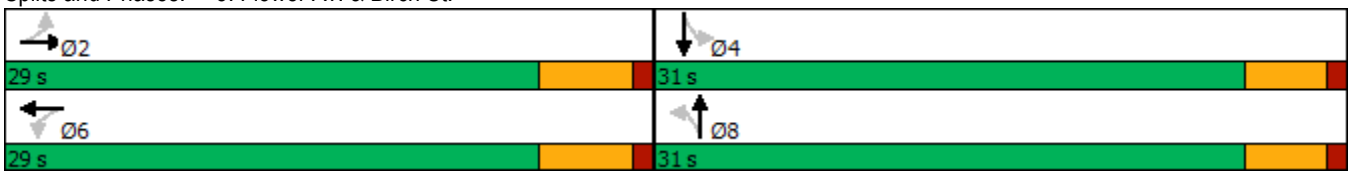
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.4	22.8
HCM LOS			C	C

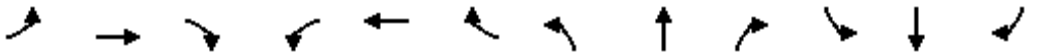
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	233	-	-	-	-	225
HCM Lane V/C Ratio	0.159	-	-	-	-	0.101
HCM Control Delay (s)	23.4	-	-	-	-	22.8
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.3

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	18	653	181	649	156	47	47	10
Future Volume (vph)	18	653	181	649	156	47	47	10
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.1	24.1	24.1	24.1		15.3		15.0
Actuated g/C Ratio	0.49	0.49	0.49	0.49		0.31		0.30
v/c Ratio	0.07	0.52	0.90	0.45		0.64		0.19
Control Delay	10.3	10.8	59.2	10.5		20.5		11.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.3	10.8	59.2	10.5		20.5		11.0
LOS	B	B	E	B		C		B
Approach Delay		10.8		21.0		20.5		11.0
Approach LOS		B		C		C		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 49.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 16.5	Intersection LOS: B
Intersection Capacity Utilization 65.0%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	96	181	649	10	156	47	33	47	10	13
Future Volume (veh/h)	18	653	96	181	649	10	156	47	33	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	112	213	764	12	184	55	24	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	379	1516	221	339	1751	27	431	121	43	445	93	43
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	658	3099	452	596	3579	56	986	390	138	1021	299	138
Grp Volume(v), veh/h	21	440	440	213	379	397	263	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1774	596	1777	1859	1514	0	0	1458	0	0
Q Serve(g_s), s	1.0	8.2	8.2	15.6	6.7	6.7	5.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.8	8.2	8.2	23.8	6.7	6.7	6.8	0.0	0.0	1.6	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.03	0.70		0.09	0.74		0.09
Lane Grp Cap(c), veh/h	379	869	868	339	869	909	594	0	0	580	0	0
V/C Ratio(X)	0.06	0.51	0.51	0.63	0.44	0.44	0.44	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	379	869	868	339	869	909	939	0	0	899	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.6	8.4	8.4	17.3	8.1	8.1	13.9	0.0	0.0	12.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	3.6	0.3	0.3	0.5	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.7	4.7	4.2	3.4	3.6	3.9	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.7	8.9	8.9	21.0	8.4	8.4	14.4	0.0	0.0	12.2	0.0	0.0
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		901			989			263			74	
Approach Delay, s/veh		9.0			11.1			14.4			12.2	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		19.7		29.0		19.7				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.2		3.6		25.8		8.8				
Green Ext Time (p_c), s		5.2		0.4		0.0		1.5				

Intersection Summary												
HCM 6th Ctrl Delay			10.7									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	0	0	0	0	2	0	0	0	31	0	47
Future Vol, veh/h	20	0	0	0	0	2	0	0	0	31	0	47
Conflicting Peds, #/hr	0	0	0	0	0	56	0	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	34	0	0	0	0	3	0	0	0	53	0	80

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	213	155	49	146	195	56	89	0	0	0	0	0
Stage 1	155	155	-	0	0	-	-	-	-	-	-	-
Stage 2	58	0	-	146	195	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	744	737	1020	823	700	1011	1506	-	-	-	-	-
Stage 1	847	769	-	-	-	-	-	-	-	-	-	-
Stage 2	954	-	-	857	739	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	696	730	1011	823	694	957	1493	-	-	-	-	-
Mov Cap-2 Maneuver	696	730	-	823	694	-	-	-	-	-	-	-
Stage 1	839	762	-	-	-	-	-	-	-	-	-	-
Stage 2	900	-	-	857	732	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.4	8.8	0	
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1493	-	-	696	957	-	-	-
HCM Lane V/C Ratio	-	-	-	0.049	0.004	-	-	-
HCM Control Delay (s)	0	-	-	10.4	8.8	-	-	-
HCM Lane LOS	A	-	-	B	A	-	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1762	3	0	1837	0	4
Future Vol, veh/h	0	1762	3	0	1837	0	4
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	1895	3	0	1975	0	4

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1442	0	0	-	-	-	951
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	249	-	-	0	-	0	224
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	249	-	-	-	-	-	224
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

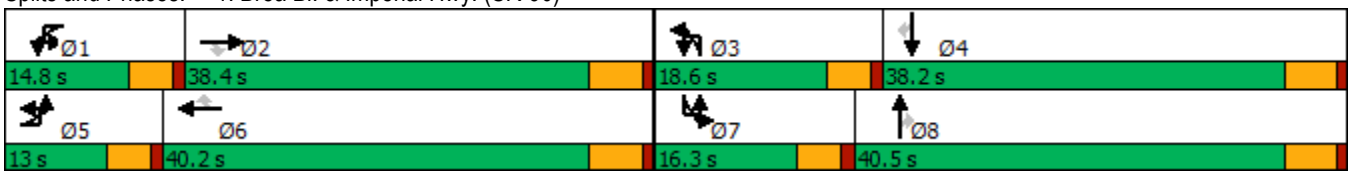
Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.4
HCM LOS			C

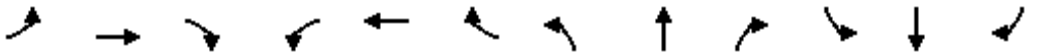
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	224	249	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-	-
HCM Control Delay (s)	21.4	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	307	1285	338	296	1377	161	398	598	233	282	563	304
Future Volume (vph)	307	1285	338	296	1377	161	398	598	233	282	563	304
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	27.2	27.2	11.6	24.8	24.8
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
v/c Ratio	1.26	0.84	0.56	1.00	0.85	0.28	0.98	0.47	0.46	0.85	0.70	0.64
Control Delay	186.3	38.3	15.1	99.1	37.7	10.7	85.0	32.3	12.2	67.1	39.8	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	186.3	38.3	15.1	99.1	37.7	10.7	85.0	32.3	12.2	67.1	39.8	21.4
LOS	F	D	B	F	D	B	F	C	B	E	D	C
Approach Delay		57.8			45.2			45.5			41.6	
Approach LOS		E			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.26	
Intersection Signal Delay: 48.6	Intersection LOS: D
Intersection Capacity Utilization 87.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	307	1285	338	296	1377	161	398	598	233	282	563	304
Future Volume (veh/h)	307	1285	338	296	1377	161	398	598	233	282	563	304
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	330	1382	221	318	1481	116	428	643	148	303	605	268
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	1628	495	327	1720	529	449	1355	412	362	846	372
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	330	1382	221	318	1481	116	428	643	148	303	605	268
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	25.1	11.2	9.9	26.9	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Cycle Q Clear(g_c), s	8.4	25.1	11.2	9.9	26.9	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	1628	495	327	1720	529	449	1355	412	362	846	372
V/C Ratio(X)	1.23	0.85	0.45	0.97	0.86	0.22	0.95	0.47	0.36	0.84	0.72	0.72
Avail Cap(c_a), veh/h	269	1697	516	327	1789	551	449	1815	551	375	1181	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.4	31.6	26.9	44.4	30.7	23.6	42.3	30.7	29.6	43.1	34.7	34.8
Incr Delay (d2), s/veh	129.9	4.2	0.6	42.1	4.4	0.2	30.6	0.3	0.5	13.9	1.2	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.6	15.7	7.4	9.8	17.2	3.5	11.3	7.6	5.2	7.7	10.9	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	175.4	35.7	27.5	86.5	35.2	23.8	73.0	30.9	30.1	57.0	36.0	37.7
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	D
Approach Vol, veh/h		1933			1915			1219			1176	
Approach Delay, s/veh		58.6			43.0			45.6			41.8	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.1	18.6	28.8	13.0	38.9	15.9	31.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	11.9	27.1	15.3	17.7	10.4	28.9	11.3	12.5
Green Ext Time (p_c), s	0.0	4.3	0.0	4.4	0.0	4.6	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	48.1
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1

Cycle (sec):	100	Critical Vol./Cap.(X):	0.696
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	37	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	398	605	226	282	574	294	300	1292	338	286	1387	161
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	398	605	226	282	574	294	300	1292	338	286	1387	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	398	605	226	282	574	294	300	1292	338	286	1387	161
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	398	605	226	282	574	294	300	1292	338	286	1387	161
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	398	605	226	282	574	294	300	1292	338	286	1387	161
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.12	0.13	0.08	0.17	0.17	0.09	0.25	0.20	0.08	0.27	0.09
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	960	37	23	1071	20	14	1	68	0	0	21
Future Vol, veh/h	0	960	37	23	1071	20	14	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1091	42	26	1217	23	16	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1142	0	0	1761	2395	555	-	-	623
Stage 1	-	-	-	-	-	-	1100	1100	-	-	-	-
Stage 2	-	-	-	-	-	-	661	1295	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	608	-	-	54	33	475	0	0	429
Stage 1	0	-	-	-	-	-	226	286	-	0	0	-
Stage 2	0	-	-	-	-	-	418	231	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	603	-	-	49	31	471	-	-	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	127	-	-	-	-
Stage 1	-	-	-	-	-	-	226	283	-	-	-	-
Stage 2	-	-	-	-	-	-	378	220	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	19.7	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	338	-	-	603	-	-	428
HCM Lane V/C Ratio	0.279	-	-	0.043	-	-	0.056
HCM Control Delay (s)	19.7	-	-	11.2	-	-	13.9
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	19	29	6	22	49
Future Vol, veh/h	8	19	29	6	22	49
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	29	44	9	33	74

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	190	53	0	0	54	0
Stage 1	50	-	-	-	-	-
Stage 2	140	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	799	1014	-	-	1551	-
Stage 1	972	-	-	-	-	-
Stage 2	887	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	781	1010	-	-	1550	-
Mov Cap-2 Maneuver	781	-	-	-	-	-
Stage 1	971	-	-	-	-	-
Stage 2	867	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.1	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	929	1550	-
HCM Lane V/C Ratio	-	-	0.044	0.022	-
HCM Control Delay (s)	-	-	9.1	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1824	21	0	1936	35	0	0	23	0	0	57
Future Vol, veh/h	0	1824	21	0	1936	35	0	0	23	0	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2121	24	0	2251	41	0	0	27	0	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1073	-	-	1146
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	321	0	0	297
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	321	-	-	297
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

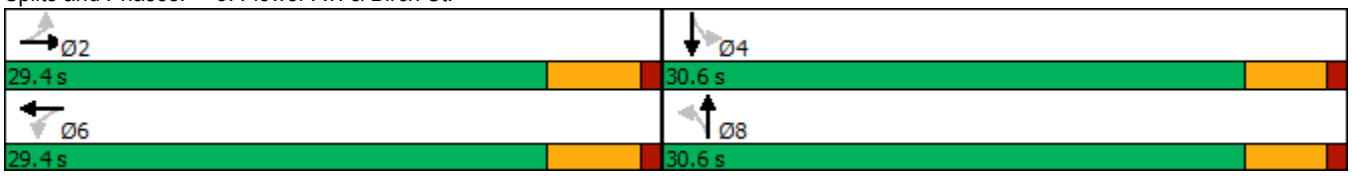
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.2	20.6
HCM LOS			C	C

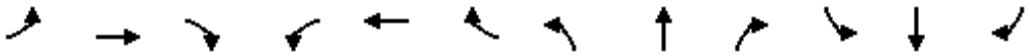
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	321	-	-	-	-	297
HCM Lane V/C Ratio	0.083	-	-	-	-	0.223
HCM Control Delay (s)	17.2	-	-	-	-	20.6
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.8

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	26	958	143	994	104	36	34	3
Future Volume (vph)	26	958	143	994	104	36	34	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.6	24.6	24.6	24.6		13.8		13.8
Actuated g/C Ratio	0.51	0.51	0.51	0.51		0.29		0.29
v/c Ratio	0.18	0.64	1.01	0.63		0.54		0.15
Control Delay	12.6	12.3	97.8	12.1		17.4		9.4
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.6	12.3	97.8	12.1		17.4		9.4
LOS	B	B	F	B		B		A
Approach Delay		12.3		22.8		17.4		9.4
Approach LOS		B		C		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 48.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.01	
Intersection Signal Delay: 17.6	Intersection LOS: B
Intersection Capacity Utilization 70.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	66	143	994	19	104	36	64	34	3	20
Future Volume (veh/h)	26	958	66	143	994	19	104	36	64	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	73	161	1117	19	117	40	45	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1627	110	254	1724	29	368	127	109	482	43	58
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	469	3374	229	463	3575	61	788	393	339	1093	133	179
Grp Volume(v), veh/h	29	566	583	161	555	581	202	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1826	463	1777	1859	1520	0	0	1406	0	0
Q Serve(g_s), s	2.5	12.2	12.2	12.0	11.8	11.8	3.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.3	12.2	12.2	24.2	11.8	11.8	5.0	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.03	0.58		0.22	0.81		0.13
Lane Grp Cap(c), veh/h	259	857	881	254	857	896	603	0	0	583	0	0
V/C Ratio(X)	0.11	0.66	0.66	0.63	0.65	0.65	0.33	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	259	857	881	254	857	896	896	0	0	839	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.2	9.9	9.9	21.0	9.8	9.8	13.1	0.0	0.0	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.9	1.9	5.0	1.7	1.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	7.6	7.8	3.8	6.7	7.0	2.9	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	11.8	11.7	26.0	11.5	11.4	13.5	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1178			1297			202			47	
Approach Delay, s/veh		11.8			13.3			13.5			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.8		29.4		20.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		16.3		3.0		26.2		7.0				
Green Ext Time (p_c), s		4.7		0.2		0.0		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			12.6									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	1	0	0	0	18	0	6
Future Vol, veh/h	0	0	0	0	0	1	0	0	0	18	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	1	0	0	0	23	0	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	51	50	4	50	54	0	8	0	0	0	0	0
Stage 1	50	50	-	0	0	-	-	-	-	-	-	-
Stage 2	1	0	-	50	54	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	948	841	1080	950	837	-	1612	-	-	-	-	-
Stage 1	963	853	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	963	850	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	841	1080	950	837	-	1612	-	-	-	-	-
Mov Cap-2 Maneuver	-	841	-	950	837	-	-	-	-	-	-	-
Stage 1	963	853	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	963	850	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0		0	
HCM LOS	A	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1612	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-	-	-	-
HCM Lane LOS	A	-	-	A	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1814	13	0	1971	0	3
Future Vol, veh/h	0	1814	13	0	1971	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2016	14	0	2190	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1599	0	0	-	-	-	1015
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	203	-	-	0	-	0	203
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	203	-	-	-	-	-	203
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

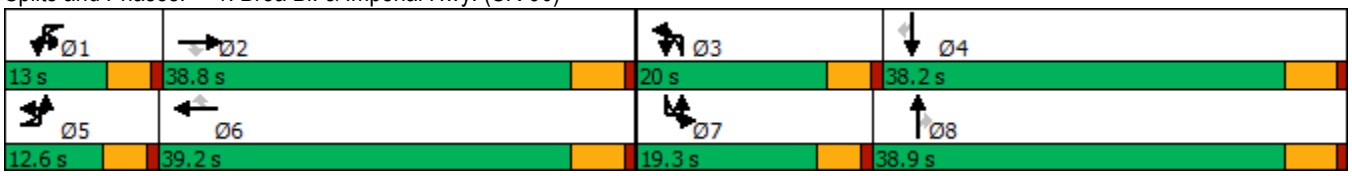
Approach	EB	WB	NB
HCM Control Delay, s	0	0	23
HCM LOS			C

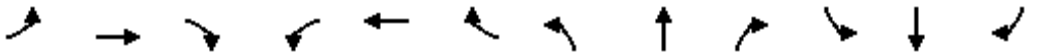
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	203	203	-	-	-
HCM Lane V/C Ratio	0.016	-	-	-	-
HCM Control Delay (s)	23	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	303	1573	441	274	1519	170	505	742	261	289	609	271
Future Volume (vph)	303	1573	441	274	1519	170	505	742	261	289	609	271
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.5	33.5	8.4	33.9	33.9	15.4	27.8	27.8	12.8	25.2	25.2
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.33	0.33	0.15	0.27	0.27	0.12	0.25	0.25
v/c Ratio	1.25	0.97	0.67	1.08	0.92	0.29	1.08	0.55	0.49	0.74	0.71	0.55
Control Delay	181.8	50.3	20.0	124.1	43.9	11.9	107.3	33.6	14.6	55.9	40.0	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	181.8	50.3	20.0	124.1	43.9	11.9	107.3	33.6	14.6	55.9	40.0	18.2
LOS	F	D	C	F	D	B	F	C	B	E	D	B
Approach Delay		61.7			52.3			55.0			38.9	
Approach LOS		E			D			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102.4	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.25	
Intersection Signal Delay: 53.8	Intersection LOS: D
Intersection Capacity Utilization 89.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	303	1573	441	274	1519	170	505	742	261	289	609	271
Future Volume (veh/h)	303	1573	441	274	1519	170	505	742	261	289	609	271
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	309	1605	280	280	1550	113	515	757	162	295	621	236
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	254	1699	518	267	1719	530	490	1393	426	359	823	360
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	309	1605	280	280	1550	113	515	757	162	295	621	236
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	30.6	14.6	8.4	28.9	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Cycle Q Clear(g_c), s	8.0	30.6	14.6	8.4	28.9	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	254	1699	518	267	1719	530	490	1393	426	359	823	360
V/C Ratio(X)	1.21	0.94	0.54	1.05	0.90	0.21	1.05	0.54	0.38	0.82	0.75	0.66
Avail Cap(c_a), veh/h	254	1704	520	267	1724	532	490	1719	526	467	1172	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	32.5	27.2	45.8	31.6	23.7	42.3	31.1	29.5	43.4	35.8	34.8
Incr Delay (d2), s/veh	127.0	11.3	1.1	68.3	7.0	0.2	54.9	0.3	0.6	6.9	1.7	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.8	19.7	9.2	10.0	18.7	3.4	15.1	8.8	5.7	6.9	11.4	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	173.1	43.8	28.3	114.1	38.6	23.9	97.3	31.4	30.1	50.3	37.5	36.9
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	D
Approach Vol, veh/h		2194			1943			1434			1152	
Approach Delay, s/veh		60.0			48.6			54.9			40.7	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.7	20.0	28.4	12.6	39.1	15.9	32.5
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	32.6	17.4	18.3	10.0	30.9	11.1	14.7
Green Ext Time (p_c), s	0.0	0.7	0.0	4.3	0.0	2.4	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	52.3
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1

Cycle (sec):	100	Critical Vol./Cap.(X):	0.774
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	47	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	505	752	250	289	617	263	323	1552	441	266	1527	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	505	752	250	289	617	263	323	1552	441	266	1527	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	505	752	250	289	617	263	323	1552	441	266	1527	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	505	752	250	289	617	263	323	1552	441	266	1527	170
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	505	752	250	289	617	263	323	1552	441	266	1527	170
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.15	0.15	0.15	0.09	0.18	0.15	0.10	0.30	0.26	0.08	0.30	0.10
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1078	33	31	1193	19	5	6	42	0	0	27
Future Vol, veh/h	0	1078	33	31	1193	19	5	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1172	36	34	1297	21	5	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1210	0	0	1891	2566	588	-	-	665
Stage 1	-	-	-	-	-	-	1174	1174	-	-	-	-
Stage 2	-	-	-	-	-	-	717	1392	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	572	-	-	43	26	452	0	0	403
Stage 1	0	-	-	-	-	-	204	264	-	0	0	-
Stage 2	0	-	-	-	-	-	387	207	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	571	-	-	38	24	451	-	-	401
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	112	-	-	-	-
Stage 1	-	-	-	-	-	-	204	263	-	-	-	-
Stage 2	-	-	-	-	-	-	337	193	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	20.7	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	287	-	-	571	-	-	401
HCM Lane V/C Ratio	0.201	-	-	0.059	-	-	0.073
HCM Control Delay (s)	20.7	-	-	11.7	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	6	36	1	5	37
Future Vol, veh/h	5	6	36	1	5	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	8	51	1	7	52

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	118	52	0	0	52	0
Stage 1	52	-	-	-	-	-
Stage 2	66	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	878	1016	-	-	1554	-
Stage 1	970	-	-	-	-	-
Stage 2	957	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	874	1016	-	-	1554	-
Mov Cap-2 Maneuver	874	-	-	-	-	-
Stage 1	970	-	-	-	-	-
Stage 2	952	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	946	1554	-
HCM Lane V/C Ratio	-	-	0.016	0.005	-
HCM Control Delay (s)	-	-	8.9	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1958	18	0	2017	37	0	0	27	0	0	42
Future Vol, veh/h	0	1958	18	0	2017	37	0	0	27	0	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2040	19	0	2101	39	0	0	28	0	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1030	-	-	1070
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	274	0	0	261
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	274	-	-	261
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

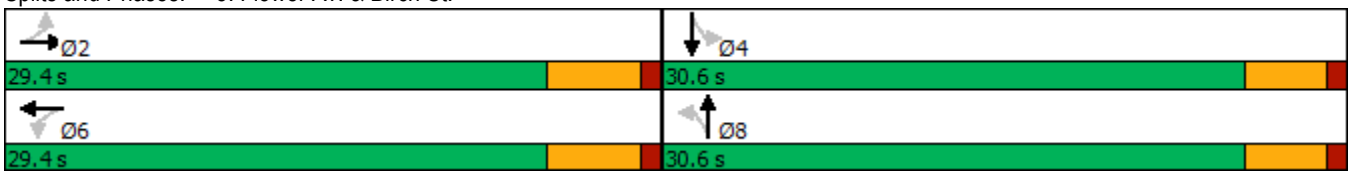
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.6	21.6
HCM LOS			C	C

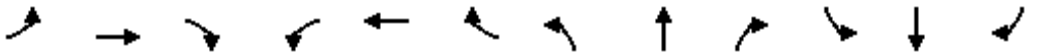
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	274	-	-	-	-	261
HCM Lane V/C Ratio	0.103	-	-	-	-	0.168
HCM Control Delay (s)	19.6	-	-	-	-	21.6
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.6

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	24	1080	155	1113	72	10	27	2
Future Volume (vph)	24	1080	155	1113	72	10	27	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	27.1	27.1	27.1	27.1		13.0		13.0
Actuated g/C Ratio	0.61	0.61	0.61	0.61		0.29		0.29
v/c Ratio	0.11	0.53	0.72	0.53		0.35		0.11
Control Delay	10.2	10.1	39.6	10.0		13.6		9.6
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.2	10.1	39.6	10.0		13.6		9.6
LOS	B	B	D	A		B		A
Approach Delay		10.1		13.6		13.6		9.6
Approach LOS		B		B		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 12.0	Intersection LOS: B
Intersection Capacity Utilization 64.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	50	155	1113	8	72	10	69	27	2	15
Future Volume (veh/h)	24	1080	50	155	1113	8	72	10	69	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	50	157	1124	8	73	10	40	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1985	91	348	2075	15	278	57	95	318	42	82
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	470	3460	159	467	3616	26	734	298	497	907	220	427
Grp Volume(v), veh/h	24	560	581	157	552	580	123	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1841	467	1777	1865	1529	0	0	1554	0	0
Q Serve(g_s), s	1.4	8.2	8.2	13.2	8.0	8.0	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.4	8.2	8.2	21.4	8.0	8.0	2.8	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.59		0.33	0.67		0.27
Lane Grp Cap(c), veh/h	352	1020	1057	348	1020	1070	431	0	0	442	0	0
V/C Ratio(X)	0.07	0.55	0.55	0.45	0.54	0.54	0.29	0.00	0.00	0.09	0.00	0.00
Avail Cap(c_a), veh/h	353	1027	1064	350	1027	1078	1067	0	0	1054	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.4	5.6	5.6	12.2	5.5	5.5	14.7	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.9	0.6	0.5	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.7	3.8	1.9	3.0	3.1	1.7	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.5	6.2	6.1	13.1	6.1	6.1	15.1	0.0	0.0	14.1	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1165			1289			123			40	
Approach Delay, s/veh		6.2			6.9			15.1			14.1	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.2		12.6		29.2		12.6				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		11.4		2.8		23.4		4.8				
Green Ext Time (p_c), s		6.6		0.1		0.6		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			7.1									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	12	0	0	0	0	2	0	0	0	7	0	36
Future Vol, veh/h	12	0	0	0	0	2	0	0	0	7	0	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	0	0	0	0	3	0	0	0	10	0	50

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	48	46	26	45	71	0	51	0	0	0	0	0
Stage 1	46	46	-	0	0	-	-	-	-	-	-	-
Stage 2	2	0	-	45	71	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	953	846	1050	957	819	-	1555	-	-	-	-	-
Stage 1	968	857	-	-	-	-	-	-	-	-	-	-
Stage 2	1021	-	-	969	836	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	845	1049	957	818	-	1554	-	-	-	-	-
Mov Cap-2 Maneuver	-	845	-	957	818	-	-	-	-	-	-	-
Stage 1	967	856	-	-	-	-	-	-	-	-	-	-
Stage 2	1021	-	-	969	835	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1554	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	-	-	-	-
HCM Lane LOS	A	-	-	-	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2006	5	0	2054	0	7
Future Vol, veh/h	0	2006	5	0	2054	0	7
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2068	5	0	2118	0	7

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1546	0	0	-	-	-	1040
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	217	-	-	0	-	0	195
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	217	-	-	-	-	-	194
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	24.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	194	217	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-	-
HCM Control Delay (s)	24.3	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

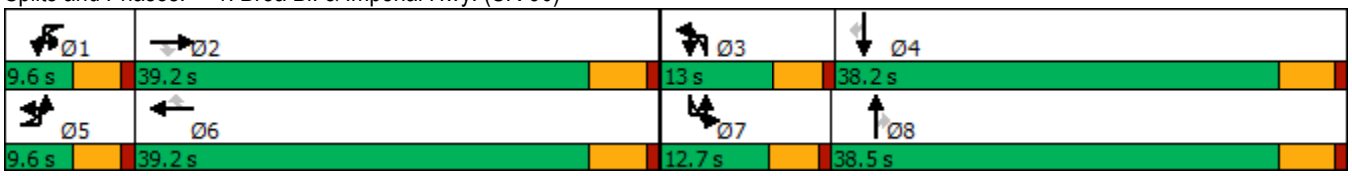
APPENDIX 5.4: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

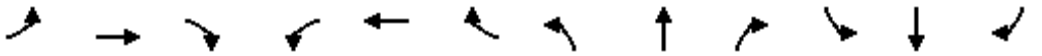
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	1347	357	173	1450	118	410	479	168	209	627	267
Future Volume (vph)	260	1347	357	173	1450	118	410	479	168	209	627	267
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.5	33.5	5.0	33.5	33.5	8.4	24.7	24.7	8.1	24.4	24.4
Actuated g/C Ratio	0.05	0.37	0.37	0.05	0.37	0.37	0.09	0.27	0.27	0.09	0.27	0.27
v/c Ratio	1.58	0.76	0.52	1.05	0.82	0.19	1.48	0.37	0.34	0.78	0.70	0.55
Control Delay	318.4	29.3	11.4	127.0	31.3	5.1	266.5	27.4	10.4	62.2	34.2	19.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	318.4	29.3	11.4	127.0	31.3	5.1	266.5	27.4	10.4	62.2	34.2	19.4
LOS	F	C	B	F	C	A	F	C	B	E	C	B
Approach Delay		64.3			39.1			117.5			35.9	
Approach LOS		E			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 91.3	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.58	
Intersection Signal Delay: 61.1	Intersection LOS: E
Intersection Capacity Utilization 85.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1347	357	173	1450	118	410	479	168	209	627	267
Future Volume (veh/h)	260	1347	357	173	1450	118	410	479	168	209	627	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	274	1418	368	182	1526	116	432	504	169	220	660	264
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	1850	564	180	1850	572	303	1362	415	286	929	410
Arrive On Green	0.06	0.36	0.36	0.06	0.36	0.36	0.10	0.27	0.27	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	274	1418	368	182	1526	116	432	504	169	220	660	264
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	21.6	17.4	5.0	24.0	4.5	8.4	7.1	7.9	6.0	14.9	13.2
Cycle Q Clear(g_c), s	5.0	21.6	17.4	5.0	24.0	4.5	8.4	7.1	7.9	6.0	14.9	13.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	1850	564	180	1850	572	303	1362	415	286	929	410
V/C Ratio(X)	1.52	0.77	0.65	1.01	0.82	0.20	1.43	0.37	0.41	0.77	0.71	0.64
Avail Cap(c_a), veh/h	180	1956	597	180	1956	605	303	1928	588	292	1329	586
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	24.8	23.5	41.6	25.6	19.4	39.9	26.3	26.6	39.2	29.6	28.9
Incr Delay (d2), s/veh	259.7	1.8	2.4	69.3	2.9	0.2	209.6	0.2	0.6	10.4	1.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.6	13.1	10.5	6.6	15.1	2.9	19.8	5.0	5.2	4.8	10.3	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	301.3	26.6	25.8	110.9	28.5	19.5	249.5	26.5	27.2	49.6	30.6	30.6
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2060			1824			1105			1144	
Approach Delay, s/veh		63.0			36.1			113.8			34.3	
Approach LOS		E			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	37.4	13.0	28.3	9.6	37.4	12.5	28.7
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	23.6	10.4	16.9	7.0	26.0	8.0	9.9
Green Ext Time (p_c), s	0.0	7.0	0.0	4.9	0.0	5.9	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	58.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1

Cycle (sec):	100	Critical Vol./Cap.(X):	0.714
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	39	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	410	484	160	209	638	282	249	1352	357	157	1422	118
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	410	484	160	209	638	282	249	1352	357	157	1422	118
Added Vol:	0	3	0	0	0	0	3	3	0	6	13	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	410	487	160	209	638	282	252	1355	357	163	1435	118
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	410	487	160	209	638	282	252	1355	357	163	1435	118
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	410	487	160	209	638	282	252	1355	357	163	1435	118
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	410	487	160	209	638	282	252	1355	357	163	1435	118
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.10	0.09	0.06	0.19	0.17	0.07	0.27	0.21	0.05	0.28	0.07
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	721	27	15	814	5	12	1	16	0	0	15
Future Vol, veh/h	0	721	27	15	814	5	12	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	819	31	17	925	6	14	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	851	0	0	1317	1789	411	-	-	470
Stage 1	-	-	-	-	-	-	820	820	-	-	-	-
Stage 2	-	-	-	-	-	-	497	969	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	783	-	-	115	80	590	0	0	540
Stage 1	0	-	-	-	-	-	335	387	-	0	0	-
Stage 2	0	-	-	-	-	-	523	330	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	782	-	-	109	78	589	-	-	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	230	195	-	-	-	-
Stage 1	-	-	-	-	-	-	335	387	-	-	-	-
Stage 2	-	-	-	-	-	-	495	321	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.6	11.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	343	-	-	782	-	-	538
HCM Lane V/C Ratio	0.096	-	-	0.022	-	-	0.032
HCM Control Delay (s)	16.6	-	-	9.7	-	-	11.9
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	5.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	21	18	53	41	18
Future Vol, veh/h	65	21	18	53	41	18
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	37	32	93	72	32

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	259	90	0	0	129	0
Stage 1	83	-	-	-	-	-
Stage 2	176	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	730	968	-	-	1457	-
Stage 1	940	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	690	958	-	-	1451	-
Mov Cap-2 Maneuver	690	-	-	-	-	-
Stage 1	936	-	-	-	-	-
Stage 2	811	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.1	0	5.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	741	1451	-
HCM Lane V/C Ratio	-	-	0.204	0.05	-
HCM Control Delay (s)	-	-	11.1	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1771	13	0	1775	71	0	0	36	0	0	83
Future Vol, veh/h	0	1771	13	0	1775	71	0	0	36	0	0	83
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1826	13	0	1830	73	0	0	37	0	0	86

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	923	-	-	952
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	233	0	0	223
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	232	-	-	223
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

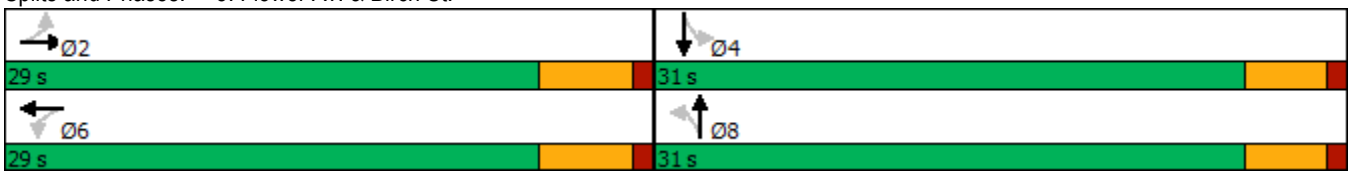
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.5	30.9
HCM LOS			C	D

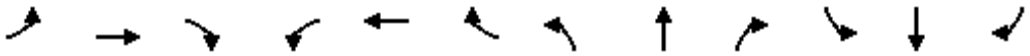
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	232	-	-	-	-	223
HCM Lane V/C Ratio	0.16	-	-	-	-	0.384
HCM Control Delay (s)	23.5	-	-	-	-	30.9
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.6	-	-	-	-	1.7

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	18	653	193	649	156	47	47	10
Future Volume (vph)	18	653	193	649	156	47	47	10
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.1	24.1	24.1	24.1		15.6		15.2
Actuated g/C Ratio	0.49	0.49	0.49	0.49		0.31		0.31
v/c Ratio	0.08	0.52	0.97	0.45		0.66		0.19
Control Delay	10.4	11.0	74.5	10.6		20.7		10.9
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.4	11.0	74.5	10.6		20.7		10.9
LOS	B	B	E	B		C		B
Approach Delay		11.0		25.1		20.7		10.9
Approach LOS		B		C		C		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 49.6	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.97	
Intersection Signal Delay: 18.4	Intersection LOS: B
Intersection Capacity Utilization 65.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	96	193	649	10	156	47	50	47	10	13
Future Volume (veh/h)	18	653	96	193	649	10	156	47	50	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	112	227	764	12	184	55	44	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	1496	218	332	1728	27	408	119	75	444	93	43
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	658	3099	452	596	3579	56	904	375	235	996	291	134
Grp Volume(v), veh/h	21	440	440	227	379	397	283	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1774	596	1777	1859	1514	0	0	1421	0	0
Q Serve(g_s), s	1.1	8.4	8.4	15.4	6.9	6.9	5.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.0	8.4	8.4	23.8	6.9	6.9	7.5	0.0	0.0	1.6	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.03	0.65		0.16	0.74		0.09
Lane Grp Cap(c), veh/h	371	858	856	332	858	897	603	0	0	580	0	0
V/C Ratio(X)	0.06	0.51	0.51	0.68	0.44	0.44	0.47	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	371	858	856	332	858	897	924	0	0	873	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.0	8.8	8.8	18.3	8.4	8.4	13.9	0.0	0.0	12.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	5.7	0.4	0.3	0.6	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.9	4.9	5.1	3.6	3.7	4.3	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.1	9.3	9.3	24.0	8.7	8.7	14.5	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		901			1003			283			74	
Approach Delay, s/veh		9.3			12.2			14.5			12.1	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		20.3		29.0		20.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.4		3.6		25.8		9.5				
Green Ext Time (p_c), s		5.1		0.4		0.0		1.6				

Intersection Summary												
HCM 6th Ctrl Delay			11.3									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	37	0	0	0	0	2	0	0	0	31	0	59
Future Vol, veh/h	37	0	0	0	0	2	0	0	0	31	0	59
Conflicting Peds, #/hr	0	0	0	0	0	56	0	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	63	0	0	0	0	3	0	0	0	53	0	100

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	223	165	59	156	215	56	109	0	0	0	0	0
Stage 1	165	165	-	0	0	-	-	-	-	-	-	-
Stage 2	58	0	-	156	215	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	733	728	1007	810	683	1011	1481	-	-	-	-	-
Stage 1	837	762	-	-	-	-	-	-	-	-	-	-
Stage 2	954	-	-	846	725	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	685	721	998	810	677	957	1468	-	-	-	-	-
Mov Cap-2 Maneuver	685	721	-	810	677	-	-	-	-	-	-	-
Stage 1	829	755	-	-	-	-	-	-	-	-	-	-
Stage 2	900	-	-	846	718	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.8	8.8	0	
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1468	-	-	685	957	-	-	-
HCM Lane V/C Ratio	-	-	-	0.092	0.004	-	-	-
HCM Control Delay (s)	0	-	-	10.8	8.8	-	-	-
HCM Lane LOS	A	-	-	B	A	-	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1765	3	0	1847	0	4
Future Vol, veh/h	0	1765	3	0	1847	0	4
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	1898	3	0	1986	0	4

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1450	0	0	-	-	-	953
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	246	-	-	0	-	0	223
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	246	-	-	-	-	-	223
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

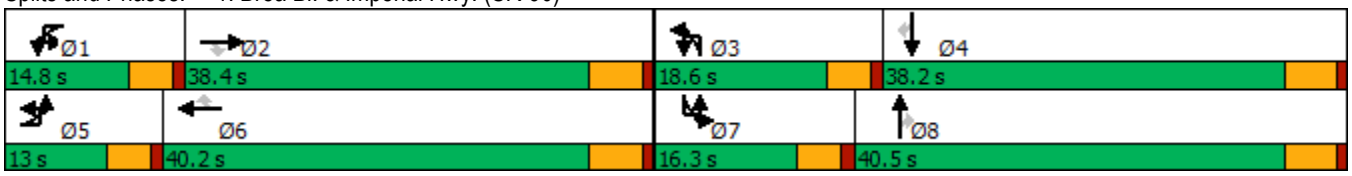
Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.5
HCM LOS			C

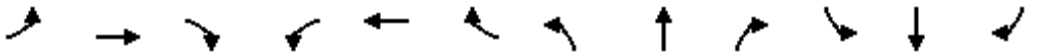
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	223	246	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-	-
HCM Control Delay (s)	21.5	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	308	1286	338	297	1380	161	398	599	233	282	563	304
Future Volume (vph)	308	1286	338	297	1380	161	398	599	233	282	563	304
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	27.2	27.2	11.6	24.8	24.8
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
v/c Ratio	1.27	0.84	0.56	1.01	0.85	0.28	0.98	0.47	0.46	0.85	0.70	0.64
Control Delay	187.7	38.3	15.1	99.8	37.8	10.7	85.0	32.3	12.2	67.1	39.8	21.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	187.7	38.3	15.1	99.8	37.8	10.7	85.0	32.3	12.2	67.1	39.8	21.4
LOS	F	D	B	F	D	B	F	C	B	E	D	C
Approach Delay		58.1			45.4			45.5			41.6	
Approach LOS		E			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 48.7	Intersection LOS: D
Intersection Capacity Utilization 87.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	308	1286	338	297	1380	161	398	599	233	282	563	304
Future Volume (veh/h)	308	1286	338	297	1380	161	398	599	233	282	563	304
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	331	1383	221	319	1484	116	428	644	148	303	605	268
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	1629	495	327	1721	530	449	1355	412	362	846	372
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	331	1383	221	319	1484	116	428	644	148	303	605	268
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	25.1	11.2	9.9	27.0	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Cycle Q Clear(g_c), s	8.4	25.1	11.2	9.9	27.0	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	1629	495	327	1721	530	449	1355	412	362	846	372
V/C Ratio(X)	1.23	0.85	0.45	0.98	0.86	0.22	0.95	0.48	0.36	0.84	0.72	0.72
Avail Cap(c_a), veh/h	269	1696	516	327	1789	550	449	1815	551	375	1181	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.5	31.6	26.9	44.4	30.8	23.6	42.3	30.7	29.6	43.1	34.8	34.8
Incr Delay (d2), s/veh	131.5	4.2	0.6	43.0	4.5	0.2	30.7	0.3	0.5	13.9	1.2	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.7	15.7	7.4	9.8	17.2	3.5	11.3	7.6	5.2	7.7	10.9	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	177.0	35.8	27.5	87.4	35.2	23.8	73.1	30.9	30.2	57.0	36.0	37.7
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	D
Approach Vol, veh/h		1935			1919			1220			1176	
Approach Delay, s/veh		59.0			43.2			45.6			41.8	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.1	18.6	28.8	13.0	38.9	15.9	31.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	11.9	27.1	15.3	17.7	10.4	29.0	11.3	12.5
Green Ext Time (p_c), s	0.0	4.2	0.0	4.4	0.0	4.5	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	48.3
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1

Cycle (sec):	100	Critical Vol./Cap.(X):	0.697
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	37	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	398	605	226	282	574	294	300	1292	338	286	1387	161
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	398	605	226	282	574	294	300	1292	338	286	1387	161
Added Vol:	0	1	0	0	0	0	1	1	0	1	3	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	398	606	226	282	574	294	301	1293	338	287	1390	161
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	398	606	226	282	574	294	301	1293	338	287	1390	161
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	398	606	226	282	574	294	301	1293	338	287	1390	161
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	398	606	226	282	574	294	301	1293	338	287	1390	161
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.12	0.12	0.13	0.08	0.17	0.17	0.09	0.25	0.20	0.08	0.27	0.09
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑↳			↕				↱
Traffic Vol, veh/h	0	960	41	23	1071	20	15	1	68	0	0	21
Future Vol, veh/h	0	960	41	23	1071	20	15	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1091	47	26	1217	23	17	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1147	0	0	1761	2395	555	-	-	623
Stage 1	-	-	-	-	-	-	1100	1100	-	-	-	-
Stage 2	-	-	-	-	-	-	661	1295	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	605	-	-	54	33	475	0	0	429
Stage 1	0	-	-	-	-	-	226	286	-	0	0	-
Stage 2	0	-	-	-	-	-	418	231	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	600	-	-	49	31	471	-	-	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	127	-	-	-	-
Stage 1	-	-	-	-	-	-	226	283	-	-	-	-
Stage 2	-	-	-	-	-	-	378	220	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	20.1	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	333	-	-	600	-	-	428
HCM Lane V/C Ratio	0.287	-	-	0.044	-	-	0.056
HCM Control Delay (s)	20.1	-	-	11.3	-	-	13.9
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-	-	0.2

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	31	20	29	29	26	49
Future Vol, veh/h	31	20	29	29	26	49
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	47	30	44	44	39	74

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	219	70	0	0	89	0
Stage 1	67	-	-	-	-	-
Stage 2	152	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	769	993	-	-	1506	-
Stage 1	956	-	-	-	-	-
Stage 2	876	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	747	989	-	-	1505	-
Mov Cap-2 Maneuver	747	-	-	-	-	-
Stage 1	955	-	-	-	-	-
Stage 2	852	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	2.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	826	1505	-
HCM Lane V/C Ratio	-	-	0.094	0.026	-
HCM Control Delay (s)	-	-	9.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1825	21	0	1917	58	0	0	23	0	0	80
Future Vol, veh/h	0	1825	21	0	1917	58	0	0	23	0	0	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2122	24	0	2229	67	0	0	27	0	0	93

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1073	-	-	1148
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	321	0	0	297
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	321	-	-	297
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

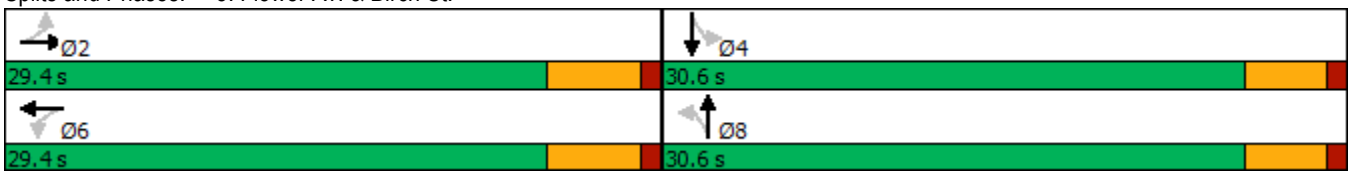
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.2	22.6
HCM LOS			C	C

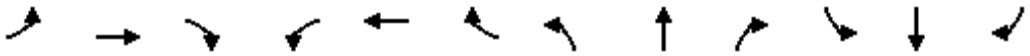
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	321	-	-	-	-	297
HCM Lane V/C Ratio	0.083	-	-	-	-	0.313
HCM Control Delay (s)	17.2	-	-	-	-	22.6
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	1.3

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	26	958	147	994	104	36	34	3
Future Volume (vph)	26	958	147	994	104	36	34	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.5	24.5	24.5	24.5		13.9		13.9
Actuated g/C Ratio	0.51	0.51	0.51	0.51		0.29		0.29
v/c Ratio	0.18	0.65	1.04	0.64		0.55		0.15
Control Delay	12.7	12.4	106.8	12.2		17.5		9.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.7	12.4	106.8	12.2		17.5		9.3
LOS	B	B	F	B		B		A
Approach Delay		12.4		24.2		17.5		9.3
Approach LOS		B		C		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 48.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.04	
Intersection Signal Delay: 18.3	Intersection LOS: B
Intersection Capacity Utilization 70.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	66	147	994	19	104	36	68	34	3	20
Future Volume (veh/h)	26	958	66	147	994	19	104	36	68	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	73	165	1117	19	117	40	49	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1626	110	254	1723	29	361	126	117	481	43	58
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	469	3374	229	463	3575	61	770	389	361	1088	132	179
Grp Volume(v), veh/h	29	566	583	165	555	581	206	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1826	463	1777	1859	1520	0	0	1399	0	0
Q Serve(g_s), s	2.5	12.2	12.2	12.0	11.8	11.8	3.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.3	12.2	12.2	24.2	11.8	11.8	5.1	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.03	0.57		0.24	0.81		0.13
Lane Grp Cap(c), veh/h	259	856	880	254	856	896	603	0	0	581	0	0
V/C Ratio(X)	0.11	0.66	0.66	0.65	0.65	0.65	0.34	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	259	856	880	254	856	896	894	0	0	836	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.2	9.9	9.9	21.1	9.8	9.8	13.2	0.0	0.0	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.9	1.9	5.7	1.7	1.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	7.6	7.8	3.9	6.7	7.0	3.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	11.8	11.8	26.8	11.5	11.4	13.5	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1178			1301			206			47	
Approach Delay, s/veh		11.9			13.4			13.5			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.8		29.4		20.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		16.3		3.0		26.2		7.1				
Green Ext Time (p_c), s		4.7		0.2		0.0		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			12.7									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	0	0	0	1	0	0	0	18	0	10
Future Vol, veh/h	4	0	0	0	0	1	0	0	0	18	0	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	0	0	0	1	0	0	0	23	0	13

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	54	53	7	53	59	0	13	0	0	0	0	0
Stage 1	53	53	-	0	0	-	-	-	-	-	-	-
Stage 2	1	0	-	53	59	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	944	838	1075	946	832	-	1606	-	-	-	-	-
Stage 1	960	851	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	960	846	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	838	1075	946	832	-	1606	-	-	-	-	-
Mov Cap-2 Maneuver	-	838	-	946	832	-	-	-	-	-	-	-
Stage 1	960	851	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	960	846	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1606	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	-	-	-	-
HCM Lane LOS	A	-	-	-	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1815	13	0	1974	0	3
Future Vol, veh/h	0	1815	13	0	1974	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2017	14	0	2193	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1601	0	0	-	-	-	1016
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	203	-	-	0	-	0	202
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	203	-	-	-	-	-	202
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

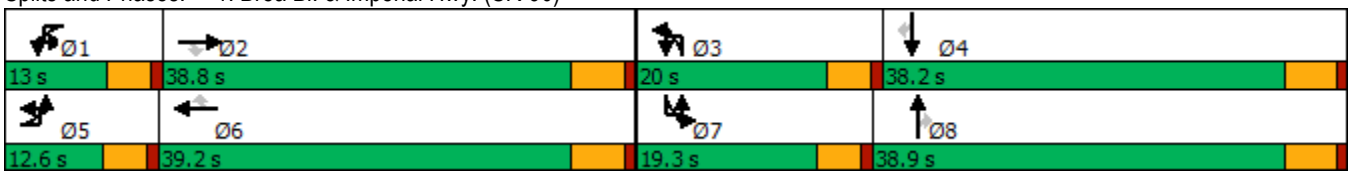
Approach	EB	WB	NB
HCM Control Delay, s	0	0	23.1
HCM LOS			C

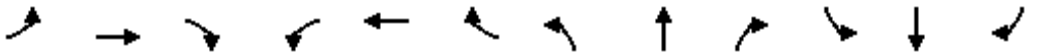
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	202	203	-	-	-
HCM Lane V/C Ratio	0.017	-	-	-	-
HCM Control Delay (s)	23.1	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	306	1576	441	276	1523	170	505	745	261	289	609	271
Future Volume (vph)	306	1576	441	276	1523	170	505	745	261	289	609	271
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.5	33.5	8.4	33.9	33.9	15.4	27.8	27.8	12.8	25.2	25.2
Actuated g/C Ratio	0.08	0.33	0.33	0.08	0.33	0.33	0.15	0.27	0.27	0.12	0.25	0.25
v/c Ratio	1.26	0.97	0.67	1.08	0.92	0.29	1.08	0.55	0.49	0.74	0.71	0.55
Control Delay	186.3	50.6	20.0	126.3	44.1	11.9	107.3	33.7	14.6	55.9	40.0	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	186.3	50.6	20.0	126.3	44.1	11.9	107.3	33.7	14.6	55.9	40.0	18.2
LOS	F	D	C	F	D	B	F	C	B	E	D	B
Approach Delay		62.6			52.9			55.0			38.9	
Approach LOS		E			D			D			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 102.4	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.26	
Intersection Signal Delay: 54.3	Intersection LOS: D
Intersection Capacity Utilization 89.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	306	1576	441	276	1523	170	505	745	261	289	609	271
Future Volume (veh/h)	306	1576	441	276	1523	170	505	745	261	289	609	271
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	312	1608	280	282	1554	113	515	760	162	295	621	236
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	254	1699	519	267	1720	531	490	1393	426	359	823	360
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	312	1608	280	282	1554	113	515	760	162	295	621	236
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	30.7	14.6	8.4	29.0	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Cycle Q Clear(g_c), s	8.0	30.7	14.6	8.4	29.0	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	254	1699	519	267	1720	531	490	1393	426	359	823	360
V/C Ratio(X)	1.23	0.95	0.54	1.06	0.90	0.21	1.05	0.55	0.38	0.82	0.75	0.66
Avail Cap(c_a), veh/h	254	1704	520	267	1724	532	490	1719	526	467	1171	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.1	32.5	27.2	45.9	31.6	23.7	42.4	31.1	29.5	43.4	35.8	34.8
Incr Delay (d2), s/veh	131.6	11.5	1.1	70.5	7.1	0.2	55.0	0.3	0.6	6.9	1.7	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.1	19.8	9.2	10.1	18.8	3.4	15.1	8.8	5.7	6.9	11.4	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	177.7	44.0	28.3	116.4	38.8	23.9	97.3	31.4	30.1	50.3	37.5	36.9
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	D
Approach Vol, veh/h		2200			1949			1437			1152	
Approach Delay, s/veh		61.0			49.1			54.9			40.7	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.7	20.0	28.4	12.6	39.1	15.9	32.5
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	32.7	17.4	18.3	10.0	31.0	11.1	14.7
Green Ext Time (p_c), s	0.0	0.6	0.0	4.3	0.0	2.3	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	52.8
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1

Cycle (sec):	100	Critical Vol./Cap.(X):	0.776
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	47	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	505	752	250	289	617	263	323	1552	441	266	1527	170
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	505	752	250	289	617	263	323	1552	441	266	1527	170
Added Vol:	0	3	0	0	0	0	3	3	0	2	4	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	505	755	250	289	617	263	326	1555	441	268	1531	170
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	505	755	250	289	617	263	326	1555	441	268	1531	170
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	505	755	250	289	617	263	326	1555	441	268	1531	170
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	505	755	250	289	617	263	326	1555	441	268	1531	170
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.15	0.15	0.15	0.09	0.18	0.15	0.10	0.30	0.26	0.08	0.30	0.10
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1078	44	31	1193	19	7	6	42	0	0	27
Future Vol, veh/h	0	1078	44	31	1193	19	7	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1172	48	34	1297	21	8	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1222	0	0	1891	2566	588	-	-	665
Stage 1	-	-	-	-	-	-	1174	1174	-	-	-	-
Stage 2	-	-	-	-	-	-	717	1392	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	566	-	-	43	26	452	0	0	403
Stage 1	0	-	-	-	-	-	204	264	-	0	0	-
Stage 2	0	-	-	-	-	-	387	207	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	565	-	-	38	24	451	-	-	401
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	112	-	-	-	-
Stage 1	-	-	-	-	-	-	204	263	-	-	-	-
Stage 2	-	-	-	-	-	-	337	193	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	21.7	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	275	-	-	565	-	-	401
HCM Lane V/C Ratio	0.217	-	-	0.06	-	-	0.073
HCM Control Delay (s)	21.7	-	-	11.8	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	8	36	36	16	37
Future Vol, veh/h	36	8	36	36	16	37
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	11	51	51	23	52

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	175	77	0	0	102	0
Stage 1	77	-	-	-	-	-
Stage 2	98	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	815	984	-	-	1490	-
Stage 1	946	-	-	-	-	-
Stage 2	926	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	802	984	-	-	1490	-
Mov Cap-2 Maneuver	802	-	-	-	-	-
Stage 1	946	-	-	-	-	-
Stage 2	911	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	2.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	830	1490	-
HCM Lane V/C Ratio	-	-	0.075	0.015	-
HCM Control Delay (s)	-	-	9.7	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1961	18	0	1992	72	0	0	27	0	0	73
Future Vol, veh/h	0	1961	18	0	1992	72	0	0	27	0	0	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2043	19	0	2075	75	0	0	28	0	0	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1031	-	-	1075
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	274	0	0	260
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	274	-	-	260
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

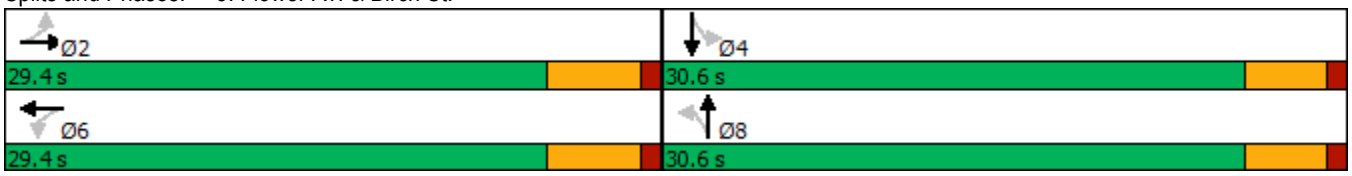
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.6	24.5
HCM LOS			C	C

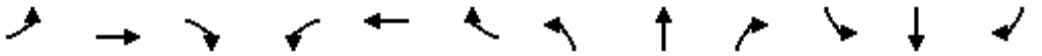
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	274	-	-	-	-	260
HCM Lane V/C Ratio	0.103	-	-	-	-	0.292
HCM Control Delay (s)	19.6	-	-	-	-	24.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	1.2

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	24	1080	166	1113	72	10	27	2
Future Volume (vph)	24	1080	166	1113	72	10	27	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	27.0	27.0	27.0	27.0		13.0		13.0
Actuated g/C Ratio	0.61	0.61	0.61	0.61		0.29		0.29
v/c Ratio	0.11	0.53	0.77	0.53		0.36		0.11
Control Delay	10.2	10.1	45.0	10.0		13.8		9.5
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.2	10.1	45.0	10.0		13.8		9.5
LOS	B	B	D	B		B		A
Approach Delay		10.1		14.5		13.8		9.5
Approach LOS		B		B		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.4	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 65.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	50	166	1113	8	72	10	75	27	2	15
Future Volume (veh/h)	24	1080	50	166	1113	8	72	10	75	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	50	168	1124	8	73	10	46	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	349	1983	91	346	2072	15	268	58	107	320	42	83
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	470	3460	159	467	3616	26	689	298	547	910	217	428
Grp Volume(v), veh/h	24	560	581	168	552	580	129	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1841	467	1777	1865	1535	0	0	1555	0	0
Q Serve(g_s), s	1.4	8.3	8.3	14.8	8.1	8.1	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.5	8.3	8.3	23.1	8.1	8.1	2.9	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.57		0.36	0.67		0.27
Lane Grp Cap(c), veh/h	349	1018	1055	346	1018	1069	433	0	0	446	0	0
V/C Ratio(X)	0.07	0.55	0.55	0.49	0.54	0.54	0.30	0.00	0.00	0.09	0.00	0.00
Avail Cap(c_a), veh/h	349	1018	1055	346	1018	1069	1058	0	0	1044	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.5	5.6	5.6	12.8	5.6	5.6	14.8	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	1.1	0.6	0.6	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.8	3.9	2.2	3.1	3.2	1.8	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.6	6.3	6.2	13.9	6.2	6.1	15.2	0.0	0.0	14.1	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1165			1300			129			40	
Approach Delay, s/veh		6.3			7.2			15.2			14.1	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		12.8		29.4		12.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		11.5		2.8		25.1		4.9				
Green Ext Time (p_c), s		6.6		0.1		0.0		0.7				

Intersection Summary												
HCM 6th Ctrl Delay			7.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	0	0	0	0	2	0	0	0	7	0	47
Future Vol, veh/h	18	0	0	0	0	2	0	0	0	7	0	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	0	0	0	0	3	0	0	0	10	0	65

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	3	0	0	0	0	0	85	53	0	52	52	3
Stage 1	-	-	-	-	-	-	50	50	-	2	2	-
Stage 2	-	-	-	-	-	-	35	3	-	50	50	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1619	-	-	-	-	-	901	838	-	947	839	1081
Stage 1	-	-	-	-	-	-	963	853	-	1021	894	-
Stage 2	-	-	-	-	-	-	981	893	-	963	853	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1619	-	-	-	-	-	836	825	-	-	826	1080
Mov Cap-2 Maneuver	-	-	-	-	-	-	836	825	-	-	826	-
Stage 1	-	-	-	-	-	-	949	840	-	1006	894	-
Stage 2	-	-	-	-	-	-	921	893	-	949	840	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7.3	0	0	
HCM LOS			A	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	1619	-	-	-	-	-	-
HCM Lane V/C Ratio	-	0.015	-	-	-	-	-	-
HCM Control Delay (s)	0	7.3	0	-	0	-	-	-
HCM Lane LOS	A	A	A	-	A	-	-	-
HCM 95th %tile Q(veh)	-	0	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2009	5	0	2063	0	7
Future Vol, veh/h	0	2009	5	0	2063	0	7
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2071	5	0	2127	0	7

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1553	0	0	-	-	-	1041
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	216	-	-	0	-	0	195
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	216	-	-	-	-	-	194
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	24.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	194	216	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-	-
HCM Control Delay (s)	24.3	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

APPENDIX 5.5: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

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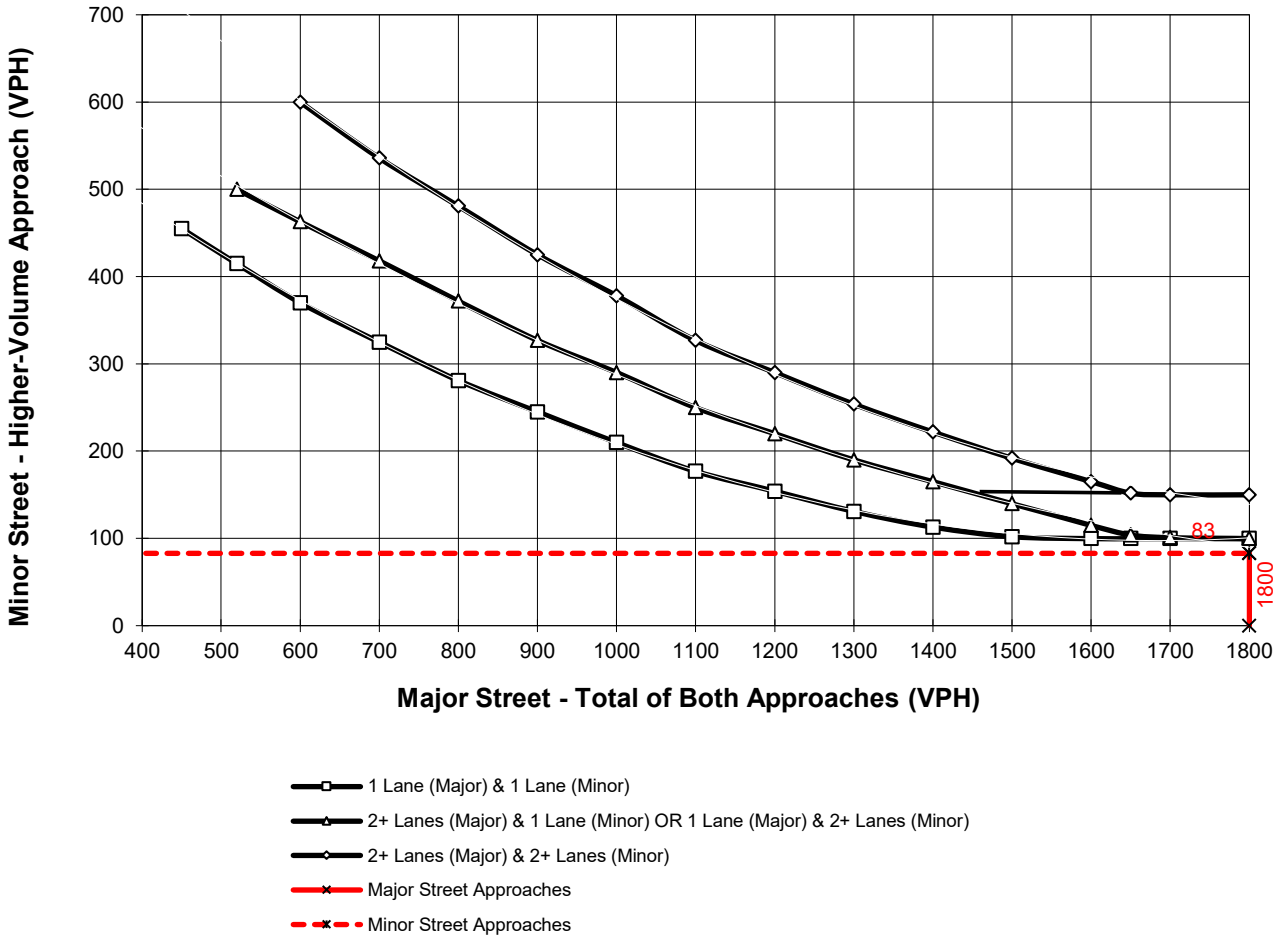
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Birch St.**
Total of Both Approaches (VPH) = **2004**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**
High Volume Approach (VPH) = **83**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

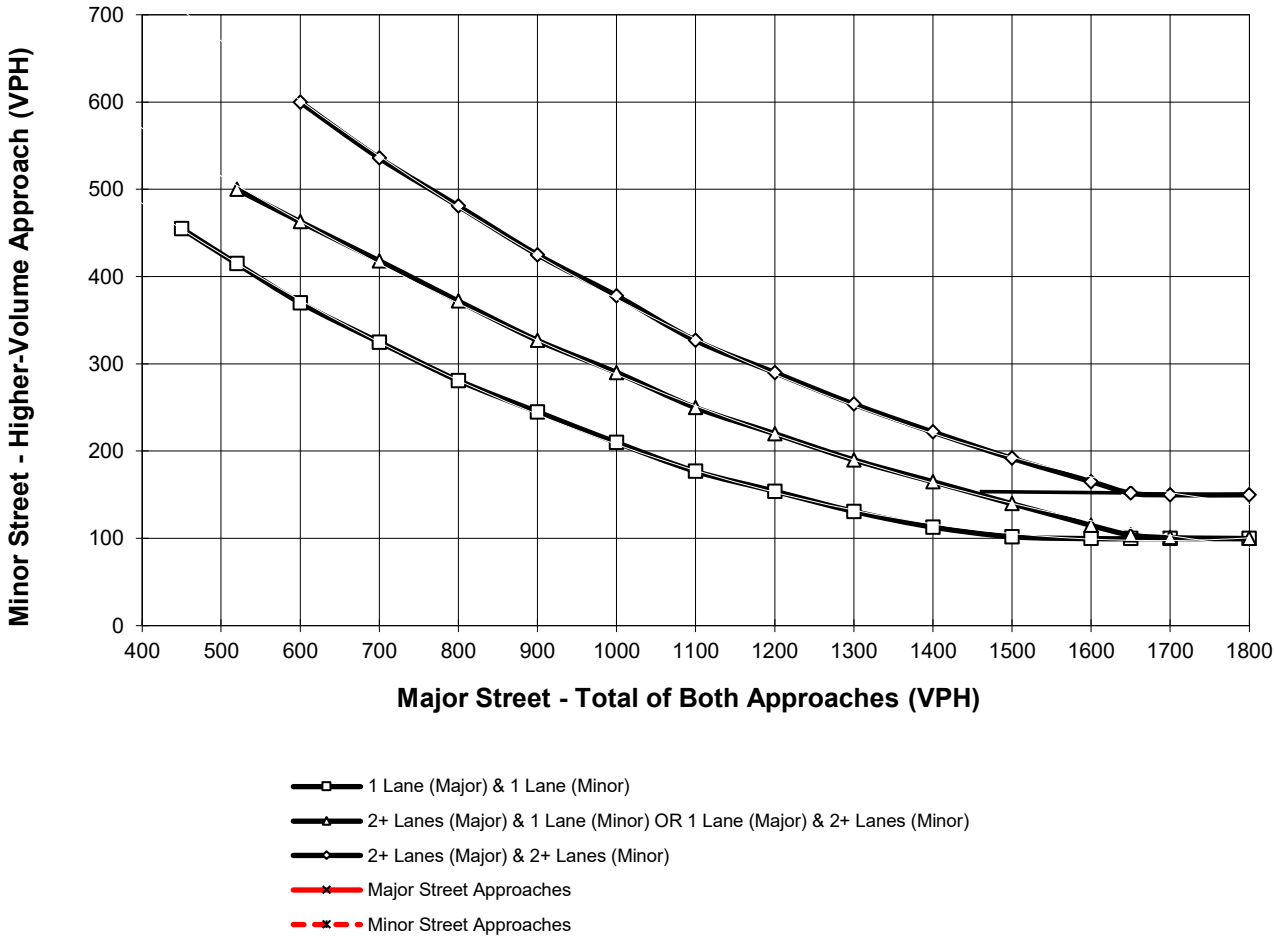
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **106**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **27**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

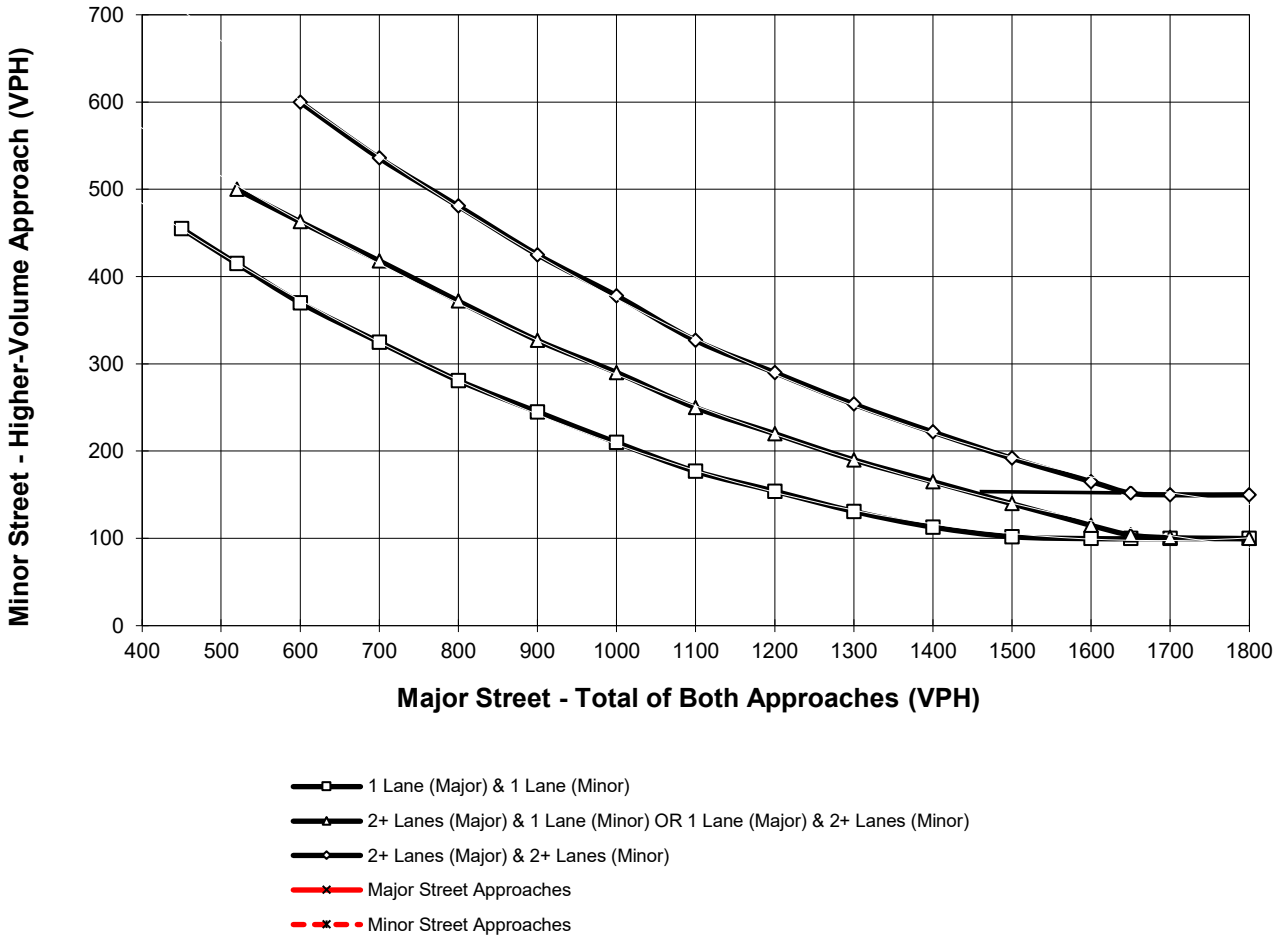
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **346**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **20**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

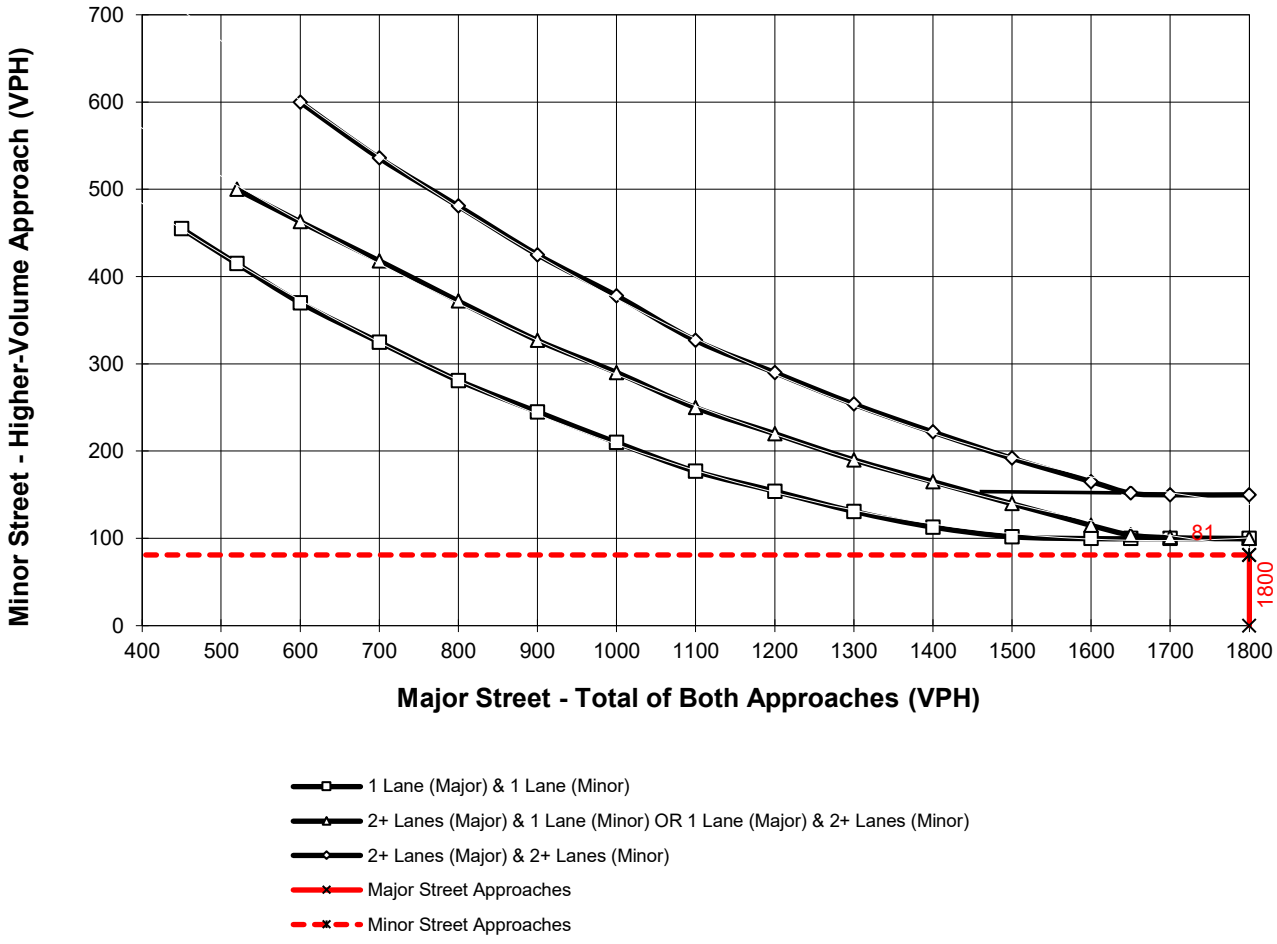
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Imperial Hwy. (SR-90)** Total of Both Approaches (VPH) = **3807**
Number of Approach Lanes on Major Street = **3**

Minor Street Name = **Flower Av.** High Volume Approach (VPH) = **81**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 5.6: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

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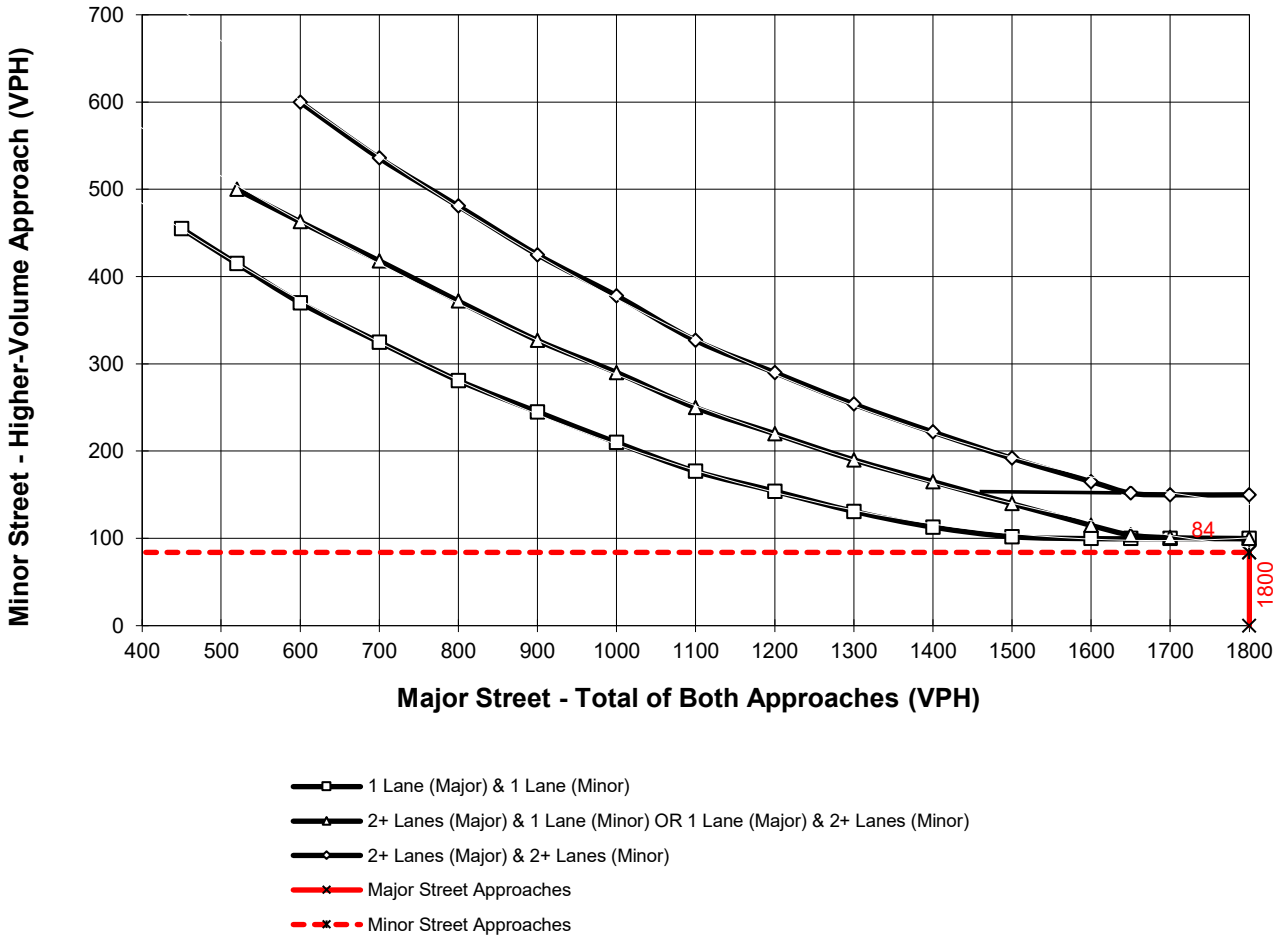
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Birch St.**
Total of Both Approaches (VPH) = **2006**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**
High Volume Approach (VPH) = **84**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

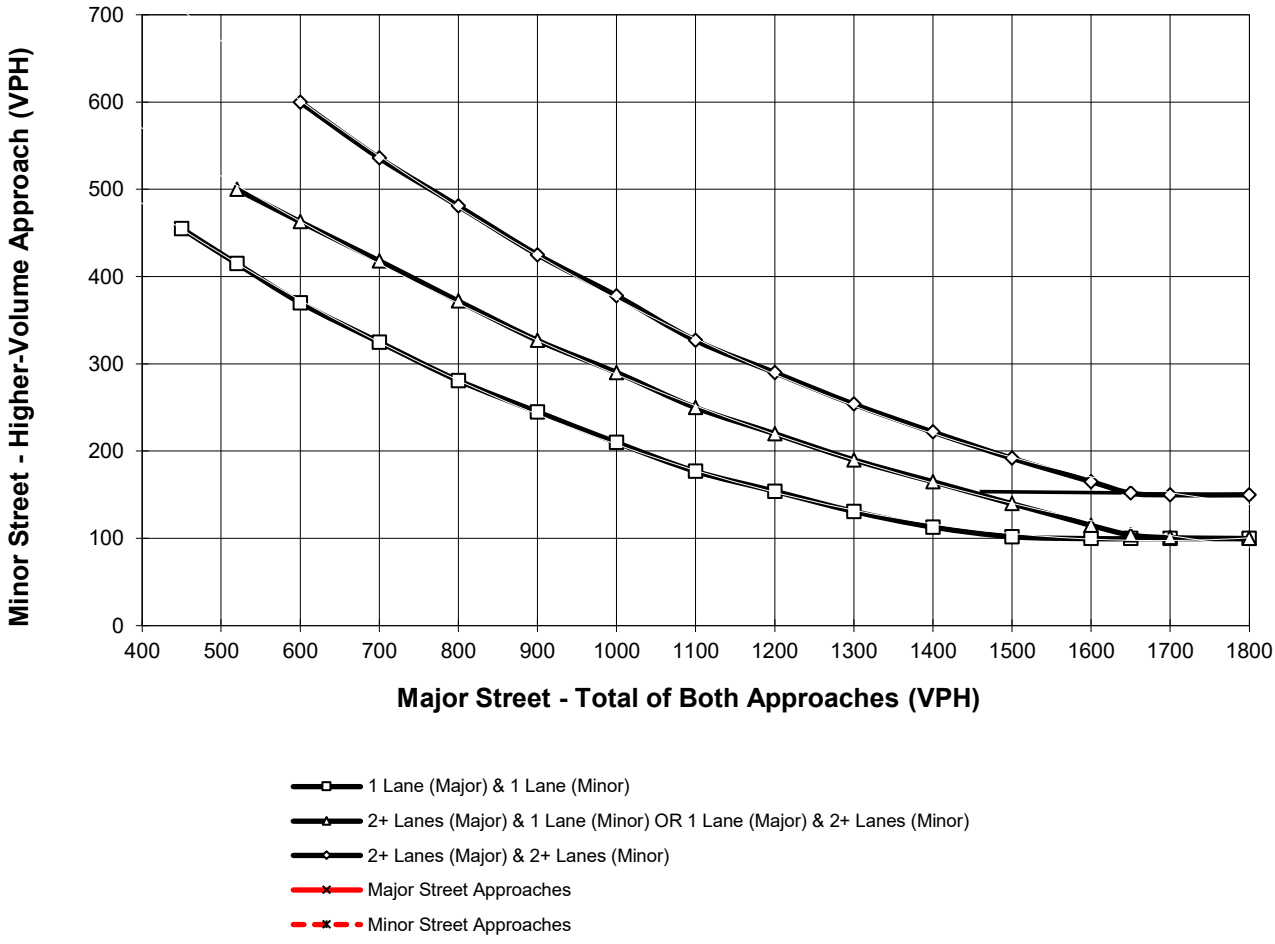
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **119**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **41**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

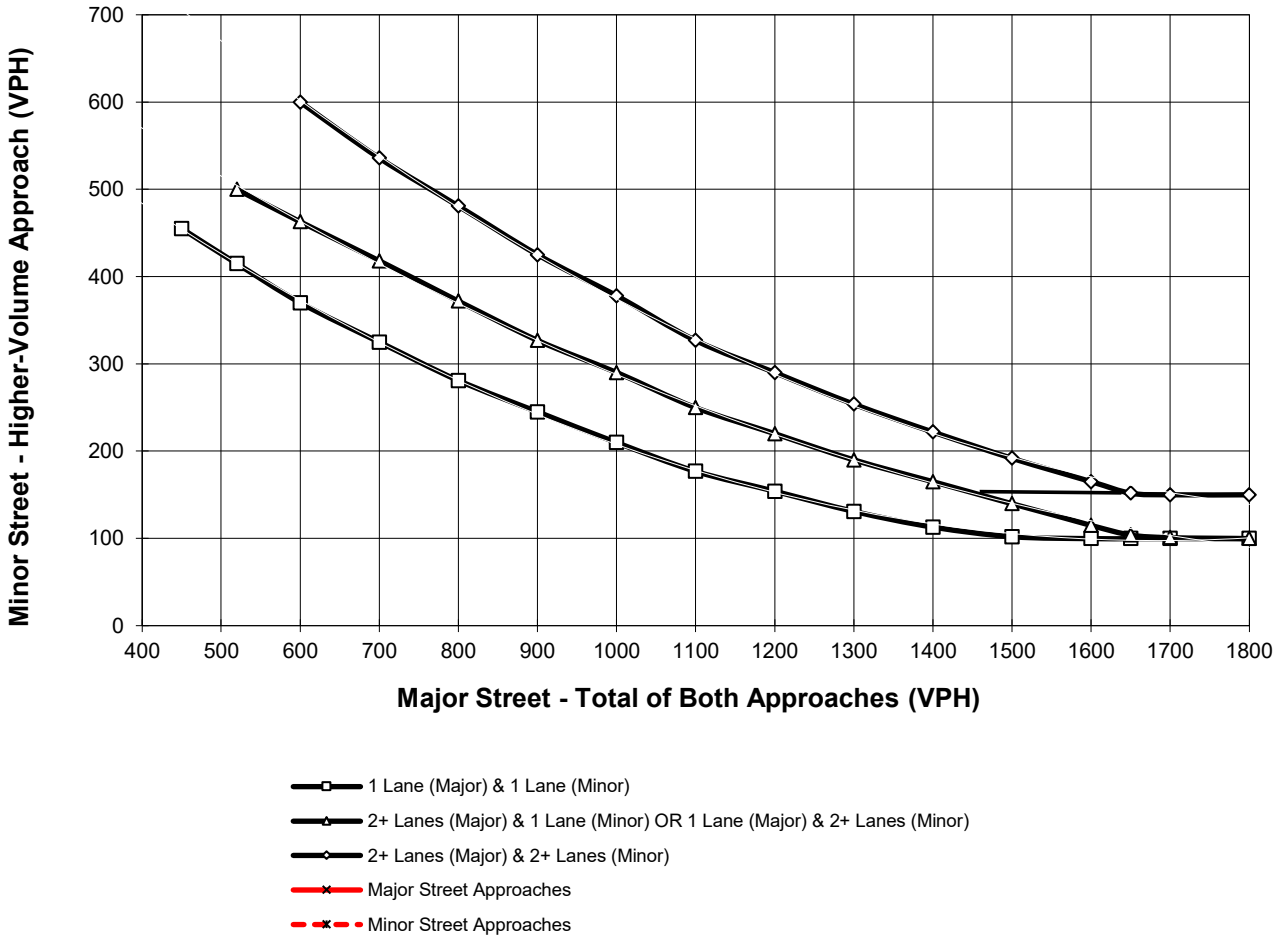
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **389**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **60**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

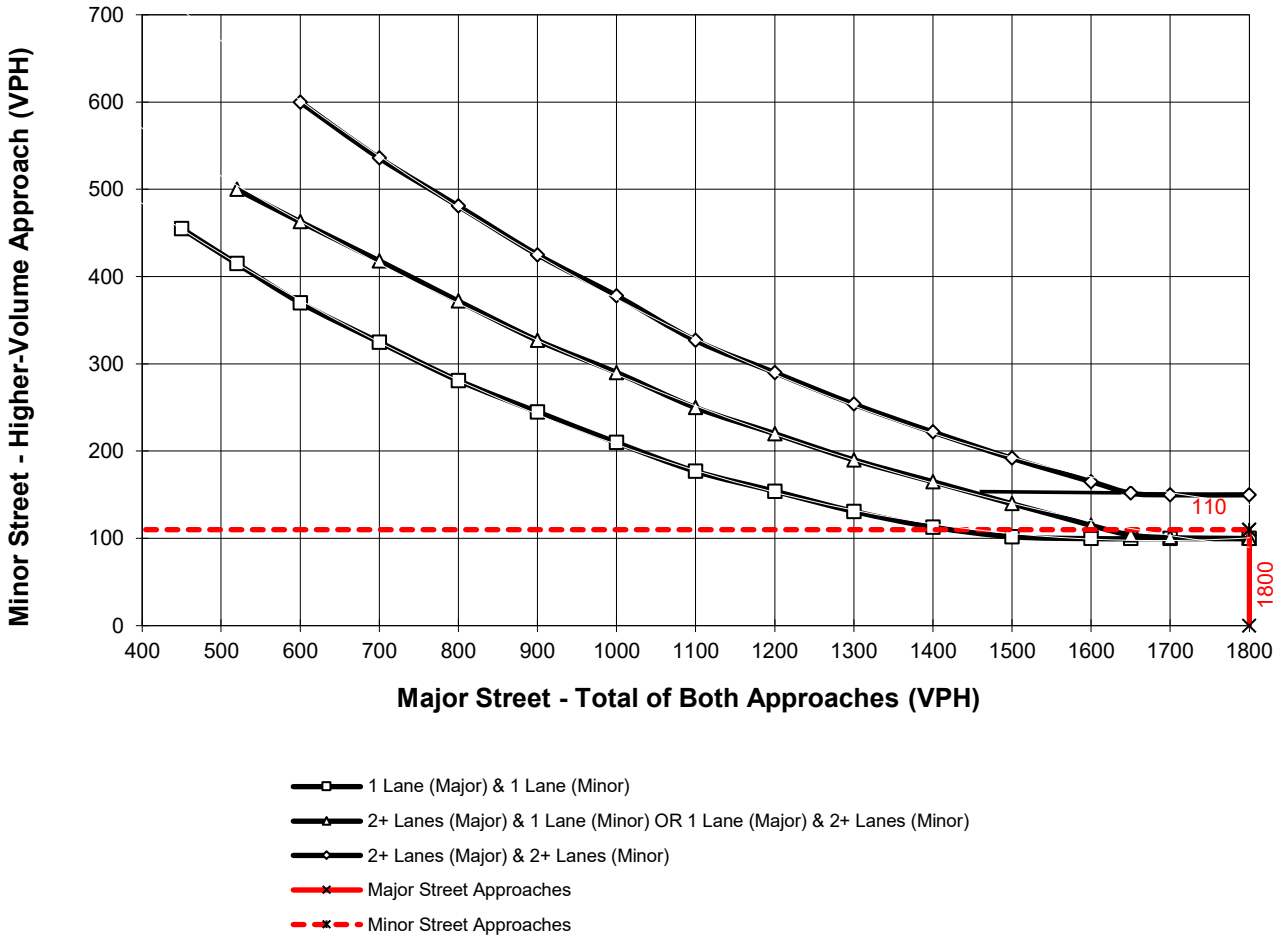
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Imperial Hwy. (SR-90)** Total of Both Approaches (VPH) = **3829**
Number of Approach Lanes on Major Street = **3**

Minor Street Name = **Flower Av.** High Volume Approach (VPH) = **110**
Number of Approach Lanes On Minor Street = **1**

WARRANTED FOR A SIGNAL



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 5.7: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

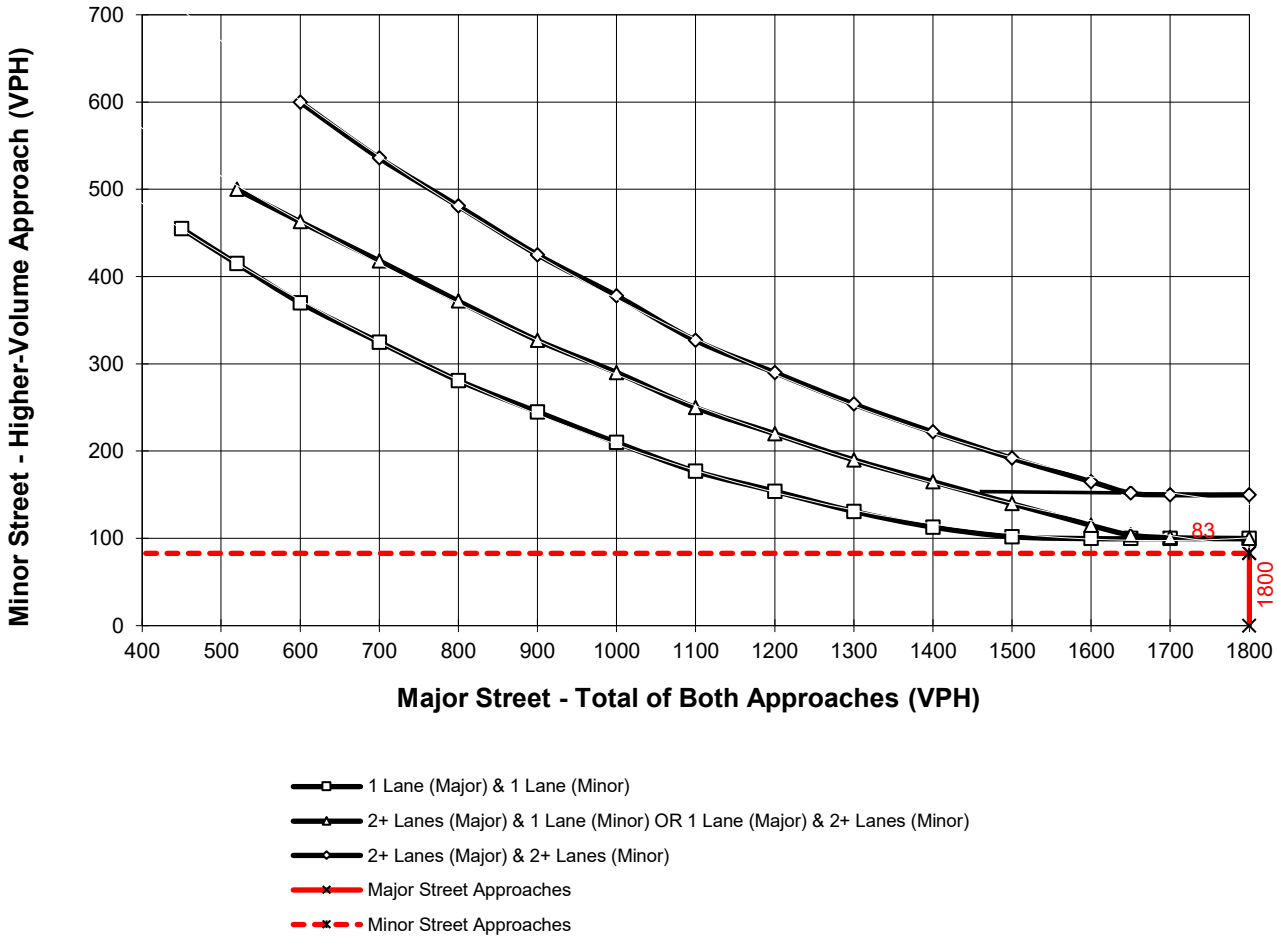
Major Street Name = **Birch St.**

Total of Both Approaches (VPH) = **2111**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**

High Volume Approach (VPH) = **83**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

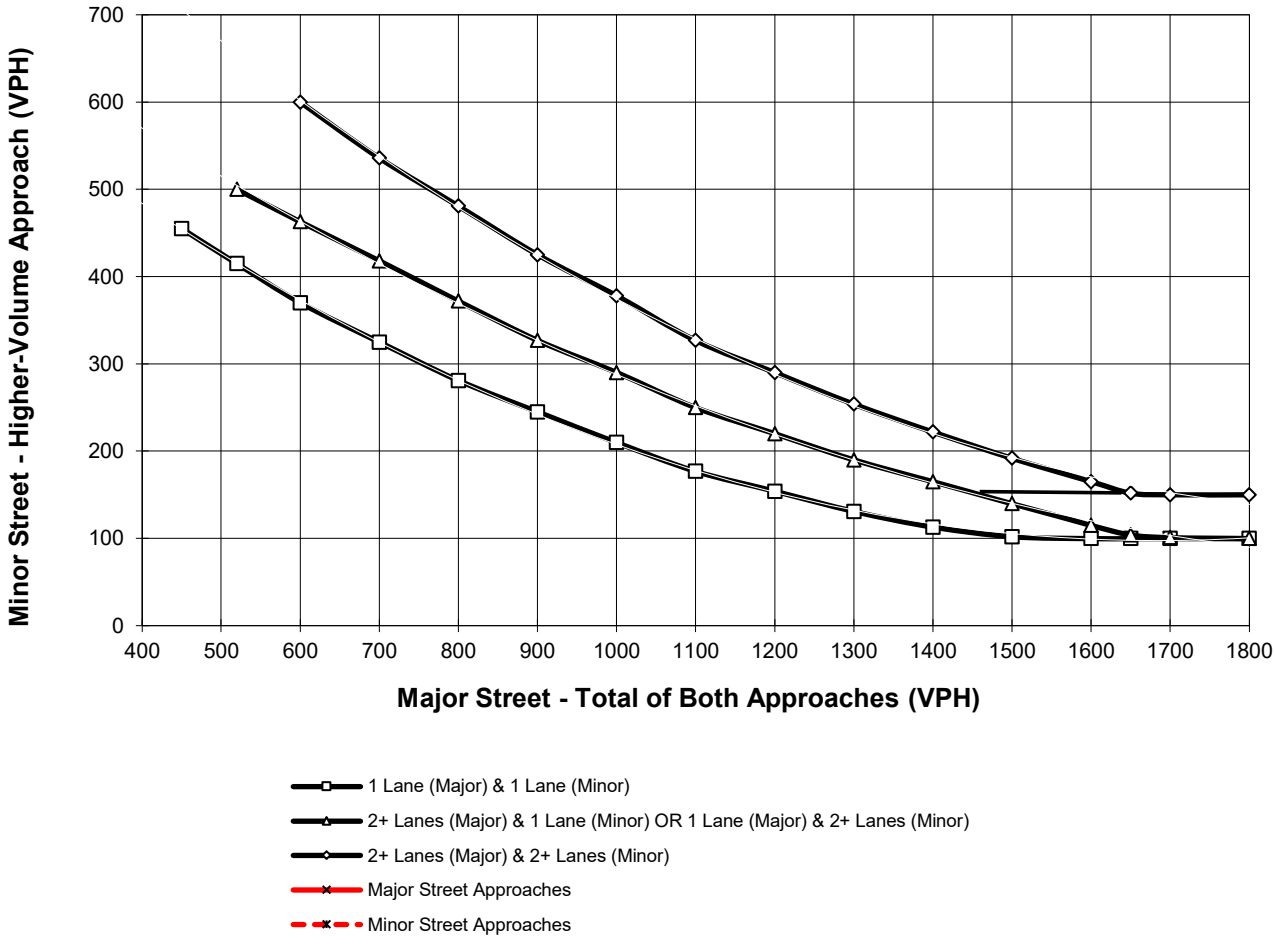
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **106**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **27**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 Without Project Conditions - Weekday AM Peak Hour (Without Flower)**

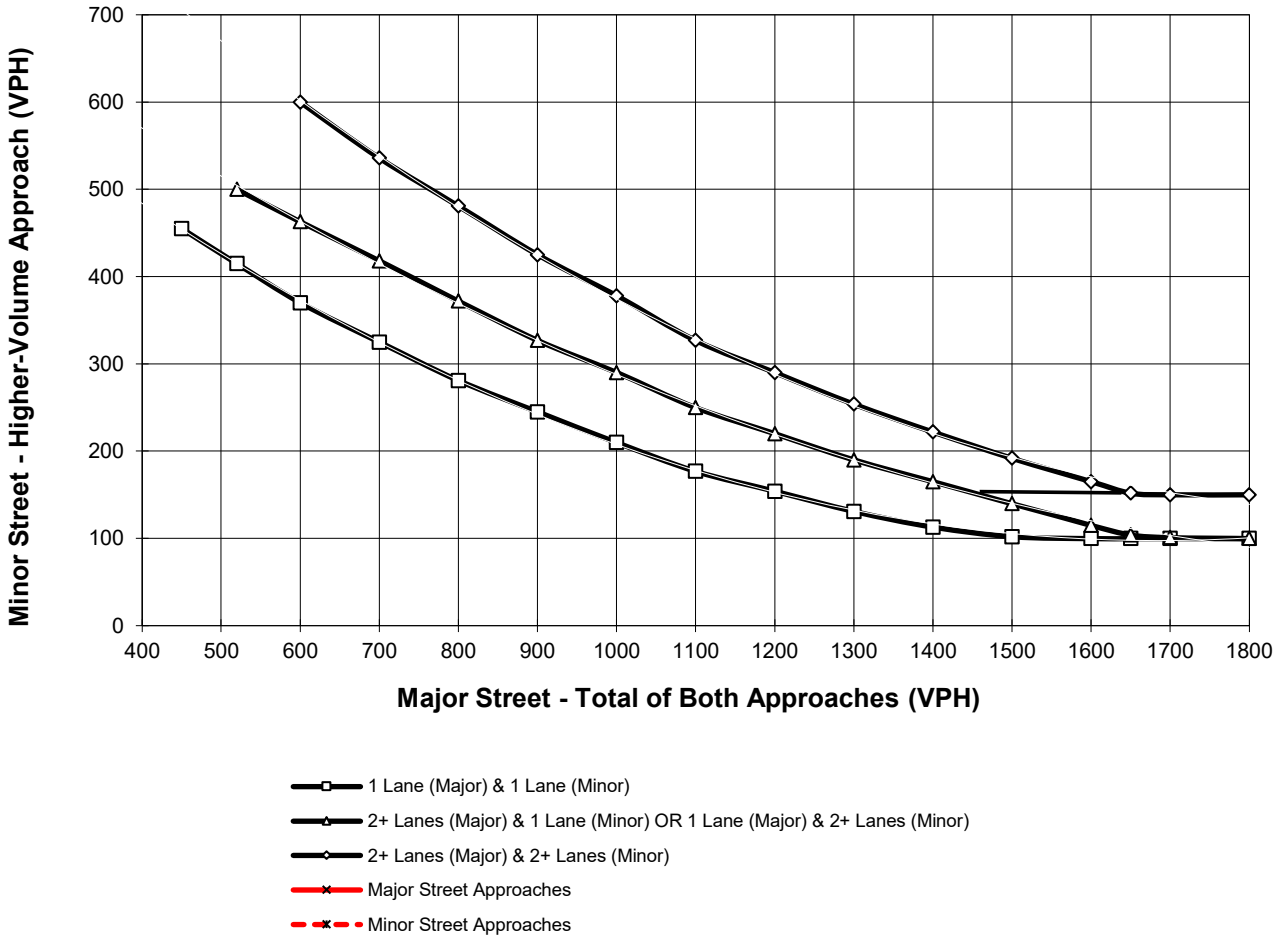
Major Street Name = **Flower Av.**

Total of Both Approaches (VPH) = **78**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**

High Volume Approach (VPH) = **20**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

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APPENDIX 5.8: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

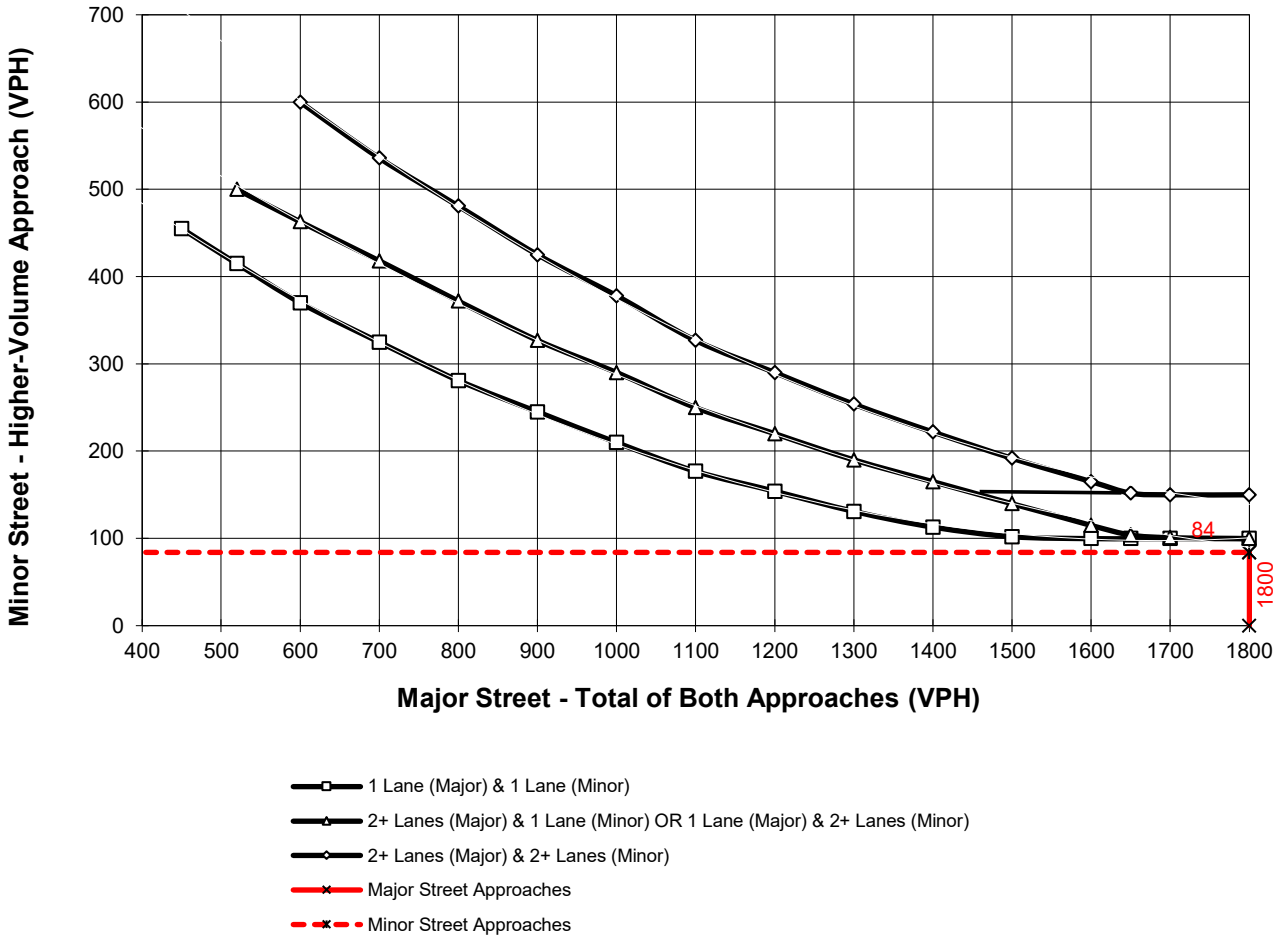
Major Street Name = **Birch St.**

Total of Both Approaches (VPH) = **2115**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**

High Volume Approach (VPH) = **84**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

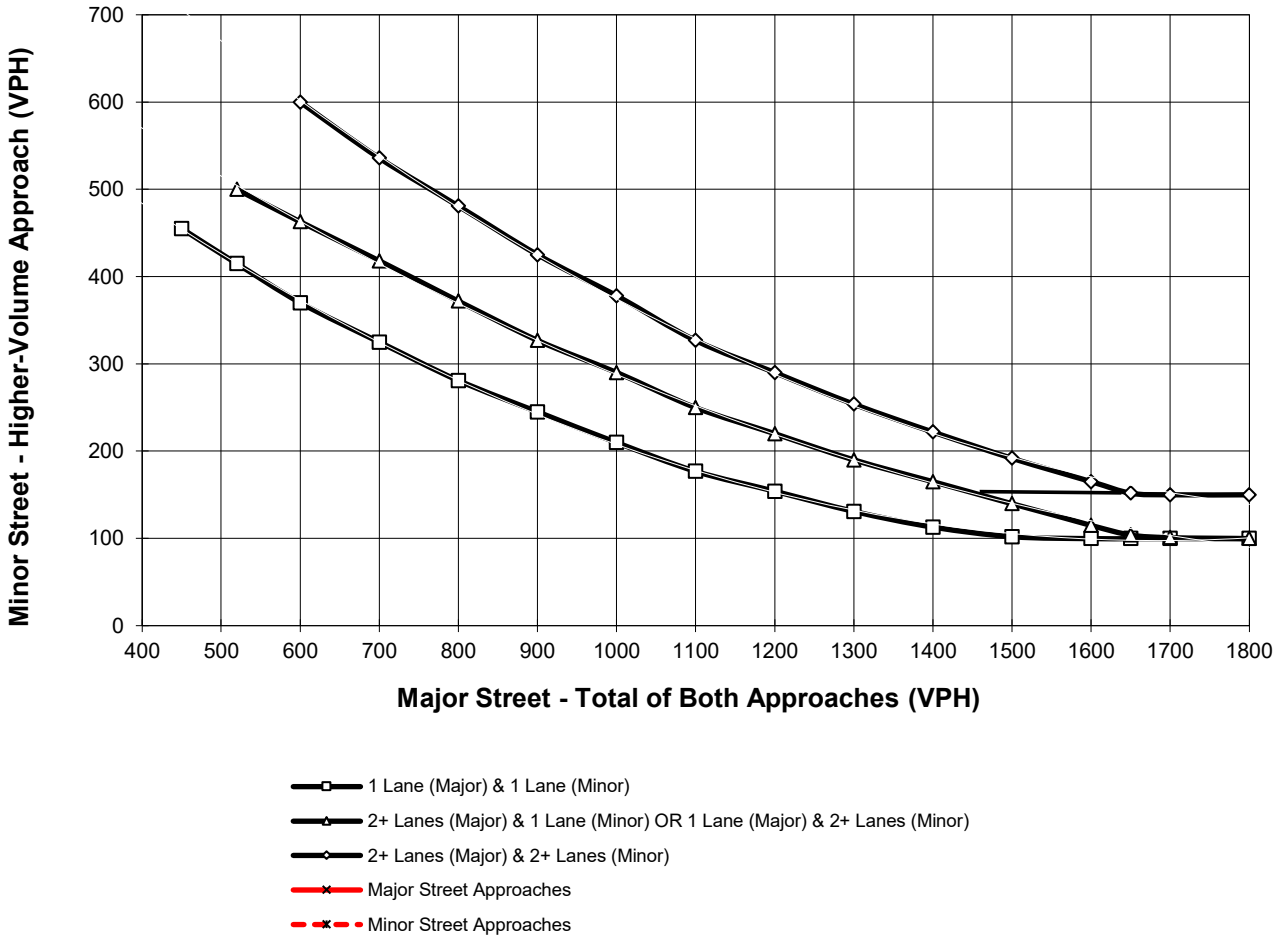
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **133**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **51**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

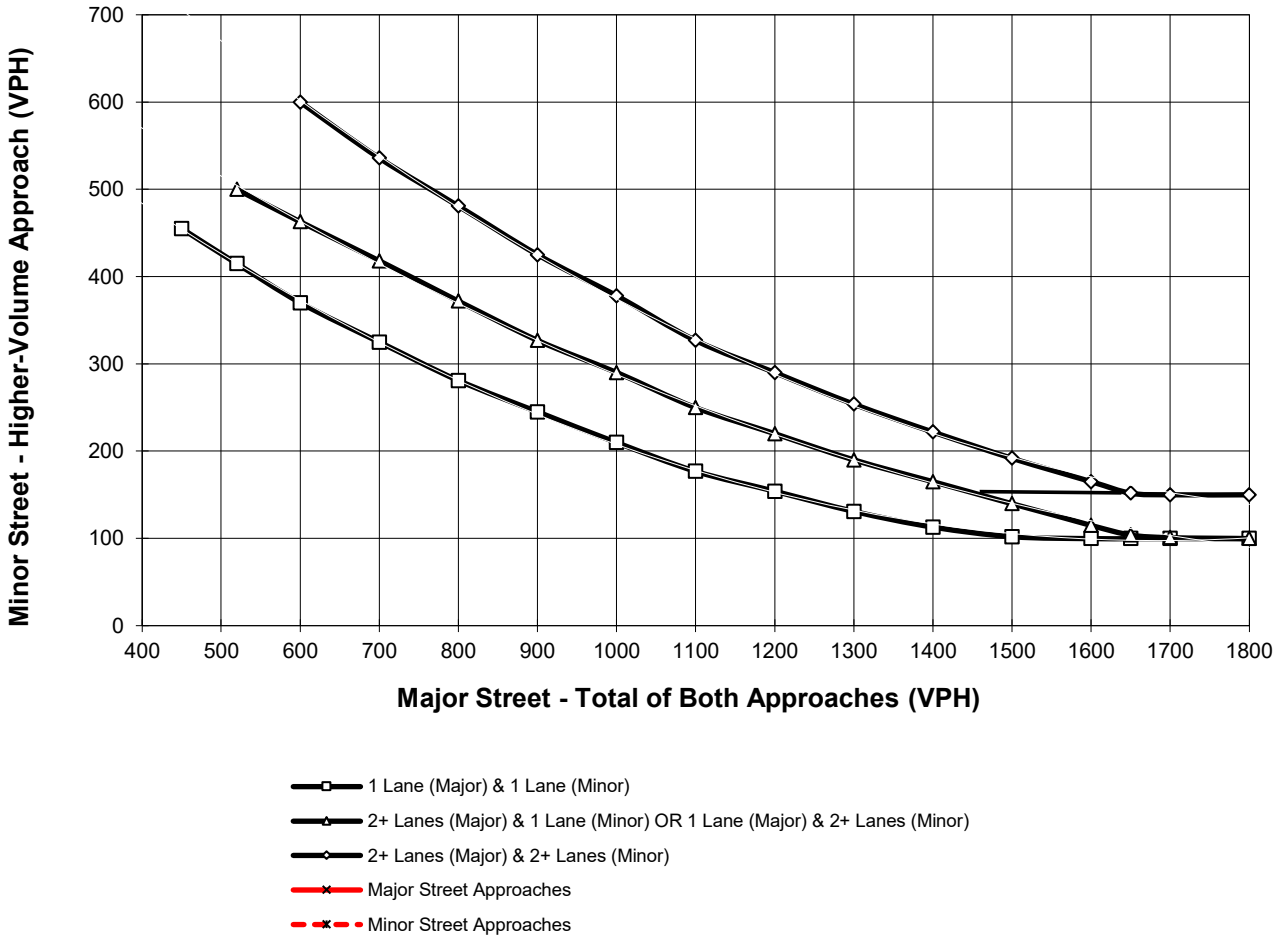
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **2024 With Project Conditions - Weekday AM Peak Hour (Without Flower)**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **90**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **37**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED

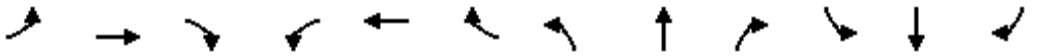


*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

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APPENDIX 5.9: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	176	1425	357	167	1511	118	410	476	168	209	627	193
Future Volume (veh/h)	176	1425	357	167	1511	118	410	476	168	209	627	193
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	185	1500	368	176	1591	116	432	501	169	220	660	186
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	1874	571	180	1874	580	302	1345	410	286	918	405
Arrive On Green	0.06	0.37	0.37	0.06	0.37	0.37	0.09	0.26	0.26	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	185	1500	368	176	1591	116	432	501	169	220	660	186
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	23.3	17.4	4.9	25.4	4.4	8.4	7.1	7.9	6.0	15.0	8.9
Cycle Q Clear(g_c), s	5.0	23.3	17.4	4.9	25.4	4.4	8.4	7.1	7.9	6.0	15.0	8.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	1874	571	180	1874	580	302	1345	410	286	918	405
V/C Ratio(X)	1.03	0.80	0.64	0.98	0.85	0.20	1.43	0.37	0.41	0.77	0.72	0.46
Avail Cap(c_a), veh/h	180	1947	594	180	1947	603	302	1919	585	291	1323	583
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.8	25.1	23.3	41.8	25.8	19.2	40.1	26.7	27.0	39.4	29.9	27.6
Incr Delay (d2), s/veh	75.3	2.4	2.3	60.9	3.7	0.2	212.5	0.2	0.7	10.5	1.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.8	14.0	10.5	6.2	15.9	2.8	20.0	5.0	5.3	4.9	10.4	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	117.1	27.6	25.5	102.7	29.5	19.3	252.6	26.8	27.6	50.0	31.0	28.5
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2053			1883			1102			1066	
Approach Delay, s/veh		35.3			35.7			115.5			34.5	
Approach LOS		D			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	37.9	13.0	28.1	9.6	37.9	12.6	28.5
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	6.9	25.3	10.4	17.0	7.0	27.4	8.0	9.9
Green Ext Time (p_c), s	0.0	6.3	0.0	4.6	0.0	5.1	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	49.7
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	640	15	15	739	5	6	1	16	0	0	15
Future Vol, veh/h	0	640	15	15	739	5	6	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	727	17	17	840	6	7	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	745	0	0	1182	1612	365	-	-	427
Stage 1	-	-	-	-	-	-	728	728	-	-	-	-
Stage 2	-	-	-	-	-	-	454	884	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	859	-	-	145	103	632	0	0	576
Stage 1	0	-	-	-	-	-	381	427	-	0	0	-
Stage 2	0	-	-	-	-	-	555	362	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	858	-	-	138	100	631	-	-	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	263	221	-	-	-	-
Stage 1	-	-	-	-	-	-	381	427	-	-	-	-
Stage 2	-	-	-	-	-	-	528	353	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	13.8	11.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	436	-	-	858	-	-	574
HCM Lane V/C Ratio	0.06	-	-	0.02	-	-	0.03
HCM Control Delay (s)	13.8	-	-	9.3	-	-	11.5
HCM Lane LOS	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-	0.1

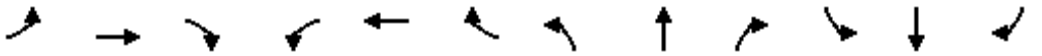
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1849	13	0	1892	19	0	0	36	0	0	22
Future Vol, veh/h	0	1849	13	0	1892	19	0	0	36	0	0	22
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1906	13	0	1951	20	0	0	37	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	963	-	-	986
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	220	0	0	212
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	219	-	-	212
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	24.8	24
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	219	-	-	-	-	212
HCM Lane V/C Ratio	0.169	-	-	-	-	0.107
HCM Control Delay (s)	24.8	-	-	-	-	24
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.4



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	14	57	649	10	82	47	26	47	10	13
Future Volume (veh/h)	18	653	14	57	649	10	82	47	26	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	15	67	764	12	96	55	16	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1466	29	350	1473	23	408	213	50	501	104	46
Arrive On Green	0.41	0.41	0.41	0.41	0.41	0.41	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	658	3563	70	653	3579	56	780	635	150	1012	310	138
Grp Volume(v), veh/h	21	383	400	67	379	397	167	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1855	653	1777	1858	1565	0	0	1459	0	0
Q Serve(g_s), s	1.0	6.2	6.2	3.3	6.2	6.2	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.1	6.2	6.2	9.6	6.2	6.2	2.8	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.57		0.10	0.74		0.09
Lane Grp Cap(c), veh/h	352	731	764	350	731	765	670	0	0	651	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.19	0.52	0.52	0.25	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	487	1095	1143	483	1095	1145	1205	0	0	1130	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.2	8.5	8.5	12.1	8.5	8.5	9.4	0.0	0.0	8.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.3	0.6	0.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.4	3.6	0.7	3.0	3.1	1.5	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.2	9.1	9.1	12.4	9.1	9.0	9.6	0.0	0.0	9.0	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		804			843			167			74	
Approach Delay, s/veh		9.1			9.3			9.6			9.0	
Approach LOS		A			A			A			A	
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.1		17.5		21.1		17.5				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		9.1		3.1		11.6		4.8				
Green Ext Time (p_c), s		4.7		0.4		4.2		0.9				
Intersection Summary												
HCM 6th Ctrl Delay			9.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	5.4

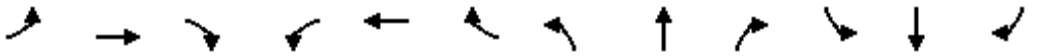
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	82	1762	3	0	1837	123	0	0	4	7	0	74
Future Vol, veh/h	82	1762	3	0	1837	123	0	0	4	7	0	74
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	88	1895	3	0	1975	132	0	0	4	8	0	80

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2112	0	0	-	-	0	-	-	951	2980	-	1059
Stage 1	-	-	-	-	-	-	-	-	-	2046	-	-
Stage 2	-	-	-	-	-	-	-	-	-	934	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	110	-	-	0	-	-	0	0	224	15	0	189
Stage 1	-	-	-	0	-	-	0	0	-	36	0	-
Stage 2	-	-	-	0	-	-	0	0	-	258	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	109	-	-	-	-	-	-	-	224	~ 5	-	188
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 6	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 7	-	-
Stage 2	-	-	-	-	-	-	-	-	-	49	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5	0	21.4	142
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	224	109	-	-	-	-	6	188
HCM Lane V/C Ratio	0.019	0.809	-	-	-	-	1.254	0.423
HCM Control Delay (s)	21.4	112.8	-	-	-	-	$ 1247.1	37.5
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	4.6	-	-	-	-	1.8	1.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1332	338	296	1437	161	398	598	233	282	563	244
Future Volume (veh/h)	260	1332	338	296	1437	161	398	598	233	282	563	244
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	280	1432	221	318	1545	116	428	643	148	303	605	203
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	1650	502	326	1742	536	447	1338	406	362	836	368
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	280	1432	221	318	1545	116	428	643	148	303	605	203
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	26.3	11.2	9.9	28.5	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Cycle Q Clear(g_c), s	8.4	26.3	11.2	9.9	28.5	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	268	1650	502	326	1742	536	447	1338	406	362	836	368
V/C Ratio(X)	1.04	0.87	0.44	0.98	0.89	0.22	0.96	0.48	0.36	0.84	0.72	0.55
Avail Cap(c_a), veh/h	268	1691	514	326	1784	549	447	1809	550	374	1177	518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	31.7	26.6	44.6	31.0	23.3	42.5	31.0	30.0	43.3	35.1	33.5
Incr Delay (d2), s/veh	66.7	5.0	0.6	43.0	5.7	0.2	31.4	0.3	0.5	14.1	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.8	16.4	7.4	9.8	18.2	3.5	11.4	7.7	5.2	7.7	11.0	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	112.3	36.7	27.2	87.6	36.7	23.5	73.9	31.3	30.5	57.3	36.4	34.8
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	C
Approach Vol, veh/h		1933			1979			1219			1111	
Approach Delay, s/veh		46.6			44.1			46.2			41.8	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.6	18.6	28.6	13.0	39.4	15.9	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	11.9	28.3	15.3	17.6	10.4	30.5	11.3	12.6
Green Ext Time (p_c), s	0.0	3.6	0.0	4.2	0.0	3.5	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	44.9
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	913	37	23	1011	20	14	1	68	0	0	21
Future Vol, veh/h	0	913	37	23	1011	20	14	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1038	42	26	1149	23	16	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1089	0	0	1674	2274	528	-	-	589
Stage 1	-	-	-	-	-	-	1047	1047	-	-	-	-
Stage 2	-	-	-	-	-	-	627	1227	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	636	-	-	62	40	495	0	0	452
Stage 1	0	-	-	-	-	-	244	303	-	0	0	-
Stage 2	0	-	-	-	-	-	438	249	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	631	-	-	56	38	491	-	-	451
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	138	-	-	-	-
Stage 1	-	-	-	-	-	-	244	300	-	-	-	-
Stage 2	-	-	-	-	-	-	398	238	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.6	13.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	358	-	-	631	-	-	451
HCM Lane V/C Ratio	0.263	-	-	0.041	-	-	0.053
HCM Control Delay (s)	18.6	-	-	11	-	-	13.4
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1	-	-	0.1	-	-	0.2

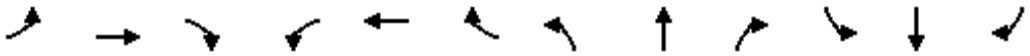
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1871	21	0	1997	35	0	0	23	0	0	57
Future Vol, veh/h	0	1871	21	0	1997	35	0	0	23	0	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2176	24	0	2322	41	0	0	27	0	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1100	-	-	1182
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	312	0	0	287
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	312	-	-	287
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.6	21.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	312	-	-	-	-	287
HCM Lane V/C Ratio	0.086	-	-	-	-	0.231
HCM Control Delay (s)	17.6	-	-	-	-	21.3
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.9



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	19	78	994	19	44	36	52	34	3	20
Future Volume (veh/h)	26	958	19	78	994	19	44	36	52	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	20	88	1117	19	49	40	31	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	1715	32	275	1719	29	268	209	129	473	42	56
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	469	3568	66	487	3575	61	515	664	411	1071	135	176
Grp Volume(v), veh/h	29	536	560	88	555	581	120	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1858	487	1777	1859	1590	0	0	1382	0	0
Q Serve(g_s), s	2.4	10.7	10.8	7.9	11.3	11.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	13.7	10.7	10.8	18.6	11.3	11.3	2.4	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.41		0.26	0.81		0.13
Lane Grp Cap(c), veh/h	265	854	893	275	854	894	606	0	0	571	0	0
V/C Ratio(X)	0.11	0.63	0.63	0.32	0.65	0.65	0.20	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	276	897	938	287	897	938	959	0	0	870	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.6	9.3	9.3	16.2	9.4	9.4	12.1	0.0	0.0	11.6	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.3	1.2	0.7	1.6	1.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	6.4	6.7	1.4	6.2	6.4	1.5	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	10.6	10.5	16.8	11.0	10.9	12.2	0.0	0.0	11.6	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1125			1224			120			47	
Approach Delay, s/veh		10.6			11.4			12.2			11.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.2		19.7		28.2		19.7				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		15.7		2.9		20.6		4.4				
Green Ext Time (p_c), s		4.8		0.2		2.4		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	4.4

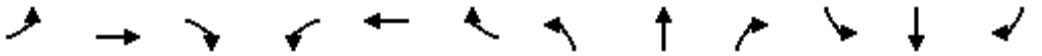
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	47	1814	13	0	1971	65	0	0	3	12	0	60
Future Vol, veh/h	47	1814	13	0	1971	65	0	0	3	12	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	52	2016	14	0	2190	72	0	0	3	13	0	67

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2262	0	0	-	-	0	-	-	1015	3136	-	1131
Stage 1	-	-	-	-	-	-	-	-	-	2226	-	-
Stage 2	-	-	-	-	-	-	-	-	-	910	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	92	-	-	0	-	-	0	0	203	~ 12	0	169
Stage 1	-	-	-	0	-	-	0	0	-	26	0	-
Stage 2	-	-	-	0	-	-	0	0	-	267	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	92	-	-	-	-	-	-	-	203	~ 7	-	169
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 10	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 11	-	-
Stage 2	-	-	-	-	-	-	-	-	-	114	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.2	0	23	184.7
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	203	92	-	-	-	-	10	169
HCM Lane V/C Ratio	0.016	0.568	-	-	-	-	1.333	0.394
HCM Control Delay (s)	23	86.3	-	-	-	-	$ 910.8	39.5
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	2.6	-	-	-	-	2.5	1.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1615	441	274	1576	170	505	742	261	289	609	214
Future Volume (veh/h)	260	1615	441	274	1576	170	505	742	261	289	609	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	265	1648	280	280	1608	113	515	757	162	295	621	177
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	265	1648	280	280	1608	113	515	757	162	295	621	177
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	31.7	14.6	8.4	30.4	5.1	15.4	12.7	8.4	9.1	16.3	9.9
Cycle Q Clear(g_c), s	8.0	31.7	14.6	8.4	30.4	5.1	15.4	12.7	8.4	9.1	16.3	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
V/C Ratio(X)	1.04	0.97	0.54	1.05	0.93	0.21	1.05	0.55	0.38	0.82	0.76	0.49
Avail Cap(c_a), veh/h	255	1705	520	267	1726	532	490	1721	526	468	1173	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	32.8	27.0	45.8	32.0	23.6	42.3	31.2	29.6	43.4	35.9	33.5
Incr Delay (d2), s/veh	67.4	14.6	1.1	68.0	9.7	0.2	54.6	0.3	0.6	6.8	1.8	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.4	20.9	9.2	10.0	20.0	3.4	15.1	8.8	5.7	6.9	11.4	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.5	47.4	28.1	113.8	41.7	23.8	96.9	31.5	30.2	50.2	37.7	34.5
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	C
Approach Vol, veh/h		2193			2001			1434			1093	
Approach Delay, s/veh		52.9			50.7			54.9			40.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	28.2	12.6	39.2	15.9	32.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	33.7	17.4	18.3	10.0	32.4	11.1	14.7
Green Ext Time (p_c), s	0.0	0.0	0.0	4.1	0.0	1.2	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	50.7
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	33	31	1136	19	5	6	42	0	0	27
Future Vol, veh/h	0	1035	33	31	1136	19	5	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1125	36	34	1235	21	5	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1163	0	0	1813	2457	565	-	-	634
Stage 1	-	-	-	-	-	-	1127	1127	-	-	-	-
Stage 2	-	-	-	-	-	-	686	1330	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	596	-	-	49	30	468	0	0	422
Stage 1	0	-	-	-	-	-	218	278	-	0	0	-
Stage 2	0	-	-	-	-	-	404	222	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	595	-	-	44	28	467	-	-	420
Mov Cap-2 Maneuver	-	-	-	-	-	-	142	121	-	-	-	-
Stage 1	-	-	-	-	-	-	218	277	-	-	-	-
Stage 2	-	-	-	-	-	-	354	208	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	19.6	14.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	303	-	-	595	-	-	420
HCM Lane V/C Ratio	0.19	-	-	0.057	-	-	0.07
HCM Control Delay (s)	19.6	-	-	11.4	-	-	14.2
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-	-	0.2

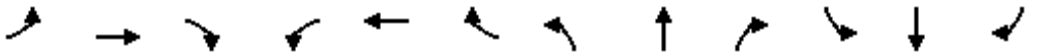
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2001	18	0	2074	37	0	0	27	0	0	42
Future Vol, veh/h	0	2001	18	0	2074	37	0	0	27	0	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2084	19	0	2160	39	0	0	28	0	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1052	-	-	1100
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	267	0	0	252
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	267	-	-	252
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.1	22.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	267	-	-	-	-	252
HCM Lane V/C Ratio	0.105	-	-	-	-	0.174
HCM Control Delay (s)	20.1	-	-	-	-	22.3
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	7	89	1113	8	15	10	55	27	2	15
Future Volume (veh/h)	24	1080	7	89	1113	8	15	10	55	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	6	90	1124	8	15	10	26	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	400	2087	11	411	2083	15	182	59	103	280	41	52
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	470	3624	20	487	3616	26	323	465	820	766	328	415
Grp Volume(v), veh/h	24	535	562	90	552	580	51	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1867	487	1777	1865	1609	0	0	1510	0	0
Q Serve(g_s), s	1.1	6.0	6.0	4.5	6.3	6.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.4	6.0	6.0	10.5	6.3	6.3	0.9	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.29		0.51	0.67		0.27
Lane Grp Cap(c), veh/h	400	1023	1075	411	1023	1074	344	0	0	373	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.22	0.54	0.54	0.15	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	476	1309	1375	489	1309	1373	1386	0	0	1329	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.6	4.2	4.2	7.4	4.3	4.3	12.9	0.0	0.0	12.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.3	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.1	1.9	2.0	0.5	1.3	1.4	0.5	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.6	4.6	4.6	7.7	4.7	4.7	13.1	0.0	0.0	13.0	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1121			1222			51			40	
Approach Delay, s/veh		4.7			4.9			13.1			13.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		24.1		8.7		24.1		8.7				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		9.4		2.7		12.5		2.9				
Green Ext Time (p_c), s		6.9		0.1		6.3		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.1									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	2006	5	0	2054	66	0	0	7	14	0	57
Future Vol, veh/h	43	2006	5	0	2054	66	0	0	7	14	0	57
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	44	2068	5	0	2118	68	0	0	7	14	0	59

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2191	0	0	-	-	0	-	-	1040	3072	-	1098
Stage 1	-	-	-	-	-	-	-	-	-	2157	-	-
Stage 2	-	-	-	-	-	-	-	-	-	915	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	100	-	-	0	-	-	0	0	195	~ 13	0	178
Stage 1	-	-	-	0	-	-	0	0	-	30	0	-
Stage 2	-	-	-	0	-	-	0	0	-	266	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	100	-	-	-	-	-	-	-	194	~ 8	-	177
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	15	-	-
Stage 1	-	-	-	-	-	-	-	-	-	17	-	-
Stage 2	-	-	-	-	-	-	-	-	-	143	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	0	24.3	138.4
HCM LOS			C	F

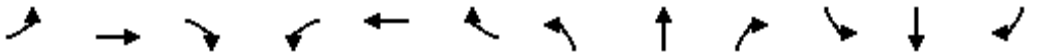
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	194	100	-	-	-	-	15	177
HCM Lane V/C Ratio	0.037	0.443	-	-	-	-	0.962	0.332
HCM Control Delay (s)	24.3	67	-	-	-	-	$ 559	35.1
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	1.9	-	-	-	-	2.3	1.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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APPENDIX 5.10: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	176	1432	357	173	1524	118	410	476	171	209	627	193
Future Volume (veh/h)	176	1432	357	173	1524	118	410	476	171	209	627	193
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	185	1507	368	182	1604	116	432	501	172	220	660	186
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	179	1877	573	179	1877	581	301	1344	410	286	918	405
Arrive On Green	0.06	0.37	0.37	0.06	0.37	0.37	0.09	0.26	0.26	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	185	1507	368	182	1604	116	432	501	172	220	660	186
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	23.5	17.4	5.0	25.7	4.4	8.4	7.1	8.1	6.0	15.0	8.9
Cycle Q Clear(g_c), s	5.0	23.5	17.4	5.0	25.7	4.4	8.4	7.1	8.1	6.0	15.0	8.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	1877	573	179	1877	581	301	1344	410	286	918	405
V/C Ratio(X)	1.03	0.80	0.64	1.01	0.85	0.20	1.43	0.37	0.42	0.77	0.72	0.46
Avail Cap(c_a), veh/h	179	1945	593	179	1945	602	301	1916	584	290	1321	583
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	25.2	23.2	41.9	25.9	19.2	40.2	26.7	27.1	39.5	30.0	27.7
Incr Delay (d2), s/veh	75.8	2.5	2.3	71.2	3.9	0.2	213.4	0.2	0.7	10.6	1.1	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.8	14.1	10.5	6.7	16.1	2.9	20.0	5.0	5.4	4.9	10.4	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	117.6	27.6	25.5	113.0	29.7	19.3	253.6	26.9	27.8	50.1	31.1	28.5
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2060			1902			1105			1066	
Approach Delay, s/veh		35.3			37.1			115.6			34.5	
Approach LOS		D			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.0	13.0	28.1	9.6	38.0	12.6	28.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	25.5	10.4	17.0	7.0	27.7	8.0	10.1
Green Ext Time (p_c), s	0.0	6.2	0.0	4.6	0.0	4.9	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	50.2
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	640	20	15	739	5	12	1	16	0	0	15
Future Vol, veh/h	0	640	20	15	739	5	12	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	727	23	17	840	6	14	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	751	0	0	1182	1612	365	-	-	427
Stage 1	-	-	-	-	-	-	728	728	-	-	-	-
Stage 2	-	-	-	-	-	-	454	884	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	854	-	-	145	103	632	0	0	576
Stage 1	0	-	-	-	-	-	381	427	-	0	0	-
Stage 2	0	-	-	-	-	-	555	362	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	853	-	-	138	100	631	-	-	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	263	221	-	-	-	-
Stage 1	-	-	-	-	-	-	381	427	-	-	-	-
Stage 2	-	-	-	-	-	-	528	353	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	15.3	11.5
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	384	-	-	853	-	-	574
HCM Lane V/C Ratio	0.086	-	-	0.02	-	-	0.03
HCM Control Delay (s)	15.3	-	-	9.3	-	-	11.5
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

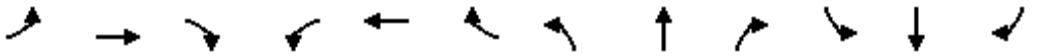
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1859	13	0	1873	47	0	0	36	0	0	60
Future Vol, veh/h	0	1859	13	0	1873	47	0	0	36	0	0	60
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1916	13	0	1931	48	0	0	37	0	0	62

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	968	-	-	990
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	218	0	0	211
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	217	-	-	211
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25	29
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	217	-	-	-	-	211
HCM Lane V/C Ratio	0.171	-	-	-	-	0.293
HCM Control Delay (s)	25	-	-	-	-	29
HCM Lane LOS	D	-	-	-	-	D
HCM 95th %tile Q(veh)	0.6	-	-	-	-	1.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	14	64	649	10	82	47	37	47	10	13
Future Volume (veh/h)	18	653	14	64	649	10	82	47	37	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	15	75	764	12	96	55	29	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1483	29	350	1490	23	377	203	84	498	103	46
Arrive On Green	0.42	0.42	0.42	0.42	0.42	0.42	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	658	3563	70	653	3579	56	708	605	252	1012	308	138
Grp Volume(v), veh/h	21	383	400	75	379	397	180	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1855	653	1777	1859	1565	0	0	1458	0	0
Q Serve(g_s), s	1.0	6.3	6.3	3.8	6.2	6.2	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.2	6.3	6.3	10.1	6.2	6.2	3.1	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.53		0.16	0.74		0.09
Lane Grp Cap(c), veh/h	352	739	772	350	739	773	664	0	0	648	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.21	0.51	0.51	0.27	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	476	1073	1121	472	1073	1123	1177	0	0	1104	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.2	8.6	8.6	12.3	8.5	8.5	9.7	0.0	0.0	9.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.5	0.3	0.6	0.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.5	3.6	0.8	3.1	3.2	1.7	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.3	9.1	9.1	12.6	9.1	9.1	9.9	0.0	0.0	9.2	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		804			851			180			74	
Approach Delay, s/veh		9.2			9.4			9.9			9.2	
Approach LOS		A			A			A			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		21.6		17.8		21.6		17.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		9.2		3.1		12.1		5.1				
Green Ext Time (p_c), s		4.7		0.4		4.1		1.0				

Intersection Summary												
HCM 6th Ctrl Delay			9.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	17

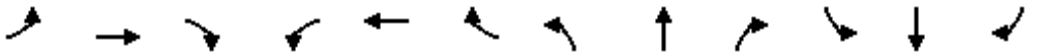
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	92	1762	3	0	1823	149	0	0	4	13	0	97
Future Vol, veh/h	92	1762	3	0	1823	149	0	0	4	13	0	97
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	99	1895	3	0	1960	160	0	0	4	14	0	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2125	0	0	-	-	0	-	-	951	3001	-	1065
Stage 1	-	-	-	-	-	-	-	-	-	2045	-	-
Stage 2	-	-	-	-	-	-	-	-	-	956	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	108	-	-	0	-	-	0	0	224	15	0	188
Stage 1	-	-	-	0	-	-	0	0	-	36	0	-
Stage 2	-	-	-	0	-	-	0	0	-	250	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	107	-	-	-	-	-	-	-	224	~ 3	-	187
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 3	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 3	-	-
Stage 2	-	-	-	-	-	-	-	-	-	18	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	7	0	21.4	$ 491.6
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	224	107	-	-	-	-	3	187
HCM Lane V/C Ratio	0.019	0.925	-	-	-	-	4.659	0.558
HCM Control Delay (s)	21.4	141.2	-	-	-	-	$ 3815.6	46.1
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	5.6	-	-	-	-	3.1	2.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1334	338	297	1440	161	398	598	234	282	563	244
Future Volume (veh/h)	260	1334	338	297	1440	161	398	598	234	282	563	244
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	280	1434	221	319	1548	116	428	643	149	303	605	203
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	1651	502	326	1743	536	447	1338	406	362	836	367
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.26	0.26	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	280	1434	221	319	1548	116	428	643	149	303	605	203
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	26.3	11.2	10.0	28.6	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Cycle Q Clear(g_c), s	8.4	26.3	11.2	10.0	28.6	5.2	13.3	10.6	7.8	9.3	15.6	11.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	268	1651	502	326	1743	536	447	1338	406	362	836	367
V/C Ratio(X)	1.04	0.87	0.44	0.98	0.89	0.22	0.96	0.48	0.37	0.84	0.72	0.55
Avail Cap(c_a), veh/h	268	1691	514	326	1783	549	447	1809	549	374	1177	518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.6	31.7	26.6	44.6	31.0	23.3	42.5	31.0	30.0	43.3	35.1	33.5
Incr Delay (d2), s/veh	66.8	5.1	0.6	43.9	5.8	0.2	31.5	0.3	0.6	14.1	1.3	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.8	16.4	7.4	9.9	18.3	3.5	11.4	7.7	5.3	7.7	11.0	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	112.4	36.8	27.2	88.5	36.8	23.5	74.0	31.3	30.6	57.3	36.5	34.8
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	C
Approach Vol, veh/h		1935			1983			1220			1111	
Approach Delay, s/veh		46.6			44.4			46.2			41.8	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.6	18.6	28.6	13.0	39.4	15.9	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.0	28.3	15.3	17.6	10.4	30.6	11.3	12.6
Green Ext Time (p_c), s	0.0	3.5	0.0	4.2	0.0	3.5	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	45.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	913	39	23	1011	20	15	1	68	0	0	21
Future Vol, veh/h	0	913	39	23	1011	20	15	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1038	44	26	1149	23	17	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1091	0	0	1674	2274	528	-	-	589
Stage 1	-	-	-	-	-	-	1047	1047	-	-	-	-
Stage 2	-	-	-	-	-	-	627	1227	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	635	-	-	62	40	495	0	0	452
Stage 1	0	-	-	-	-	-	244	303	-	0	0	-
Stage 2	0	-	-	-	-	-	438	249	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	630	-	-	56	38	491	-	-	451
Mov Cap-2 Maneuver	-	-	-	-	-	-	162	138	-	-	-	-
Stage 1	-	-	-	-	-	-	244	300	-	-	-	-
Stage 2	-	-	-	-	-	-	398	238	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	19	13.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	352	-	-	630	-	-	451
HCM Lane V/C Ratio	0.271	-	-	0.041	-	-	0.053
HCM Control Delay (s)	19	-	-	11	-	-	13.4
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-	-	0.2

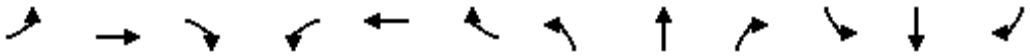
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1875	21	0	1988	46	0	0	23	0	0	70
Future Vol, veh/h	0	1875	21	0	1988	46	0	0	23	0	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2180	24	0	2312	53	0	0	27	0	0	81

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1102	-	-	1183
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	311	0	0	286
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	311	-	-	286
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.7	22.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	311	-	-	-	-	286
HCM Lane V/C Ratio	0.086	-	-	-	-	0.285
HCM Control Delay (s)	17.7	-	-	-	-	22.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	1.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	19	80	994	19	44	36	54	34	3	20
Future Volume (veh/h)	26	958	19	80	994	19	44	36	54	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	20	90	1117	19	49	40	34	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	1717	32	275	1720	29	261	205	138	473	42	56
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	469	3568	66	487	3575	61	497	651	439	1071	134	176
Grp Volume(v), veh/h	29	536	560	90	555	581	123	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1858	487	1777	1859	1588	0	0	1382	0	0
Q Serve(g_s), s	2.4	10.8	10.8	8.1	11.3	11.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	13.7	10.8	10.8	18.9	11.3	11.3	2.5	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.40		0.28	0.81		0.13
Lane Grp Cap(c), veh/h	265	855	894	275	855	895	605	0	0	571	0	0
V/C Ratio(X)	0.11	0.63	0.63	0.33	0.65	0.65	0.20	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	275	893	934	285	893	935	954	0	0	866	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	14.6	9.3	9.3	16.3	9.4	9.4	12.1	0.0	0.0	11.6	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.3	1.3	0.7	1.6	1.5	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.4	6.5	6.7	1.4	6.2	6.5	1.6	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	10.6	10.5	17.0	11.0	10.9	12.3	0.0	0.0	11.6	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1125			1226			123			47	
Approach Delay, s/veh		10.7			11.4			12.3			11.6	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		28.4		19.8		28.4		19.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		15.7		2.9		20.9		4.5				
Green Ext Time (p_c), s		4.8		0.2		2.3		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			11.1									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	5.6

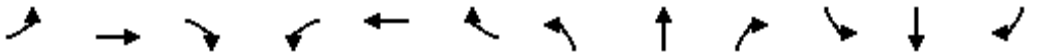
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	51	1814	13	0	1963	77	0	0	3	13	0	70
Future Vol, veh/h	51	1814	13	0	1963	77	0	0	3	13	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	2016	14	0	2181	86	0	0	3	14	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2267	0	0	-	-	0	-	-	1015	3144	-	1134
Stage 1	-	-	-	-	-	-	-	-	-	2224	-	-
Stage 2	-	-	-	-	-	-	-	-	-	920	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	91	-	-	0	-	-	0	0	203	~ 12	0	169
Stage 1	-	-	-	0	-	-	0	0	-	26	0	-
Stage 2	-	-	-	0	-	-	0	0	-	264	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	91	-	-	-	-	-	-	-	203	~ 6	-	169
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 9	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 10	-	-
Stage 2	-	-	-	-	-	-	-	-	-	97	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0	23	208.1
HCM LOS			C	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	203	91	-	-	-	-	9	169
HCM Lane V/C Ratio	0.016	0.623	-	-	-	-	1.605	0.46
HCM Control Delay (s)	23	94.9	-	-	-	-	$ 1095.6	43.3
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	2.9	-	-	-	-	2.7	2.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1621	441	276	1580	170	505	742	264	289	609	214
Future Volume (veh/h)	260	1621	441	276	1580	170	505	742	264	289	609	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	265	1654	280	282	1612	113	515	757	165	295	621	177
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	265	1654	280	282	1612	113	515	757	165	295	621	177
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	31.9	14.6	8.4	30.5	5.1	15.4	12.7	8.6	9.1	16.3	9.9
Cycle Q Clear(g_c), s	8.0	31.9	14.6	8.4	30.5	5.1	15.4	12.7	8.6	9.1	16.3	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	255	1705	520	267	1726	532	490	1385	424	359	818	358
V/C Ratio(X)	1.04	0.97	0.54	1.05	0.93	0.21	1.05	0.55	0.39	0.82	0.76	0.49
Avail Cap(c_a), veh/h	255	1705	520	267	1726	532	490	1721	526	468	1173	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	32.8	27.0	45.8	32.0	23.6	42.3	31.2	29.7	43.4	35.9	33.5
Incr Delay (d2), s/veh	67.4	15.2	1.1	70.2	9.9	0.2	54.6	0.3	0.6	6.8	1.8	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.4	21.1	9.2	10.1	20.1	3.4	15.1	8.8	5.8	6.9	11.4	6.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.5	48.1	28.1	116.0	42.0	23.8	96.9	31.5	30.3	50.2	37.7	34.5
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	C
Approach Vol, veh/h		2199			2007			1437			1093	
Approach Delay, s/veh		53.4			51.3			54.8			40.6	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	28.2	12.6	39.2	15.9	32.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	33.9	17.4	18.3	10.0	32.5	11.1	14.7
Green Ext Time (p_c), s	0.0	0.0	0.0	4.1	0.0	1.1	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	51.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	38	31	1136	19	7	6	42	0	0	27
Future Vol, veh/h	0	1035	38	31	1136	19	7	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1125	41	34	1235	21	8	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1168	0	0	1813	2457	565	-	-	634
Stage 1	-	-	-	-	-	-	1127	1127	-	-	-	-
Stage 2	-	-	-	-	-	-	686	1330	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	594	-	-	49	30	468	0	0	422
Stage 1	0	-	-	-	-	-	218	278	-	0	0	-
Stage 2	0	-	-	-	-	-	404	222	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	593	-	-	44	28	467	-	-	420
Mov Cap-2 Maneuver	-	-	-	-	-	-	142	121	-	-	-	-
Stage 1	-	-	-	-	-	-	218	277	-	-	-	-
Stage 2	-	-	-	-	-	-	354	208	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	20.5	14.2
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	291	-	-	593	-	-	420
HCM Lane V/C Ratio	0.205	-	-	0.057	-	-	0.07
HCM Control Delay (s)	20.5	-	-	11.4	-	-	14.2
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-	-	0.2

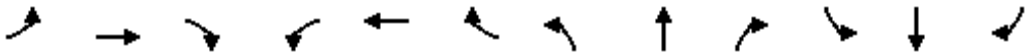
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2011	18	0	2063	55	0	0	27	0	0	60
Future Vol, veh/h	0	2011	18	0	2063	55	0	0	27	0	0	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2095	19	0	2149	57	0	0	28	0	0	63

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1057	-	-	1103
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	266	0	0	251
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	266	-	-	251
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.1	24
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	266	-	-	-	-	251
HCM Lane V/C Ratio	0.106	-	-	-	-	0.249
HCM Control Delay (s)	20.1	-	-	-	-	24
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	7	95	1113	8	15	10	59	27	2	15
Future Volume (veh/h)	24	1080	7	95	1113	8	15	10	59	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	6	96	1124	8	15	10	30	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	396	2088	11	406	2083	15	174	59	116	282	42	55
Arrive On Green	0.58	0.58	0.58	0.58	0.58	0.58	0.13	0.13	0.13	0.13	0.13	0.13
Sat Flow, veh/h	470	3624	20	487	3616	26	287	444	878	779	315	415
Grp Volume(v), veh/h	24	535	562	96	552	580	55	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1867	487	1777	1865	1610	0	0	1510	0	0
Q Serve(g_s), s	1.1	6.1	6.1	5.0	6.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.5	6.1	6.1	11.1	6.4	6.4	1.0	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.27		0.55	0.67		0.27
Lane Grp Cap(c), veh/h	396	1024	1075	406	1024	1074	349	0	0	379	0	0
V/C Ratio(X)	0.06	0.52	0.52	0.24	0.54	0.54	0.16	0.00	0.00	0.11	0.00	0.00
Avail Cap(c_a), veh/h	464	1281	1346	477	1281	1345	1356	0	0	1300	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.7	4.3	4.3	7.7	4.4	4.4	13.1	0.0	0.0	12.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.4	0.4	0.3	0.4	0.4	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	2.0	2.1	0.6	1.4	1.5	0.6	0.0	0.0	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	6.8	4.7	4.7	8.0	4.8	4.8	13.3	0.0	0.0	13.1	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1121			1228			55			40	
Approach Delay, s/veh		4.8			5.1			13.3			13.1	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		24.5		9.0		24.5		9.0				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		9.5		2.7		13.1		3.0				
Green Ext Time (p_c), s		6.9		0.1		6.1		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			5.2									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	53	2006	5	0	2047	84	0	0	7	16	0	71
Future Vol, veh/h	53	2006	5	0	2047	84	0	0	7	16	0	71
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	55	2068	5	0	2110	87	0	0	7	16	0	73

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2202	0	0	-	-	0	-	-	1040	3096	-	1104
Stage 1	-	-	-	-	-	-	-	-	-	2159	-	-
Stage 2	-	-	-	-	-	-	-	-	-	937	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	99	-	-	0	-	-	0	0	195	~ 13	0	177
Stage 1	-	-	-	0	-	-	0	0	-	29	0	-
Stage 2	-	-	-	0	-	-	0	0	-	257	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	99	-	-	-	-	-	-	-	194	~ 7	-	176
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 12	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 13	-	-
Stage 2	-	-	-	-	-	-	-	-	-	110	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2	0	24.3	184.4
HCM LOS			C	F

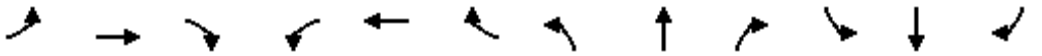
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	194	99	-	-	-	-	12	176
HCM Lane V/C Ratio	0.037	0.552	-	-	-	-	1.375	0.416
HCM Control Delay (s)	24.3	79.1	-	-	-	-	$ 828.2	39.3
HCM Lane LOS	C	F	-	-	-	-	F	E
HCM 95th %tile Q(veh)	0.1	2.5	-	-	-	-	2.8	1.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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APPENDIX 5.11: OPENING YEAR CUMULATIVE (2024) WITHOUT PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	257	1344	357	167	1437	118	410	476	168	209	627	267
Future Volume (veh/h)	257	1344	357	167	1437	118	410	476	168	209	627	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	271	1415	368	176	1513	116	432	501	169	220	660	264
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	181	1845	563	181	1845	571	304	1363	416	286	929	410
Arrive On Green	0.06	0.36	0.36	0.06	0.36	0.36	0.10	0.27	0.27	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	271	1415	368	176	1513	116	432	501	169	220	660	264
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	21.6	17.4	4.9	23.7	4.5	8.4	7.0	7.9	6.0	14.8	13.2
Cycle Q Clear(g_c), s	5.0	21.6	17.4	4.9	23.7	4.5	8.4	7.0	7.9	6.0	14.8	13.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	181	1845	563	181	1845	571	304	1363	416	286	929	410
V/C Ratio(X)	1.50	0.77	0.65	0.97	0.82	0.20	1.42	0.37	0.41	0.77	0.71	0.64
Avail Cap(c_a), veh/h	181	1960	598	181	1960	606	304	1931	589	293	1332	587
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.5	24.8	23.5	41.5	25.5	19.4	39.8	26.2	26.5	39.2	29.5	28.9
Incr Delay (d2), s/veh	251.5	1.8	2.4	58.8	2.8	0.2	208.4	0.2	0.6	10.3	1.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.3	13.0	10.5	6.1	14.9	2.9	19.8	5.0	5.2	4.8	10.3	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	293.0	26.6	25.9	100.3	28.3	19.5	248.3	26.4	27.2	49.5	30.5	30.6
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2054			1805			1102			1144	
Approach Delay, s/veh		61.6			34.7			113.5			34.2	
Approach LOS		E			C			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	37.2	13.0	28.2	9.6	37.2	12.5	28.7
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	6.9	23.6	10.4	16.8	7.0	25.7	8.0	9.9
Green Ext Time (p_c), s	0.0	7.1	0.0	4.9	0.0	6.1	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	57.9
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↔				↱
Traffic Vol, veh/h	0	721	15	15	814	5	6	1	16	0	0	15
Future Vol, veh/h	0	721	15	15	814	5	6	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	819	17	17	925	6	7	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	837	0	0	1317	1789	411	-	-	470
Stage 1	-	-	-	-	-	-	820	820	-	-	-	-
Stage 2	-	-	-	-	-	-	497	969	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	793	-	-	115	80	590	0	0	540
Stage 1	0	-	-	-	-	-	335	387	-	0	0	-
Stage 2	0	-	-	-	-	-	523	330	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	792	-	-	109	78	589	-	-	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	230	196	-	-	-	-
Stage 1	-	-	-	-	-	-	335	387	-	-	-	-
Stage 2	-	-	-	-	-	-	496	322	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	14.8	11.9
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	394	-	-	792	-	-	538
HCM Lane V/C Ratio	0.066	-	-	0.022	-	-	0.032
HCM Control Delay (s)	14.8	-	-	9.6	-	-	11.9
HCM Lane LOS	B	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-	-	0.1

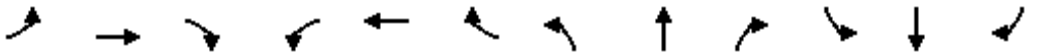
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1768	13	0	1817	19	0	0	36	0	0	22
Future Vol, veh/h	0	1768	13	0	1817	19	0	0	36	0	0	22
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1823	13	0	1873	20	0	0	37	0	0	23

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	921	-	-	947
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	234	0	0	225
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	233	-	-	225
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.4	22.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	233	-	-	-	-	225
HCM Lane V/C Ratio	0.159	-	-	-	-	0.101
HCM Control Delay (s)	23.4	-	-	-	-	22.8
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	96	181	649	10	156	47	33	47	10	13
Future Volume (veh/h)	18	653	96	181	649	10	156	47	33	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	112	213	764	12	184	55	24	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	379	1516	221	339	1751	27	431	121	43	445	93	43
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	658	3099	452	596	3579	56	986	390	138	1021	299	138
Grp Volume(v), veh/h	21	440	440	213	379	397	263	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1774	596	1777	1859	1514	0	0	1458	0	0
Q Serve(g_s), s	1.0	8.2	8.2	15.6	6.7	6.7	5.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	7.8	8.2	8.2	23.8	6.7	6.7	6.8	0.0	0.0	1.6	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.03	0.70		0.09	0.74		0.09
Lane Grp Cap(c), veh/h	379	869	868	339	869	909	594	0	0	580	0	0
V/C Ratio(X)	0.06	0.51	0.51	0.63	0.44	0.44	0.44	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	379	869	868	339	869	909	939	0	0	899	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.6	8.4	8.4	17.3	8.1	8.1	13.9	0.0	0.0	12.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	3.6	0.3	0.3	0.5	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.7	4.7	4.2	3.4	3.6	3.9	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.7	8.9	8.9	21.0	8.4	8.4	14.4	0.0	0.0	12.2	0.0	0.0
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		901			989			263			74	
Approach Delay, s/veh		9.0			11.1			14.4			12.2	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		19.7		29.0		19.7				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.2		3.6		25.8		8.8				
Green Ext Time (p_c), s		5.2		0.4		0.0		1.5				

Intersection Summary												
HCM 6th Ctrl Delay			10.7									
HCM 6th LOS			B									

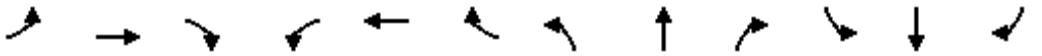
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1762	3	0	1837	0	4
Future Vol, veh/h	0	1762	3	0	1837	0	4
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	1895	3	0	1975	0	4

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1442	0	0	-	-	-	951
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	249	-	-	0	-	0	224
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	249	-	-	-	-	-	224
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	224	249	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-	-
HCM Control Delay (s)	21.4	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	307	1285	338	296	1377	161	398	598	233	282	563	304
Future Volume (veh/h)	307	1285	338	296	1377	161	398	598	233	282	563	304
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	330	1382	221	318	1481	116	428	643	148	303	605	268
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	1628	495	327	1720	529	449	1355	412	362	846	372
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	330	1382	221	318	1481	116	428	643	148	303	605	268
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	25.1	11.2	9.9	26.9	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Cycle Q Clear(g_c), s	8.4	25.1	11.2	9.9	26.9	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	1628	495	327	1720	529	449	1355	412	362	846	372
V/C Ratio(X)	1.23	0.85	0.45	0.97	0.86	0.22	0.95	0.47	0.36	0.84	0.72	0.72
Avail Cap(c_a), veh/h	269	1697	516	327	1789	551	449	1815	551	375	1181	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.4	31.6	26.9	44.4	30.7	23.6	42.3	30.7	29.6	43.1	34.7	34.8
Incr Delay (d2), s/veh	129.9	4.2	0.6	42.1	4.4	0.2	30.6	0.3	0.5	13.9	1.2	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.6	15.7	7.4	9.8	17.2	3.5	11.3	7.6	5.2	7.7	10.9	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	175.4	35.7	27.5	86.5	35.2	23.8	73.0	30.9	30.1	57.0	36.0	37.7
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	D
Approach Vol, veh/h		1933			1915			1219			1176	
Approach Delay, s/veh		58.6			43.0			45.6			41.8	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.1	18.6	28.8	13.0	38.9	15.9	31.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	11.9	27.1	15.3	17.7	10.4	28.9	11.3	12.5
Green Ext Time (p_c), s	0.0	4.3	0.0	4.4	0.0	4.6	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	48.1
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	960	37	23	1071	20	14	1	68	0	0	21
Future Vol, veh/h	0	960	37	23	1071	20	14	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1091	42	26	1217	23	16	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1142	0	0	1761	2395	555	-	-	623
Stage 1	-	-	-	-	-	-	1100	1100	-	-	-	-
Stage 2	-	-	-	-	-	-	661	1295	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	608	-	-	54	33	475	0	0	429
Stage 1	0	-	-	-	-	-	226	286	-	0	0	-
Stage 2	0	-	-	-	-	-	418	231	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	603	-	-	49	31	471	-	-	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	127	-	-	-	-
Stage 1	-	-	-	-	-	-	226	283	-	-	-	-
Stage 2	-	-	-	-	-	-	378	220	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	19.7	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	338	-	-	603	-	-	428
HCM Lane V/C Ratio	0.279	-	-	0.043	-	-	0.056
HCM Control Delay (s)	19.7	-	-	11.2	-	-	13.9
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.1	-	-	0.1	-	-	0.2

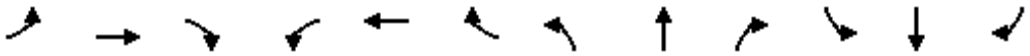
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1824	21	0	1936	35	0	0	23	0	0	57
Future Vol, veh/h	0	1824	21	0	1936	35	0	0	23	0	0	57
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2121	24	0	2251	41	0	0	27	0	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1073	-	-	1146
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	321	0	0	297
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	321	-	-	297
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.2	20.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	321	-	-	-	-	297
HCM Lane V/C Ratio	0.083	-	-	-	-	0.223
HCM Control Delay (s)	17.2	-	-	-	-	20.6
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.8



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	66	143	994	19	104	36	64	34	3	20
Future Volume (veh/h)	26	958	66	143	994	19	104	36	64	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	73	161	1117	19	117	40	45	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1627	110	254	1724	29	368	127	109	482	43	58
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	469	3374	229	463	3575	61	788	393	339	1093	133	179
Grp Volume(v), veh/h	29	566	583	161	555	581	202	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1826	463	1777	1859	1520	0	0	1406	0	0
Q Serve(g_s), s	2.5	12.2	12.2	12.0	11.8	11.8	3.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.3	12.2	12.2	24.2	11.8	11.8	5.0	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.03	0.58		0.22	0.81		0.13
Lane Grp Cap(c), veh/h	259	857	881	254	857	896	603	0	0	583	0	0
V/C Ratio(X)	0.11	0.66	0.66	0.63	0.65	0.65	0.33	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	259	857	881	254	857	896	896	0	0	839	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.2	9.9	9.9	21.0	9.8	9.8	13.1	0.0	0.0	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.9	1.9	5.0	1.7	1.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	7.6	7.8	3.8	6.7	7.0	2.9	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	11.8	11.7	26.0	11.5	11.4	13.5	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1178			1297			202			47	
Approach Delay, s/veh		11.8			13.3			13.5			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.8		29.4		20.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		16.3		3.0		26.2		7.0				
Green Ext Time (p_c), s		4.7		0.2		0.0		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			12.6									
HCM 6th LOS			B									

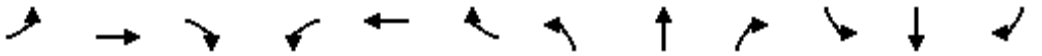
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1814	13	0	1971	0	3
Future Vol, veh/h	0	1814	13	0	1971	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2016	14	0	2190	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1599	0	0	-	-	-	1015
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	203	-	-	0	-	0	203
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	203	-	-	-	-	-	203
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	23
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	203	203	-	-	-
HCM Lane V/C Ratio	0.016	-	-	-	-
HCM Control Delay (s)	23	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	303	1573	441	274	1519	170	505	742	261	289	609	271
Future Volume (veh/h)	303	1573	441	274	1519	170	505	742	261	289	609	271
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	309	1605	280	280	1550	113	515	757	162	295	621	236
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	254	1699	518	267	1719	530	490	1393	426	359	823	360
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	309	1605	280	280	1550	113	515	757	162	295	621	236
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	30.6	14.6	8.4	28.9	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Cycle Q Clear(g_c), s	8.0	30.6	14.6	8.4	28.9	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	254	1699	518	267	1719	530	490	1393	426	359	823	360
V/C Ratio(X)	1.21	0.94	0.54	1.05	0.90	0.21	1.05	0.54	0.38	0.82	0.75	0.66
Avail Cap(c_a), veh/h	254	1704	520	267	1724	532	490	1719	526	467	1172	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	32.5	27.2	45.8	31.6	23.7	42.3	31.1	29.5	43.4	35.8	34.8
Incr Delay (d2), s/veh	127.0	11.3	1.1	68.3	7.0	0.2	54.9	0.3	0.6	6.9	1.7	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.8	19.7	9.2	10.0	18.7	3.4	15.1	8.8	5.7	6.9	11.4	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	173.1	43.8	28.3	114.1	38.6	23.9	97.3	31.4	30.1	50.3	37.5	36.9
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	D
Approach Vol, veh/h		2194			1943			1434			1152	
Approach Delay, s/veh		60.0			48.6			54.9			40.7	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.7	20.0	28.4	12.6	39.1	15.9	32.5
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	32.6	17.4	18.3	10.0	30.9	11.1	14.7
Green Ext Time (p_c), s	0.0	0.7	0.0	4.3	0.0	2.4	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	52.3
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1078	33	31	1193	19	5	6	42	0	0	27
Future Vol, veh/h	0	1078	33	31	1193	19	5	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1172	36	34	1297	21	5	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1210	0	0	1891	2566	588	-	-	665
Stage 1	-	-	-	-	-	-	1174	1174	-	-	-	-
Stage 2	-	-	-	-	-	-	717	1392	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	572	-	-	43	26	452	0	0	403
Stage 1	0	-	-	-	-	-	204	264	-	0	0	-
Stage 2	0	-	-	-	-	-	387	207	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	571	-	-	38	24	451	-	-	401
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	112	-	-	-	-
Stage 1	-	-	-	-	-	-	204	263	-	-	-	-
Stage 2	-	-	-	-	-	-	337	193	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	20.7	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	287	-	-	571	-	-	401
HCM Lane V/C Ratio	0.201	-	-	0.059	-	-	0.073
HCM Control Delay (s)	20.7	-	-	11.7	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-	-	0.2

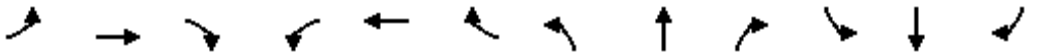
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1958	18	0	2017	37	0	0	27	0	0	42
Future Vol, veh/h	0	1958	18	0	2017	37	0	0	27	0	0	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2040	19	0	2101	39	0	0	28	0	0	44

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1030	-	-	1070
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	274	0	0	261
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	274	-	-	261
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.6	21.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	274	-	-	-	-	261
HCM Lane V/C Ratio	0.103	-	-	-	-	0.168
HCM Control Delay (s)	19.6	-	-	-	-	21.6
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	0.6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	50	155	1113	8	72	10	69	27	2	15
Future Volume (veh/h)	24	1080	50	155	1113	8	72	10	69	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	50	157	1124	8	73	10	40	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	352	1985	91	348	2075	15	278	57	95	318	42	82
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	470	3460	159	467	3616	26	734	298	497	907	220	427
Grp Volume(v), veh/h	24	560	581	157	552	580	123	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1841	467	1777	1865	1529	0	0	1554	0	0
Q Serve(g_s), s	1.4	8.2	8.2	13.2	8.0	8.0	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.4	8.2	8.2	21.4	8.0	8.0	2.8	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.59		0.33	0.67		0.27
Lane Grp Cap(c), veh/h	352	1020	1057	348	1020	1070	431	0	0	442	0	0
V/C Ratio(X)	0.07	0.55	0.55	0.45	0.54	0.54	0.29	0.00	0.00	0.09	0.00	0.00
Avail Cap(c_a), veh/h	353	1027	1064	350	1027	1078	1067	0	0	1054	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.4	5.6	5.6	12.2	5.5	5.5	14.7	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.9	0.6	0.5	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.7	3.8	1.9	3.0	3.1	1.7	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.5	6.2	6.1	13.1	6.1	6.1	15.1	0.0	0.0	14.1	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1165			1289			123			40	
Approach Delay, s/veh		6.2			6.9			15.1			14.1	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.2		12.6		29.2		12.6				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		11.4		2.8		23.4		4.8				
Green Ext Time (p_c), s		6.6		0.1		0.6		0.6				

Intersection Summary												
HCM 6th Ctrl Delay			7.1									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2006	5	0	2054	0	7
Future Vol, veh/h	0	2006	5	0	2054	0	7
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2068	5	0	2118	0	7

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1546	0	0	-	-	-	1040
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	217	-	-	0	-	0	195
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	217	-	-	-	-	-	194
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

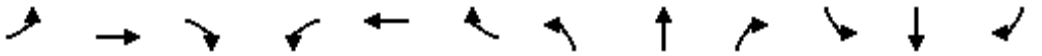
Approach	EB	WB	NB
HCM Control Delay, s	0	0	24.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	194	217	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-	-
HCM Control Delay (s)	24.3	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

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APPENDIX 5.12: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	260	1347	357	173	1450	118	410	479	168	209	627	267
Future Volume (veh/h)	260	1347	357	173	1450	118	410	479	168	209	627	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	274	1418	368	182	1526	116	432	504	169	220	660	264
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	180	1850	564	180	1850	572	303	1362	415	286	929	410
Arrive On Green	0.06	0.36	0.36	0.06	0.36	0.36	0.10	0.27	0.27	0.09	0.26	0.26
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1567
Grp Volume(v), veh/h	274	1418	368	182	1526	116	432	504	169	220	660	264
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1567
Q Serve(g_s), s	5.0	21.6	17.4	5.0	24.0	4.5	8.4	7.1	7.9	6.0	14.9	13.2
Cycle Q Clear(g_c), s	5.0	21.6	17.4	5.0	24.0	4.5	8.4	7.1	7.9	6.0	14.9	13.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	180	1850	564	180	1850	572	303	1362	415	286	929	410
V/C Ratio(X)	1.52	0.77	0.65	1.01	0.82	0.20	1.43	0.37	0.41	0.77	0.71	0.64
Avail Cap(c_a), veh/h	180	1956	597	180	1956	605	303	1928	588	292	1329	586
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	24.8	23.5	41.6	25.6	19.4	39.9	26.3	26.6	39.2	29.6	28.9
Incr Delay (d2), s/veh	259.7	1.8	2.4	69.3	2.9	0.2	209.6	0.2	0.6	10.4	1.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.6	13.1	10.5	6.6	15.1	2.9	19.8	5.0	5.2	4.8	10.3	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	301.3	26.6	25.8	110.9	28.5	19.5	249.5	26.5	27.2	49.6	30.6	30.6
LnGrp LOS	F	C	C	F	C	B	F	C	C	D	C	C
Approach Vol, veh/h		2060			1824			1105			1144	
Approach Delay, s/veh		63.0			36.1			113.8			34.3	
Approach LOS		E			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	37.4	13.0	28.3	9.6	37.4	12.5	28.7
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	23.6	10.4	16.9	7.0	26.0	8.0	9.9
Green Ext Time (p_c), s	0.0	7.0	0.0	4.9	0.0	5.9	0.0	4.0

Intersection Summary	
HCM 6th Ctrl Delay	58.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↕				↱
Traffic Vol, veh/h	0	721	27	15	814	5	12	1	16	0	0	15
Future Vol, veh/h	0	721	27	15	814	5	12	1	16	0	0	15
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	819	31	17	925	6	14	1	18	0	0	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	851	0	0	1317	1789	411	-	-	470
Stage 1	-	-	-	-	-	-	820	820	-	-	-	-
Stage 2	-	-	-	-	-	-	497	969	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	783	-	-	115	80	590	0	0	540
Stage 1	0	-	-	-	-	-	335	387	-	0	0	-
Stage 2	0	-	-	-	-	-	523	330	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	782	-	-	109	78	589	-	-	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	230	195	-	-	-	-
Stage 1	-	-	-	-	-	-	335	387	-	-	-	-
Stage 2	-	-	-	-	-	-	495	321	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.6	11.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	343	-	-	782	-	-	538
HCM Lane V/C Ratio	0.096	-	-	0.022	-	-	0.032
HCM Control Delay (s)	16.6	-	-	9.7	-	-	11.9
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

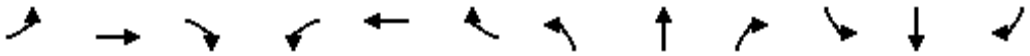
Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1771	13	0	1775	71	0	0	36	0	0	83
Future Vol, veh/h	0	1771	13	0	1775	71	0	0	36	0	0	83
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1826	13	0	1830	73	0	0	37	0	0	86

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	923	-	-	952
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	233	0	0	223
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	232	-	-	223
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.5	30.9
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	232	-	-	-	-	223
HCM Lane V/C Ratio	0.16	-	-	-	-	0.384
HCM Control Delay (s)	23.5	-	-	-	-	30.9
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.6	-	-	-	-	1.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	653	96	193	649	10	156	47	50	47	10	13
Future Volume (veh/h)	18	653	96	193	649	10	156	47	50	47	10	13
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	21	768	112	227	764	12	184	55	44	55	12	7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	371	1496	218	332	1728	27	408	119	75	444	93	43
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	658	3099	452	596	3579	56	904	375	235	996	291	134
Grp Volume(v), veh/h	21	440	440	227	379	397	283	0	0	74	0	0
Grp Sat Flow(s),veh/h/ln	658	1777	1774	596	1777	1859	1514	0	0	1421	0	0
Q Serve(g_s), s	1.1	8.4	8.4	15.4	6.9	6.9	5.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.0	8.4	8.4	23.8	6.9	6.9	7.5	0.0	0.0	1.6	0.0	0.0
Prop In Lane	1.00		0.25	1.00		0.03	0.65		0.16	0.74		0.09
Lane Grp Cap(c), veh/h	371	858	856	332	858	897	603	0	0	580	0	0
V/C Ratio(X)	0.06	0.51	0.51	0.68	0.44	0.44	0.47	0.00	0.00	0.13	0.00	0.00
Avail Cap(c_a), veh/h	371	858	856	332	858	897	924	0	0	873	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.0	8.8	8.8	18.3	8.4	8.4	13.9	0.0	0.0	12.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.5	0.5	5.7	0.4	0.3	0.6	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.9	4.9	5.1	3.6	3.7	4.3	0.0	0.0	1.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.1	9.3	9.3	24.0	8.7	8.7	14.5	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		901			1003			283			74	
Approach Delay, s/veh		9.3			12.2			14.5			12.1	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		20.3		29.0		20.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.4		3.6		25.8		9.5				
Green Ext Time (p_c), s		5.1		0.4		0.0		1.6				

Intersection Summary												
HCM 6th Ctrl Delay			11.3									
HCM 6th LOS			B									

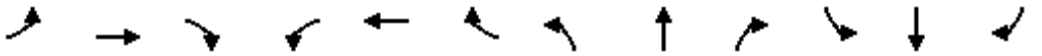
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1765	3	0	1847	0	4
Future Vol, veh/h	0	1765	3	0	1847	0	4
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	1898	3	0	1986	0	4

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1450	0	0	-	-	-	953
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	246	-	-	0	-	0	223
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	246	-	-	-	-	-	223
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	21.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	223	246	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-	-
HCM Control Delay (s)	21.5	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	308	1286	338	297	1380	161	398	599	233	282	563	304
Future Volume (veh/h)	308	1286	338	297	1380	161	398	599	233	282	563	304
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	331	1383	221	319	1484	116	428	644	148	303	605	268
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	269	1629	495	327	1721	530	449	1355	412	362	846	372
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.27	0.27	0.11	0.24	0.24
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1551	3183	3554	1563
Grp Volume(v), veh/h	331	1383	221	319	1484	116	428	644	148	303	605	268
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1551	1591	1777	1563
Q Serve(g_s), s	8.4	25.1	11.2	9.9	27.0	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Cycle Q Clear(g_c), s	8.4	25.1	11.2	9.9	27.0	5.2	13.3	10.5	7.7	9.3	15.5	15.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	269	1629	495	327	1721	530	449	1355	412	362	846	372
V/C Ratio(X)	1.23	0.85	0.45	0.98	0.86	0.22	0.95	0.48	0.36	0.84	0.72	0.72
Avail Cap(c_a), veh/h	269	1696	516	327	1789	550	449	1815	551	375	1181	519
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.5	31.6	26.9	44.4	30.8	23.6	42.3	30.7	29.6	43.1	34.8	34.8
Incr Delay (d2), s/veh	131.5	4.2	0.6	43.0	4.5	0.2	30.7	0.3	0.5	13.9	1.2	2.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.7	15.7	7.4	9.8	17.2	3.5	11.3	7.6	5.2	7.7	10.9	10.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	177.0	35.8	27.5	87.4	35.2	23.8	73.1	30.9	30.2	57.0	36.0	37.7
LnGrp LOS	F	D	C	F	D	C	E	C	C	E	D	D
Approach Vol, veh/h		1935			1919			1220			1176	
Approach Delay, s/veh		59.0			43.2			45.6			41.8	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	37.1	18.6	28.8	13.0	38.9	15.9	31.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	11.9	27.1	15.3	17.7	10.4	29.0	11.3	12.5
Green Ext Time (p_c), s	0.0	4.2	0.0	4.4	0.0	4.5	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	48.3
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑↳			↕				↱
Traffic Vol, veh/h	0	960	41	23	1071	20	15	1	68	0	0	21
Future Vol, veh/h	0	960	41	23	1071	20	15	1	68	0	0	21
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1091	47	26	1217	23	17	1	77	0	0	24

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1147	0	0	1761	2395	555	-	-	623
Stage 1	-	-	-	-	-	-	1100	1100	-	-	-	-
Stage 2	-	-	-	-	-	-	661	1295	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	605	-	-	54	33	475	0	0	429
Stage 1	0	-	-	-	-	-	226	286	-	0	0	-
Stage 2	0	-	-	-	-	-	418	231	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	600	-	-	49	31	471	-	-	428
Mov Cap-2 Maneuver	-	-	-	-	-	-	150	127	-	-	-	-
Stage 1	-	-	-	-	-	-	226	283	-	-	-	-
Stage 2	-	-	-	-	-	-	378	220	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	20.1	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	333	-	-	600	-	-	428
HCM Lane V/C Ratio	0.287	-	-	0.044	-	-	0.056
HCM Control Delay (s)	20.1	-	-	11.3	-	-	13.9
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.2	-	-	0.1	-	-	0.2

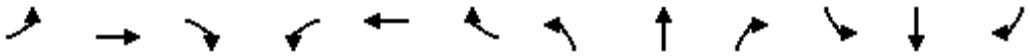
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1825	21	0	1917	58	0	0	23	0	0	80
Future Vol, veh/h	0	1825	21	0	1917	58	0	0	23	0	0	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2122	24	0	2229	67	0	0	27	0	0	93

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1073	-	-	1148
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	321	0	0	297
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	321	-	-	297
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	17.2	22.6
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	321	-	-	-	-	297
HCM Lane V/C Ratio	0.083	-	-	-	-	0.313
HCM Control Delay (s)	17.2	-	-	-	-	22.6
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	1.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	958	66	147	994	19	104	36	68	34	3	20
Future Volume (veh/h)	26	958	66	147	994	19	104	36	68	34	3	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	29	1076	73	165	1117	19	117	40	49	38	3	6
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1626	110	254	1723	29	361	126	117	481	43	58
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	469	3374	229	463	3575	61	770	389	361	1088	132	179
Grp Volume(v), veh/h	29	566	583	165	555	581	206	0	0	47	0	0
Grp Sat Flow(s),veh/h/ln	469	1777	1826	463	1777	1859	1520	0	0	1399	0	0
Q Serve(g_s), s	2.5	12.2	12.2	12.0	11.8	11.8	3.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	14.3	12.2	12.2	24.2	11.8	11.8	5.1	0.0	0.0	1.0	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.03	0.57		0.24	0.81		0.13
Lane Grp Cap(c), veh/h	259	856	880	254	856	896	603	0	0	581	0	0
V/C Ratio(X)	0.11	0.66	0.66	0.65	0.65	0.65	0.34	0.00	0.00	0.08	0.00	0.00
Avail Cap(c_a), veh/h	259	856	880	254	856	896	894	0	0	836	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	15.2	9.9	9.9	21.1	9.8	9.8	13.2	0.0	0.0	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.2	1.9	1.9	5.7	1.7	1.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.5	7.6	7.8	3.9	6.7	7.0	3.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	11.8	11.8	26.8	11.5	11.4	13.5	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1178			1301			206			47	
Approach Delay, s/veh		11.9			13.4			13.5			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.8		29.4		20.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		16.3		3.0		26.2		7.1				
Green Ext Time (p_c), s		4.7		0.2		0.0		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			12.7									
HCM 6th LOS			B									

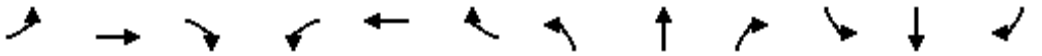
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1815	13	0	1974	0	3
Future Vol, veh/h	0	1815	13	0	1974	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2017	14	0	2193	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1601	0	0	-	-	-	1016
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	203	-	-	0	-	0	202
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	203	-	-	-	-	-	202
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	23.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	202	203	-	-	-
HCM Lane V/C Ratio	0.017	-	-	-	-
HCM Control Delay (s)	23.1	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	306	1576	441	276	1523	170	505	745	261	289	609	271
Future Volume (veh/h)	306	1576	441	276	1523	170	505	745	261	289	609	271
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	312	1608	280	282	1554	113	515	760	162	295	621	236
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	254	1699	519	267	1720	531	490	1393	426	359	823	360
Arrive On Green	0.08	0.33	0.33	0.08	0.34	0.34	0.15	0.27	0.27	0.11	0.23	0.23
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1561	3183	3554	1555
Grp Volume(v), veh/h	312	1608	280	282	1554	113	515	760	162	295	621	236
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1561	1591	1777	1555
Q Serve(g_s), s	8.0	30.7	14.6	8.4	29.0	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Cycle Q Clear(g_c), s	8.0	30.7	14.6	8.4	29.0	5.1	15.4	12.7	8.4	9.1	16.3	13.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	254	1699	519	267	1720	531	490	1393	426	359	823	360
V/C Ratio(X)	1.23	0.95	0.54	1.06	0.90	0.21	1.05	0.55	0.38	0.82	0.75	0.66
Avail Cap(c_a), veh/h	254	1704	520	267	1724	532	490	1719	526	467	1171	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.1	32.5	27.2	45.9	31.6	23.7	42.4	31.1	29.5	43.4	35.8	34.8
Incr Delay (d2), s/veh	131.6	11.5	1.1	70.5	7.1	0.2	55.0	0.3	0.6	6.9	1.7	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.1	19.8	9.2	10.1	18.8	3.4	15.1	8.8	5.7	6.9	11.4	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	177.7	44.0	28.3	116.4	38.8	23.9	97.3	31.4	30.1	50.3	37.5	36.9
LnGrp LOS	F	D	C	F	D	C	F	C	C	D	D	D
Approach Vol, veh/h		2200			1949			1437			1152	
Approach Delay, s/veh		61.0			49.1			54.9			40.7	
Approach LOS		E			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.7	20.0	28.4	12.6	39.1	15.9	32.5
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	32.7	17.4	18.3	10.0	31.0	11.1	14.7
Green Ext Time (p_c), s	0.0	0.6	0.0	4.3	0.0	2.3	0.2	5.5

Intersection Summary	
HCM 6th Ctrl Delay	52.8
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1078	44	31	1193	19	7	6	42	0	0	27
Future Vol, veh/h	0	1078	44	31	1193	19	7	6	42	0	0	27
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1172	48	34	1297	21	8	7	46	0	0	29

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1222	0	0	1891	2566	588	-	-	665
Stage 1	-	-	-	-	-	-	1174	1174	-	-	-	-
Stage 2	-	-	-	-	-	-	717	1392	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	566	-	-	43	26	452	0	0	403
Stage 1	0	-	-	-	-	-	204	264	-	0	0	-
Stage 2	0	-	-	-	-	-	387	207	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	565	-	-	38	24	451	-	-	401
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	112	-	-	-	-
Stage 1	-	-	-	-	-	-	204	263	-	-	-	-
Stage 2	-	-	-	-	-	-	337	193	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	21.7	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	275	-	-	565	-	-	401
HCM Lane V/C Ratio	0.217	-	-	0.06	-	-	0.073
HCM Control Delay (s)	21.7	-	-	11.8	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.8	-	-	0.2	-	-	0.2

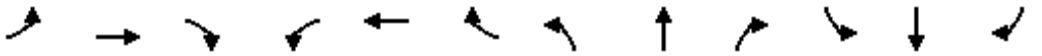
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1961	18	0	1992	72	0	0	27	0	0	73
Future Vol, veh/h	0	1961	18	0	1992	72	0	0	27	0	0	73
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2043	19	0	2075	75	0	0	28	0	0	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1031	-	-	1075
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	274	0	0	260
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	274	-	-	260
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.6	24.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	274	-	-	-	-	260
HCM Lane V/C Ratio	0.103	-	-	-	-	0.292
HCM Control Delay (s)	19.6	-	-	-	-	24.5
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.3	-	-	-	-	1.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	1080	50	166	1113	8	72	10	75	27	2	15
Future Volume (veh/h)	24	1080	50	166	1113	8	72	10	75	27	2	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	24	1091	50	168	1124	8	73	10	46	27	2	11
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	349	1983	91	346	2072	15	268	58	107	320	42	83
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	470	3460	159	467	3616	26	689	298	547	910	217	428
Grp Volume(v), veh/h	24	560	581	168	552	580	129	0	0	40	0	0
Grp Sat Flow(s),veh/h/ln	470	1777	1841	467	1777	1865	1535	0	0	1555	0	0
Q Serve(g_s), s	1.4	8.3	8.3	14.8	8.1	8.1	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.5	8.3	8.3	23.1	8.1	8.1	2.9	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.57		0.36	0.67		0.27
Lane Grp Cap(c), veh/h	349	1018	1055	346	1018	1069	433	0	0	446	0	0
V/C Ratio(X)	0.07	0.55	0.55	0.49	0.54	0.54	0.30	0.00	0.00	0.09	0.00	0.00
Avail Cap(c_a), veh/h	349	1018	1055	346	1018	1069	1058	0	0	1044	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.5	5.6	5.6	12.8	5.6	5.6	14.8	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	1.1	0.6	0.6	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.8	3.9	2.2	3.1	3.2	1.8	0.0	0.0	0.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.6	6.3	6.2	13.9	6.2	6.1	15.2	0.0	0.0	14.1	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1165			1300			129			40	
Approach Delay, s/veh		6.3			7.2			15.2			14.1	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		12.8		29.4		12.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		11.5		2.8		25.1		4.9				
Green Ext Time (p_c), s		6.6		0.1		0.0		0.7				

Intersection Summary												
HCM 6th Ctrl Delay			7.3									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2009	5	0	2063	0	7
Future Vol, veh/h	0	2009	5	0	2063	0	7
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2071	5	0	2127	0	7

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1553	0	0	-	-	-	1041
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	216	-	-	0	-	0	195
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	216	-	-	-	-	-	194
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	24.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	194	216	-	-	-
HCM Lane V/C Ratio	0.037	-	-	-	-
HCM Control Delay (s)	24.3	0	-	-	-
HCM Lane LOS	C	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

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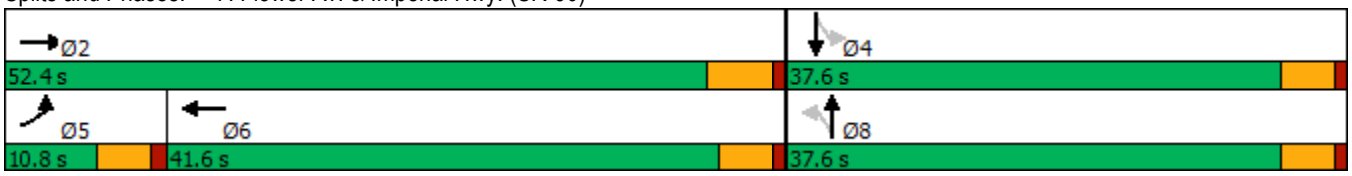
APPENDIX 5.13: OPENING YEAR CUMULATIVE (2024) WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS WITH IMPROVEMENTS

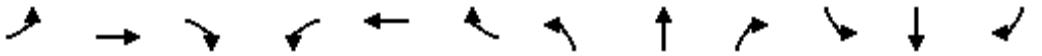
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Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	92	1762	1823	0	13	0
Future Volume (vph)	92	1762	1823	0	13	0
Turn Type	Prot	NA	NA	NA	Perm	NA
Protected Phases	5	2	6	8		4
Permitted Phases					4	
Detector Phase	5	2	6	8	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	27.4	26.6	26.6	37.6	37.6
Total Split (s)	10.8	52.4	41.6	37.6	37.6	37.6
Total Split (%)	12.0%	58.2%	46.2%	41.8%	41.8%	41.8%
Yellow Time (s)	3.6	4.4	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	4.6	4.6	4.6	4.6
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	6.4	49.8	38.1	9.9	13.8	13.8
Actuated g/C Ratio	0.09	0.72	0.55	0.14	0.20	0.20
v/c Ratio	0.60	0.51	0.76	0.01	0.05	0.23
Control Delay	51.8	7.8	17.1	0.0	21.8	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.8	7.8	17.1	0.0	21.8	2.2
LOS	D	A	B	A	C	A
Approach Delay		10.0	17.1			4.5
Approach LOS		B	B			A

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 68.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 13.4	Intersection LOS: B
Intersection Capacity Utilization 63.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Flower Av. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	92	1762	3	0	1823	149	0	0	4	13	0	97
Future Volume (veh/h)	92	1762	3	0	1823	149	0	0	4	13	0	97
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	0	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	99	1895	3	0	1960	160	0	0	4	14	0	104
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	2	2
Cap, veh/h	127	3670	6	0	2648	215	0	0	223	312	0	223
Arrive On Green	0.07	0.70	0.70	0.00	0.55	0.55	0.00	0.00	0.14	0.14	0.00	0.14
Sat Flow, veh/h	1781	5265	8	0	4971	390	0	0	1585	1412	0	1585
Grp Volume(v), veh/h	99	1225	673	0	1386	734	0	0	4	14	0	104
Grp Sat Flow(s),veh/h/ln	1781	1702	1869	0	1702	1788	0	0	1585	1412	0	1585
Q Serve(g_s), s	3.4	10.5	10.5	0.0	19.0	19.3	0.0	0.0	0.1	0.5	0.0	3.7
Cycle Q Clear(g_c), s	3.4	10.5	10.5	0.0	19.0	19.3	0.0	0.0	0.1	0.7	0.0	3.7
Prop In Lane	1.00		0.00	0.00		0.22	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	127	2373	1303	0	1877	986	0	0	223	312	0	223
V/C Ratio(X)	0.78	0.52	0.52	0.00	0.74	0.74	0.00	0.00	0.02	0.04	0.00	0.47
Avail Cap(c_a), veh/h	179	2594	1424	0	2042	1073	0	0	848	869	0	848
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.2	4.4	4.4	0.0	10.5	10.5	0.0	0.0	22.8	23.1	0.0	24.4
Incr Delay (d2), s/veh	8.3	0.2	0.3	0.0	1.3	2.6	0.0	0.0	0.0	0.1	0.0	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	3.0	4.5	5.0	0.0	10.3	11.3	0.0	0.0	0.1	0.3	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.4	4.6	4.7	0.0	11.8	13.2	0.0	0.0	22.9	23.2	0.0	25.9
LnGrp LOS	D	A	A	A	B	B	A	A	C	C	A	C
Approach Vol, veh/h		1997			2120			4			118	
Approach Delay, s/veh		6.2			12.3			22.9			25.6	
Approach LOS		A			B			C			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		48.4		13.3	9.0	39.4		13.3				
Change Period (Y+Rc), s		5.4		4.6	4.6	* 5.4		4.6				
Max Green Setting (Gmax), s		47.0		33.0	6.2	* 37		33.0				
Max Q Clear Time (g_c+I1), s		12.5		5.7	5.4	21.3		2.1				
Green Ext Time (p_c), s		20.2		0.6	0.0	12.7		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			9.8									
HCM 6th LOS			A									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1762	3	0	1823	149	0	0	4	0	0	97
Future Vol, veh/h	0	1762	3	0	1823	149	0	0	4	0	0	97
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1895	3	0	1960	160	0	0	4	0	0	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	951	-	-	1065
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	224	0	0	188
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	224	-	-	187
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	21.4	46.1
HCM LOS			C	E

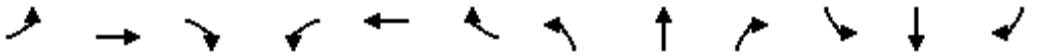
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	224	-	-	-	-	187
HCM Lane V/C Ratio	0.019	-	-	-	-	0.558
HCM Control Delay (s)	21.4	-	-	-	-	46.1
HCM Lane LOS	C	-	-	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	-	2.9

Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	51	1814	1963	0	13	0
Future Volume (vph)	51	1814	1963	0	13	0
Turn Type	Prot	NA	NA	NA	Perm	NA
Protected Phases	5	2	6	8		4
Permitted Phases					4	
Detector Phase	5	2	6	8	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.6	27.4	27.4	14.6	37.6	37.6
Total Split (s)	9.8	52.4	42.6	37.6	37.6	37.6
Total Split (%)	10.9%	58.2%	47.3%	41.8%	41.8%	41.8%
Yellow Time (s)	3.6	4.4	4.4	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	4.6	4.6
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	5.4	48.4	43.0	14.0	14.0	14.0
Actuated g/C Ratio	0.08	0.73	0.64	0.21	0.21	0.21
v/c Ratio	0.40	0.55	0.69	0.01	0.05	0.18
Control Delay	43.7	8.3	15.4	0.0	21.8	1.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	8.3	15.4	0.0	21.8	1.6
LOS	D	A	B	A	C	A
Approach Delay		9.3	15.4			4.7
Approach LOS		A	B			A

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 66.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 12.3	Intersection LOS: B
Intersection Capacity Utilization 59.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Flower Av. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	1814	13	0	1963	77	0	0	3	13	0	70
Future Volume (veh/h)	51	1814	13	0	1963	77	0	0	3	13	0	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	0	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	57	2016	14	0	2181	86	0	0	3	14	0	78
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	2	2
Cap, veh/h	91	3682	26	0	2906	114	0	0	207	301	0	207
Arrive On Green	0.05	0.70	0.70	0.00	0.58	0.58	0.00	0.00	0.13	0.13	0.00	0.13
Sat Flow, veh/h	1781	5232	36	0	5209	198	0	0	1585	1414	0	1585
Grp Volume(v), veh/h	57	1312	718	0	1470	797	0	0	3	14	0	78
Grp Sat Flow(s),veh/h/ln	1781	1702	1864	0	1702	1835	0	0	1585	1414	0	1585
Q Serve(g_s), s	1.9	11.2	11.2	0.0	19.4	19.6	0.0	0.0	0.1	0.5	0.0	2.7
Cycle Q Clear(g_c), s	1.9	11.2	11.2	0.0	19.4	19.6	0.0	0.0	0.1	0.6	0.0	2.7
Prop In Lane	1.00		0.02	0.00		0.11	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	91	2396	1312	0	1963	1058	0	0	207	301	0	207
V/C Ratio(X)	0.63	0.55	0.55	0.00	0.75	0.75	0.00	0.00	0.01	0.05	0.00	0.38
Avail Cap(c_a), veh/h	154	2653	1453	0	2100	1132	0	0	867	891	0	867
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.0	4.3	4.3	0.0	9.5	9.6	0.0	0.0	22.8	23.1	0.0	24.0
Incr Delay (d2), s/veh	2.6	0.2	0.4	0.0	1.4	2.7	0.0	0.0	0.0	0.1	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	4.5	5.1	0.0	10.2	11.4	0.0	0.0	0.1	0.3	0.0	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.7	4.5	4.7	0.0	10.9	12.3	0.0	0.0	22.9	23.2	0.0	25.1
LnGrp LOS	C	A	A	A	B	B	A	A	C	C	A	C
Approach Vol, veh/h		2087			2267			3			92	
Approach Delay, s/veh		5.3			11.4			22.9			24.8	
Approach LOS		A			B			C			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		47.8		12.5	7.7	40.2		12.5				
Change Period (Y+Rc), s		5.4		4.6	4.6	5.4		4.6				
Max Green Setting (Gmax), s		47.0		33.0	5.2	37.2		33.0				
Max Q Clear Time (g_c+I1), s		13.2		4.7	3.9	21.6		2.1				
Green Ext Time (p_c), s		21.7		0.4	0.0	13.2		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1814	13	0	1963	77	0	0	3	0	0	70
Future Vol, veh/h	0	1814	13	0	1963	77	0	0	3	0	0	70
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2016	14	0	2181	86	0	0	3	0	0	78

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1015	-	-	1134
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	203	0	0	169
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	203	-	-	169
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23	43.3
HCM LOS			C	E

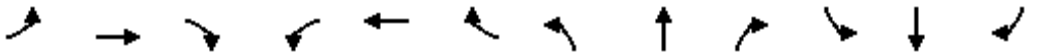
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	203	-	-	-	-	169
HCM Lane V/C Ratio	0.016	-	-	-	-	0.46
HCM Control Delay (s)	23	-	-	-	-	43.3
HCM Lane LOS	C	-	-	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	-	2.2

Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	53	2006	2047	0	16	0
Future Volume (vph)	53	2006	2047	0	16	0
Turn Type	Prot	NA	NA	NA	Perm	NA
Protected Phases	5	2	6	8		4
Permitted Phases					4	
Detector Phase	5	2	6	8	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.6	27.4	27.4	14.6	37.6	37.6
Total Split (s)	10.0	52.4	42.4	37.6	37.6	37.6
Total Split (%)	11.1%	58.2%	47.1%	41.8%	41.8%	41.8%
Yellow Time (s)	3.6	4.4	4.4	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	4.6	4.6
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	5.6	48.4	42.9	14.0	14.0	14.0
Actuated g/C Ratio	0.08	0.73	0.64	0.21	0.21	0.21
v/c Ratio	0.37	0.56	0.68	0.02	0.05	0.16
Control Delay	42.3	8.4	15.1	0.1	22.0	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.3	8.4	15.1	0.1	22.0	0.9
LOS	D	A	B	A	C	A
Approach Delay		9.3	15.1	0.1		4.7
Approach LOS		A	B	A		A

Intersection Summary	
Cycle Length: 90	
Actuated Cycle Length: 66.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 60.7%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: Flower Av. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	2006	5	0	2047	84	0	0	7	16	0	71
Future Volume (veh/h)	53	2006	5	0	2047	84	0	0	7	16	0	71
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	0	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	55	2068	5	0	2110	87	0	0	7	16	0	73
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	2	2
Cap, veh/h	89	3690	9	0	2883	118	0	0	206	299	0	206
Arrive On Green	0.05	0.70	0.70	0.00	0.57	0.57	0.00	0.00	0.13	0.13	0.00	0.13
Sat Flow, veh/h	1781	5259	13	0	5193	206	0	0	1585	1409	0	1585
Grp Volume(v), veh/h	55	1338	735	0	1427	770	0	0	7	16	0	73
Grp Sat Flow(s),veh/h/ln	1781	1702	1868	0	1702	1827	0	0	1585	1409	0	1585
Q Serve(g_s), s	1.8	11.5	11.5	0.0	18.2	18.4	0.0	0.0	0.2	0.6	0.0	2.5
Cycle Q Clear(g_c), s	1.8	11.5	11.5	0.0	18.2	18.4	0.0	0.0	0.2	0.8	0.0	2.5
Prop In Lane	1.00		0.01	0.00		0.11	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	89	2388	1310	0	1953	1048	0	0	206	299	0	206
V/C Ratio(X)	0.61	0.56	0.56	0.00	0.73	0.73	0.00	0.00	0.03	0.05	0.00	0.36
Avail Cap(c_a), veh/h	162	2698	1480	0	2124	1140	0	0	882	900	0	882
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	4.3	4.3	0.0	9.3	9.3	0.0	0.0	22.6	22.9	0.0	23.5
Incr Delay (d2), s/veh	2.5	0.2	0.4	0.0	1.2	2.3	0.0	0.0	0.1	0.1	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.4	4.6	5.1	0.0	9.6	10.6	0.0	0.0	0.2	0.3	0.0	1.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	4.6	4.7	0.0	10.5	11.6	0.0	0.0	22.6	23.0	0.0	24.6
LnGrp LOS	C	A	A	A	B	B	A	A	C	C	A	C
Approach Vol, veh/h		2128			2197			7			89	
Approach Delay, s/veh		5.3			10.9			22.6			24.3	
Approach LOS		A			B			C			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		47.0		12.3	7.6	39.4		12.3				
Change Period (Y+Rc), s		5.4		4.6	4.6	5.4		4.6				
Max Green Setting (Gmax), s		47.0		33.0	5.4	37.0		33.0				
Max Q Clear Time (g_c+I1), s		13.5		4.5	3.8	20.4		2.2				
Green Ext Time (p_c), s		22.2		0.4	0.0	13.6		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			8.5									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2006	5	0	2047	84	0	0	7	0	0	71
Future Vol, veh/h	0	2006	5	0	2047	84	0	0	7	0	0	71
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2068	5	0	2110	87	0	0	7	0	0	73

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1040	-	-	1104
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	195	0	0	177
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	194	-	-	176
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	24.3	39.3
HCM LOS			C	E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	194	-	-	-	-	176
HCM Lane V/C Ratio	0.037	-	-	-	-	0.416
HCM Control Delay (s)	24.3	-	-	-	-	39.3
HCM Lane LOS	C	-	-	-	-	E
HCM 95th %tile Q(veh)	0.1	-	-	-	-	1.9

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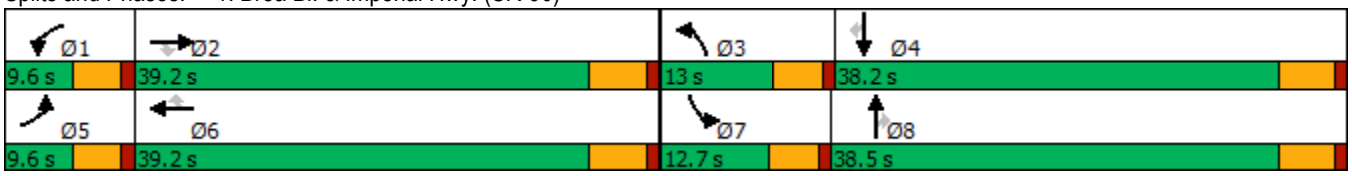
APPENDIX 6.1: GENERAL PLAN BUILDOUT WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

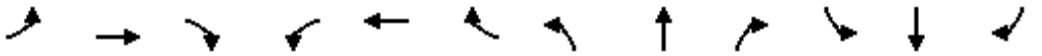
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	1485	399	164	1372	112	466	585	179	200	720	170
Future Volume (vph)	172	1485	399	164	1372	112	466	585	179	200	720	170
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.8	33.8	5.0	33.8	33.8	8.4	27.0	27.0	8.1	26.7	26.7
Actuated g/C Ratio	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.28	0.28
v/c Ratio	1.07	0.85	0.60	1.02	0.79	0.18	1.73	0.42	0.35	0.78	0.75	0.34
Control Delay	135.1	34.1	15.5	123.0	31.3	4.8	372.8	27.7	11.1	63.5	35.7	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	135.1	34.1	15.5	123.0	31.3	4.8	372.8	27.7	11.1	63.5	35.7	10.4
LOS	F	C	B	F	C	A	F	C	B	E	D	B
Approach Delay		38.9			38.6			156.1			36.8	
Approach LOS		D			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 93.8	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.73	
Intersection Signal Delay: 62.4	Intersection LOS: E
Intersection Capacity Utilization 86.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	1485	399	164	1372	112	466	585	179	200	720	170
Future Volume (veh/h)	172	1485	399	164	1372	112	466	585	179	200	720	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	181	1563	412	173	1444	110	491	616	180	211	758	162
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1825	557	174	1825	565	292	1455	444	275	993	438
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.28	0.28	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	181	1563	412	173	1444	110	491	616	180	211	758	162
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	25.9	21.1	5.0	23.2	4.4	8.4	9.0	8.5	5.9	17.9	7.6
Cycle Q Clear(g_c), s	5.0	25.9	21.1	5.0	23.2	4.4	8.4	9.0	8.5	5.9	17.9	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1825	557	174	1825	565	292	1455	444	275	993	438
V/C Ratio(X)	1.04	0.86	0.74	0.99	0.79	0.19	1.68	0.42	0.41	0.77	0.76	0.37
Avail Cap(c_a), veh/h	174	1887	576	174	1887	584	292	1860	567	282	1283	566
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.2	27.2	25.7	43.2	26.3	20.3	41.5	26.6	26.4	40.9	30.2	26.5
Incr Delay (d2), s/veh	79.1	4.0	4.9	66.3	2.3	0.2	320.2	0.2	0.6	10.5	2.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.9	15.7	12.8	6.4	14.6	2.9	26.5	6.4	5.6	4.8	12.1	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	122.4	31.3	30.6	109.5	28.6	20.5	361.7	26.8	27.0	51.4	32.2	27.0
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2156			1727			1287			1131	
Approach Delay, s/veh		38.8			36.2			154.6			35.0	
Approach LOS		D			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.1	13.0	30.8	9.6	38.1	12.5	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	27.9	10.4	19.9	7.0	25.2	7.9	11.0
Green Ext Time (p_c), s	0.0	4.7	0.0	4.7	0.0	6.2	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	61.1
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.738
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	42	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	466	585	179	200	720	170	172	1485	399	164	1372	112
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	466	585	179	200	720	170	172	1485	399	164	1372	112
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	466	585	179	200	720	170	172	1485	399	164	1372	112
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	466	585	179	200	720	170	172	1485	399	164	1372	112
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	466	585	179	200	720	170	172	1485	399	164	1372	112
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.14	0.11	0.11	0.06	0.21	0.10	0.05	0.29	0.23	0.05	0.27	0.07
Crit Moves:	****				****			****			****	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	726	18	18	837	6	7	1	19	0	0	18
Future Vol, veh/h	0	726	18	18	837	6	7	1	19	0	0	18
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	825	20	20	951	7	8	1	22	0	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	846	0	0	1342	1828	414	-	-	483
Stage 1	-	-	-	-	-	-	826	826	-	-	-	-
Stage 2	-	-	-	-	-	-	516	1002	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	787	-	-	110	76	587	0	0	530
Stage 1	0	-	-	-	-	-	332	385	-	0	0	-
Stage 2	0	-	-	-	-	-	510	318	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	786	-	-	104	74	586	-	-	528
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	190	-	-	-	-
Stage 1	-	-	-	-	-	-	332	385	-	-	-	-
Stage 2	-	-	-	-	-	-	478	309	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	15	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	392	-	-	786	-	-	528
HCM Lane V/C Ratio	0.078	-	-	0.026	-	-	0.039
HCM Control Delay (s)	15	-	-	9.7	-	-	12.1
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	18	21	1	33	21
Future Vol, veh/h	5	18	21	1	33	21
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	32	37	2	58	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	195	49	0	0	43	0
Stage 1	42	-	-	-	-	-
Stage 2	153	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	794	1020	-	-	1566	-
Stage 1	980	-	-	-	-	-
Stage 2	875	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	761	1009	-	-	1560	-
Mov Cap-2 Maneuver	761	-	-	-	-	-
Stage 1	976	-	-	-	-	-
Stage 2	842	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	4.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	942	1560	-
HCM Lane V/C Ratio	-	-	0.043	0.037	-
HCM Control Delay (s)	-	-	9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2106	15	0	2128	22	0	0	41	0	0	26
Future Vol, veh/h	0	2106	15	0	2128	22	0	0	41	0	0	26
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2171	15	0	2194	23	0	0	42	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1096	-	-	1109
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	217	0	0	214
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	216	-	-	214
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

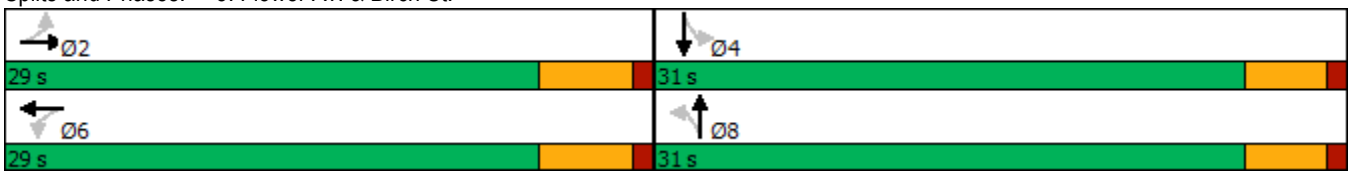
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25.7	24.2
HCM LOS			D	C

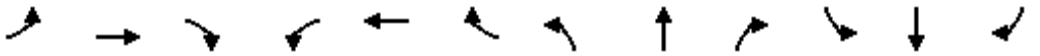
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	216	-	-	-	-	214
HCM Lane V/C Ratio	0.196	-	-	-	-	0.125
HCM Control Delay (s)	25.7	-	-	-	-	24.2
HCM Lane LOS	D	-	-	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	21	742	66	734	94	54	54	12
Future Volume (vph)	21	742	66	734	94	54	54	12
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	21.3	21.3	21.3	21.3		15.0		15.0
Actuated g/C Ratio	0.55	0.55	0.55	0.55		0.39		0.39
v/c Ratio	0.09	0.46	0.28	0.45		0.37		0.17
Control Delay	10.0	9.8	13.2	9.7		12.6		10.1
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.0	9.8	13.2	9.7		12.6		10.1
LOS	A	A	B	A		B		B
Approach Delay		9.8		10.0		12.6		10.1
Approach LOS		A		A		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 38.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 10.2	Intersection LOS: B
Intersection Capacity Utilization 61.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	742	16	66	734	12	94	54	29	54	12	15
Future Volume (veh/h)	21	742	16	66	734	12	94	54	29	54	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	873	18	78	864	14	111	64	19	64	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	1572	32	324	1580	26	388	205	50	474	100	55
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	598	3558	73	590	3577	58	779	628	153	1001	308	168
Grp Volume(v), veh/h	25	436	455	78	429	449	194	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	598	1777	1855	590	1777	1858	1559	0	0	1477	0	0
Q Serve(g_s), s	1.4	7.7	7.7	4.7	7.5	7.5	2.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.9	7.7	7.7	12.4	7.5	7.5	3.8	0.0	0.0	1.5	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.57		0.10	0.73		0.11
Lane Grp Cap(c), veh/h	329	785	819	324	785	821	642	0	0	629	0	0
V/C Ratio(X)	0.08	0.56	0.56	0.24	0.55	0.55	0.30	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	402	1003	1047	397	1003	1049	1101	0	0	1039	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.9	8.7	8.7	13.3	8.7	8.7	10.8	0.0	0.0	10.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.4	0.6	0.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.3	4.5	1.0	3.7	3.9	2.2	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	9.3	9.3	13.7	9.3	9.2	11.1	0.0	0.0	10.2	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		916			956			194			88	
Approach Delay, s/veh		9.4			9.6			11.1			10.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		23.8		18.3		23.8		18.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.9		3.5		14.4		5.8				
Green Ext Time (p_c), s		5.1		0.4		4.1		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			9.7									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	19	0	5	0	0	2	29	192	14	21	117	25
Future Vol, veh/h	19	0	5	0	0	2	29	192	14	21	117	25
Conflicting Peds, #/hr	0	0	52	0	0	56	0	0	44	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	32	0	8	0	0	3	49	325	24	36	198	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	793	791	280	826	800	437	249	0	0	393	0	0
Stage 1	300	300	-	479	479	-	-	-	-	-	-	-
Stage 2	493	491	-	347	321	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	306	322	759	291	318	620	1317	-	-	1166	-	-
Stage 1	709	666	-	568	555	-	-	-	-	-	-	-
Stage 2	558	548	-	669	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	267	280	715	245	277	562	1306	-	-	1117	-	-
Mov Cap-2 Maneuver	267	280	-	245	277	-	-	-	-	-	-	-
Stage 1	670	635	-	519	507	-	-	-	-	-	-	-
Stage 2	500	500	-	605	622	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.5	11.4	1	1.1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1306	-	-	307	562	1117	-	-
HCM Lane V/C Ratio	0.038	-	-	0.133	0.006	0.032	-	-
HCM Control Delay (s)	7.9	0	-	18.5	11.4	8.3	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.5	0	0.1	-	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	94	2005	4	0	2065	142	0	0	5	8	0	85
Future Vol, veh/h	94	2005	4	0	2065	142	0	0	5	8	0	85
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	2156	4	0	2220	153	0	0	5	9	0	91

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2378	0	0	-	-	0	-	-	1082	3366	-	1192
Stage 1	-	-	-	-	-	-	-	-	-	2302	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1064	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	~ 80	-	-	0	-	-	0	0	183	~ 8	0	154
Stage 1	-	-	-	0	-	-	0	0	-	23	0	-
Stage 2	-	-	-	0	-	-	0	0	-	215	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 80	-	-	-	-	-	-	-	183	-	-	153
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	23	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.5	0	25.3	
HCM LOS			D	-

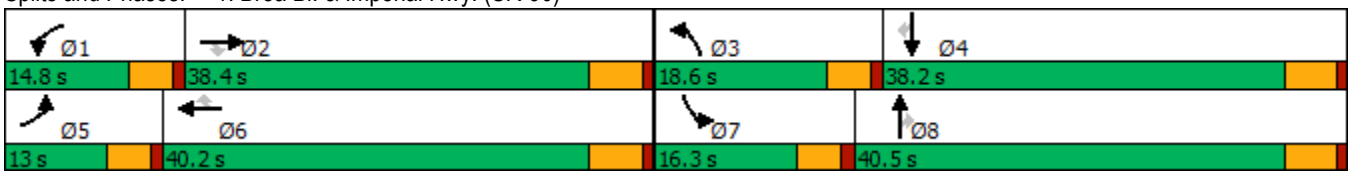
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	183	~ 80	-	-	-	-	-	153
HCM Lane V/C Ratio	0.029	1.263	-	-	-	-	-	0.597
HCM Control Delay (s)	25.3	279.9	-	-	-	-	-	58.5
HCM Lane LOS	D	F	-	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	7.6	-	-	-	-	-	3.2

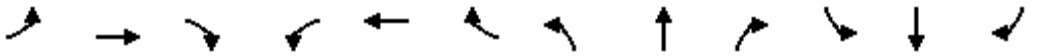
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	1510	387	337	1634	181	456	677	263	317	640	275
Future Volume (vph)	290	1510	387	337	1634	181	456	677	263	317	640	275
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	29.8	29.8	11.7	27.5	27.5
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.33	0.33	0.13	0.28	0.28	0.11	0.26	0.26
v/c Ratio	1.23	1.01	0.65	1.18	1.04	0.33	1.16	0.50	0.50	0.96	0.74	0.55
Control Delay	174.3	61.8	20.5	149.5	67.4	13.7	135.6	32.3	14.6	87.4	40.5	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.3	61.8	20.5	149.5	67.4	13.7	135.6	32.3	14.6	87.4	40.5	17.3
LOS	F	E	C	F	E	B	F	C	B	F	D	B
Approach Delay		69.4			75.7			62.7			47.4	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 104.7	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.23	
Intersection Signal Delay: 66.1	Intersection LOS: E
Intersection Capacity Utilization 91.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	1510	387	337	1634	181	456	677	263	317	640	275
Future Volume (veh/h)	290	1510	387	337	1634	181	456	677	263	317	640	275
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	312	1624	274	362	1757	138	490	728	180	341	688	237
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.25	0.25
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1564
Grp Volume(v), veh/h	312	1624	274	362	1757	138	490	728	180	341	688	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1564
Q Serve(g_s), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.8	11.0	18.5	13.7
Cycle Q Clear(g_c), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.8	11.0	18.5	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
V/C Ratio(X)	1.20	0.99	0.55	1.15	1.02	0.26	1.13	0.52	0.42	0.94	0.77	0.60
Avail Cap(c_a), veh/h	259	1635	497	315	1724	530	432	1749	531	361	1138	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	34.9	28.9	46.4	34.1	24.8	44.5	31.6	30.6	45.4	35.7	33.9
Incr Delay (d2), s/veh	122.0	20.6	1.3	97.5	26.6	0.3	85.0	0.3	0.7	32.7	2.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.9	22.5	9.5	13.7	25.8	4.4	16.7	8.7	6.6	9.9	12.8	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	169.4	55.6	30.2	143.9	60.8	25.0	129.6	31.9	31.3	78.1	38.1	35.4
LnGrp LOS	F	E	C	F	F	C	F	C	C	E	D	D
Approach Vol, veh/h		2210			2257			1398			1266	
Approach Delay, s/veh		68.5			71.9			66.0			48.3	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.3	13.0	40.2	16.3	33.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	34.7	16.0	20.5	10.4	36.8	13.0	14.4
Green Ext Time (p_c), s	0.0	0.0	0.0	4.4	0.0	0.0	0.0	5.6

Intersection Summary	
HCM 6th Ctrl Delay	65.5
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.778
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	48	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	456	677	263	317	640	275	290	1510	387	337	1634	181
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	456	677	263	317	640	275	290	1510	387	337	1634	181
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	456	677	263	317	640	275	290	1510	387	337	1634	181
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	456	677	263	317	640	275	290	1510	387	337	1634	181
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	456	677	263	317	640	275	290	1510	387	337	1634	181
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.13	0.13	0.15	0.09	0.19	0.16	0.09	0.30	0.23	0.10	0.32	0.11
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	42	27	1151	23	16	1	78	0	0	25
Future Vol, veh/h	0	1035	42	27	1151	23	16	1	78	0	0	25
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1176	48	31	1308	26	18	1	89	0	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1233	0	0	1901	2584	597	-	-	670
Stage 1	-	-	-	-	-	-	1185	1185	-	-	-	-
Stage 2	-	-	-	-	-	-	716	1399	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	561	-	-	42	25	446	0	0	399
Stage 1	0	-	-	-	-	-	201	261	-	0	0	-
Stage 2	0	-	-	-	-	-	387	206	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	556	-	-	37	23	442	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	112	-	-	-	-
Stage 1	-	-	-	-	-	-	201	259	-	-	-	-
Stage 2	-	-	-	-	-	-	339	194	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	22.8	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	309	-	-	556	-	-	398
HCM Lane V/C Ratio	0.349	-	-	0.055	-	-	0.071
HCM Control Delay (s)	22.8	-	-	11.9	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.5	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	22	33	7	26	56
Future Vol, veh/h	9	22	33	7	26	56
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	33	50	11	39	85

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	220	60	0	0	62	0
Stage 1	57	-	-	-	-	-
Stage 2	163	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	768	1005	-	-	1541	-
Stage 1	966	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	746	1001	-	-	1540	-
Mov Cap-2 Maneuver	746	-	-	-	-	-
Stage 1	965	-	-	-	-	-
Stage 2	843	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	911	1540	-
HCM Lane V/C Ratio	-	-	0.052	0.026	-
HCM Control Delay (s)	-	-	9.2	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2118	25	0	2269	40	0	0	27	0	0	66
Future Vol, veh/h	0	2118	25	0	2269	40	0	0	27	0	0	66
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2463	29	0	2638	47	0	0	31	0	0	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1246	-	-	1343
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	268	0	0	242
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	268	-	-	242
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

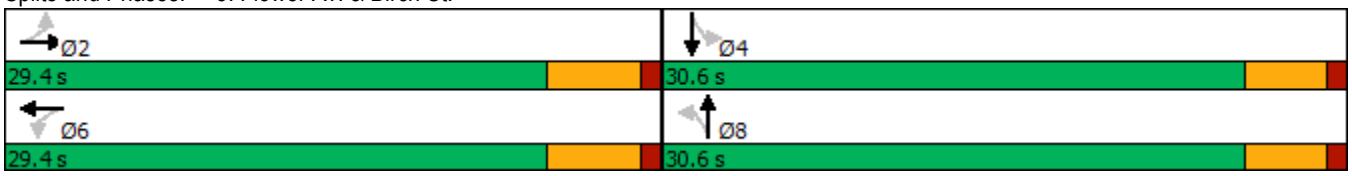
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.2	26.6
HCM LOS			C	D

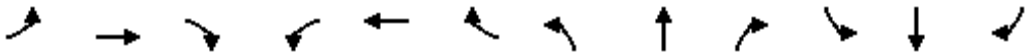
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	268	-	-	-	-	242
HCM Lane V/C Ratio	0.117	-	-	-	-	0.317
HCM Control Delay (s)	20.2	-	-	-	-	26.6
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.3

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	29	1087	89	1132	50	41	39	4
Future Volume (vph)	29	1087	89	1132	50	41	39	4
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	26.3	26.3	26.3	26.3		13.6		13.6
Actuated g/C Ratio	0.61	0.61	0.61	0.61		0.31		0.31
v/c Ratio	0.19	0.58	0.56	0.60		0.35		0.16
Control Delay	12.7	11.3	30.6	11.9		14.4		11.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.7	11.3	30.6	11.9		14.4		11.3
LOS	B	B	C	B		B		B
Approach Delay		11.4		13.2		14.4		11.3
Approach LOS		B		B		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 43.2	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 12.4	Intersection LOS: B
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1087	22	89	1132	22	50	41	60	39	4	23
Future Volume (veh/h)	29	1087	22	89	1132	22	50	41	60	39	4	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1221	24	100	1272	23	56	46	40	44	4	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	1737	34	238	1740	31	257	203	141	445	48	76
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	403	3564	70	423	3571	65	493	645	446	1006	152	241
Grp Volume(v), veh/h	33	609	636	100	633	662	142	0	0	58	0	0
Grp Sat Flow(s),veh/h/ln	403	1777	1857	423	1777	1858	1584	0	0	1400	0	0
Q Serve(g_s), s	3.5	13.3	13.3	10.9	14.1	14.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.6	13.3	13.3	24.2	14.1	14.1	3.0	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.39		0.28	0.76		0.17
Lane Grp Cap(c), veh/h	227	866	905	238	866	906	601	0	0	569	0	0
V/C Ratio(X)	0.15	0.70	0.70	0.42	0.73	0.73	0.24	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	227	866	905	238	866	906	923	0	0	843	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.2	9.9	9.9	19.7	10.1	10.1	12.7	0.0	0.0	12.0	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.6	2.5	1.2	3.2	3.1	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	8.2	8.5	1.9	8.2	8.5	1.9	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.4	12.5	12.4	20.9	13.3	13.2	12.9	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1278			1395			142			58	
Approach Delay, s/veh		12.6			13.8			12.9			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.3		29.4		20.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.6		3.1		26.2		5.0				
Green Ext Time (p_c), s		3.2		0.3		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	1	4	116	9	12	83	4
Future Vol, veh/h	0	0	0	0	0	1	4	116	9	12	83	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	1	5	149	12	15	106	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	305	310	109	304	306	155	111	0	0	161	0	0
Stage 1	139	139	-	165	165	-	-	-	-	-	-	-
Stage 2	166	171	-	139	141	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	647	605	945	648	608	891	1479	-	-	1418	-	-
Stage 1	864	782	-	837	762	-	-	-	-	-	-	-
Stage 2	836	757	-	864	780	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	639	596	945	641	599	891	1479	-	-	1418	-	-
Mov Cap-2 Maneuver	639	596	-	641	599	-	-	-	-	-	-	-
Stage 1	861	773	-	834	759	-	-	-	-	-	-	-
Stage 2	831	754	-	854	771	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	9	0.2	0.9
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1479	-	-	-	891	1418	-	-
HCM Lane V/C Ratio	0.003	-	-	-	0.001	0.011	-	-
HCM Control Delay (s)	7.4	0	-	0	9	7.6	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	43.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	2053	15	0	2240	75	0	0	4	14	0	69
Future Vol, veh/h	54	2053	15	0	2240	75	0	0	4	14	0	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	2281	17	0	2489	83	0	0	4	16	0	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2572	0	0	-	-	0	-	-	1149	3563	-	1286
Stage 1	-	-	-	-	-	-	-	-	-	2531	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1032	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	64	-	-	0	-	-	0	0	165	~ 6	0	133
Stage 1	-	-	-	0	-	-	0	0	-	16	0	-
Stage 2	-	-	-	0	-	-	0	0	-	225	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	64	-	-	-	-	-	-	-	165	~ 1	-	133
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 1	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 1	-	-
Stage 2	-	-	-	-	-	-	-	-	-	~ 14	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.1	0	27.4	$ 2224.4
HCM LOS			D	F

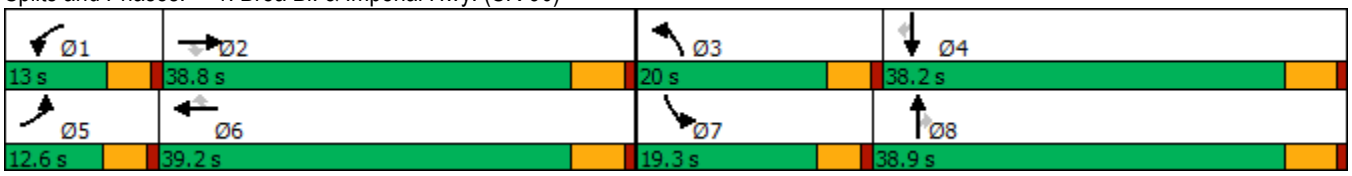
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	165	64	-	-	-	-	1	133
HCM Lane V/C Ratio	0.027	0.938	-	-	-	-	15.556	0.576
HCM Control Delay (s)	27.4	201.9	-	-	-	-	$ 12873.8	63.7
HCM Lane LOS	D	F	-	-	-	-	F	F
HCM 95th %tile Q(veh)	0.1	4.5	-	-	-	-	3.5	2.9

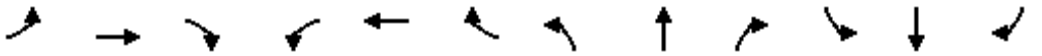
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	1612	475	275	1592	174	545	839	252	310	787	243
Future Volume (vph)	242	1612	475	275	1592	174	545	839	252	310	787	243
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.4	33.4	8.4	33.8	33.8	15.4	32.0	32.0	13.5	30.1	30.1
Actuated g/C Ratio	0.07	0.31	0.31	0.08	0.32	0.32	0.14	0.30	0.30	0.13	0.28	0.28
v/c Ratio	1.05	1.04	0.74	1.13	1.01	0.31	1.22	0.56	0.44	0.79	0.81	0.45
Control Delay	120.9	69.9	23.8	143.9	62.7	13.0	159.1	33.5	13.4	61.0	43.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	120.9	69.9	23.8	143.9	62.7	13.0	159.1	33.5	13.4	61.0	43.0	14.4
LOS	F	E	C	F	E	B	F	C	B	E	D	B
Approach Delay		65.8			69.4			72.2			42.0	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 107.2	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.22	
Intersection Signal Delay: 63.9	Intersection LOS: E
Intersection Capacity Utilization 95.5%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	1612	475	275	1592	174	545	839	252	310	787	243
Future Volume (veh/h)	242	1612	475	275	1592	174	545	839	252	310	787	243
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	247	1645	315	281	1624	118	556	856	153	316	803	207
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	247	1645	315	281	1624	118	556	856	153	316	803	207
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	33.4	18.3	8.4	33.5	5.8	15.4	14.9	8.0	10.3	22.5	11.8
Cycle Q Clear(g_c), s	8.0	33.4	18.3	8.4	33.5	5.8	15.4	14.9	8.0	10.3	22.5	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
V/C Ratio(X)	1.02	1.02	0.64	1.11	0.99	0.23	1.20	0.56	0.33	0.84	0.83	0.49
Avail Cap(c_a), veh/h	241	1615	492	253	1634	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.1	31.0	48.6	35.8	26.4	45.1	31.2	28.8	45.6	36.3	32.4
Incr Delay (d2), s/veh	64.5	27.3	2.8	89.4	20.8	0.2	108.5	0.4	0.4	10.6	5.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	24.3	11.4	11.0	23.6	3.9	20.4	10.1	5.4	8.0	15.4	7.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.3	63.4	33.7	138.0	56.6	26.6	153.6	31.6	29.2	56.2	41.2	33.3
LnGrp LOS	F	F	C	F	E	C	F	C	C	E	D	C
Approach Vol, veh/h		2207			2023			1565			1326	
Approach Delay, s/veh		64.7			66.1			74.7			43.6	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.8	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	35.4	17.4	24.5	10.0	35.5	12.3	16.9
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	63.4
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.839
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	62	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	545	839	252	310	787	243	242	1612	475	275	1592	174
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	545	839	252	310	787	243	242	1612	475	275	1592	174
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	545	839	252	310	787	243	242	1612	475	275	1592	174
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	545	839	252	310	787	243	242	1612	475	275	1592	174
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	545	839	252	310	787	243	242	1612	475	275	1592	174
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.15	0.09	0.23	0.14	0.07	0.32	0.28	0.08	0.31	0.10
Crit Moves:	****				****			****			****	

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1175	37	35	1295	22	6	7	48	0	0	30
Future Vol, veh/h	0	1175	37	35	1295	22	6	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1277	40	38	1408	24	7	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1319	0	0	2059	2793	641	-	-	722
Stage 1	-	-	-	-	-	-	1279	1279	-	-	-	-
Stage 2	-	-	-	-	-	-	780	1514	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	520	-	-	32	18	417	0	0	369
Stage 1	0	-	-	-	-	-	176	235	-	0	0	-
Stage 2	0	-	-	-	-	-	354	181	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	519	-	-	27	17	416	-	-	367
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	97	-	-	-	-
Stage 1	-	-	-	-	-	-	176	235	-	-	-	-
Stage 2	-	-	-	-	-	-	299	167	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.2	15.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	253	-	-	519	-	-	367
HCM Lane V/C Ratio	0.262	-	-	0.073	-	-	0.089
HCM Control Delay (s)	24.2	-	-	12.5	-	-	15.8
HCM Lane LOS	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	7	41	1	6	42
Future Vol, veh/h	6	7	41	1	6	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	10	58	1	8	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	134	59	0	0	59	0
Stage 1	59	-	-	-	-	-
Stage 2	75	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	860	1007	-	-	1545	-
Stage 1	964	-	-	-	-	-
Stage 2	948	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	856	1007	-	-	1545	-
Mov Cap-2 Maneuver	856	-	-	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	943	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	931	1545	-
HCM Lane V/C Ratio	-	-	0.02	0.005	-
HCM Control Delay (s)	-	-	8.9	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2267	21	0	2358	42	0	0	30	0	0	48
Future Vol, veh/h	0	2267	21	0	2358	42	0	0	30	0	0	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2361	22	0	2456	44	0	0	31	0	0	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1192	-	-	1250
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	225	0	0	209
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	225	-	-	209
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

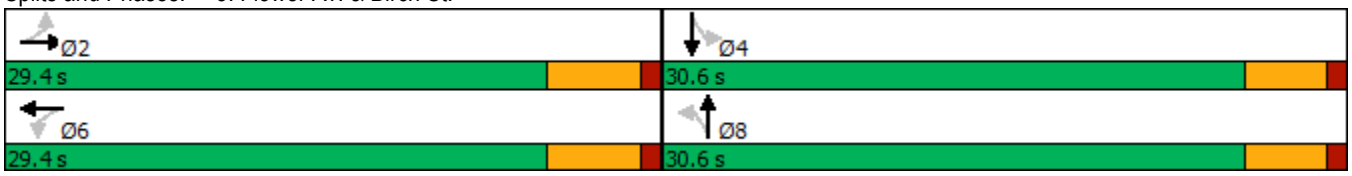
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.6	27.6
HCM LOS			C	D

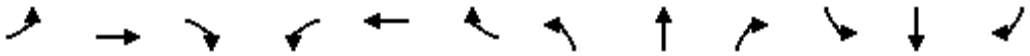
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	225	-	-	-	-	209
HCM Lane V/C Ratio	0.139	-	-	-	-	0.239
HCM Control Delay (s)	23.6	-	-	-	-	27.6
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	-	0.9

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	28	1226	102	1268	18	12	30	2
Future Volume (vph)	28	1226	102	1268	18	12	30	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	28.2	28.2	28.2	28.2		13.2		13.2
Actuated g/C Ratio	0.70	0.70	0.70	0.70		0.33		0.33
v/c Ratio	0.13	0.50	0.45	0.52		0.18		0.11
Control Delay	11.1	9.6	23.3	10.0		11.2		10.2
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	11.1	9.6	23.3	10.0		11.2		10.2
LOS	B	A	C	B		B		B
Approach Delay		9.7		11.0		11.2		10.2
Approach LOS		A		B		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 40.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 10.4	Intersection LOS: B
Intersection Capacity Utilization 66.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1226	8	102	1268	9	18	12	63	30	2	18
Future Volume (veh/h)	28	1226	8	102	1268	9	18	12	63	30	2	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1238	7	103	1281	9	18	12	34	30	2	14
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	344	2151	12	356	2147	15	164	68	122	269	41	65
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	405	3623	20	423	3616	25	280	477	858	767	285	460
Grp Volume(v), veh/h	28	607	638	103	629	661	64	0	0	46	0	0
Grp Sat Flow(s),veh/h/ln	405	1777	1867	423	1777	1865	1615	0	0	1513	0	0
Q Serve(g_s), s	1.7	7.8	7.8	7.4	8.3	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.0	7.8	7.8	15.2	8.3	8.3	1.2	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.28		0.53	0.65		0.30
Lane Grp Cap(c), veh/h	344	1055	1108	356	1055	1107	354	0	0	375	0	0
V/C Ratio(X)	0.08	0.58	0.58	0.29	0.60	0.60	0.18	0.00	0.00	0.12	0.00	0.00
Avail Cap(c_a), veh/h	368	1159	1217	381	1159	1216	1228	0	0	1175	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.9	4.6	4.6	9.3	4.7	4.7	14.2	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.4	0.7	0.7	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	2.8	3.0	0.9	2.3	2.4	0.8	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.0	5.2	5.2	9.8	5.5	5.4	14.4	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1273			1393			64			46	
Approach Delay, s/veh		5.3			5.8			14.4			14.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.2		9.9		27.2		9.9				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		12.0		2.8		17.2		3.2				
Green Ext Time (p_c), s		7.0		0.2		4.8		0.3				

Intersection Summary												
HCM 6th Ctrl Delay			5.9									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	7	0	7	1	0	1	19	103	4	5	74	22
Future Vol, veh/h	7	0	7	1	0	1	19	103	4	5	74	22
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	0	10	1	0	1	26	143	6	7	103	31

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	333	335	120	336	347	146	135	0	0	149	0	0
Stage 1	134	134	-	198	198	-	-	-	-	-	-	-
Stage 2	199	201	-	138	149	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	620	585	931	618	576	901	1449	-	-	1432	-	-
Stage 1	869	785	-	804	737	-	-	-	-	-	-	-
Stage 2	803	735	-	865	774	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	607	570	930	600	561	901	1448	-	-	1432	-	-
Mov Cap-2 Maneuver	607	570	-	600	561	-	-	-	-	-	-	-
Stage 1	851	780	-	788	722	-	-	-	-	-	-	-
Stage 2	786	720	-	852	769	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10	10	1.1	0.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1448	-	-	735	720	1432	-	-
HCM Lane V/C Ratio	0.018	-	-	0.026	0.004	0.005	-	-
HCM Control Delay (s)	7.5	0	-	10	10	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	12.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	2273	6	0	2335	76	0	0	8	16	0	66
Future Vol, veh/h	49	2273	6	0	2335	76	0	0	8	16	0	66
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	2343	6	0	2407	78	0	0	8	16	0	68

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2490	0	0	-	-	0	-	-	1178	3490	-	1248
Stage 1	-	-	-	-	-	-	-	-	-	2451	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1039	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	70	-	-	0	-	-	0	0	158	~ 7	0	141
Stage 1	-	-	-	0	-	-	0	0	-	18	0	-
Stage 2	-	-	-	0	-	-	0	0	-	222	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	70	-	-	-	-	-	-	-	158	~ 3	-	140
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 4	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 5	-	-
Stage 2	-	-	-	-	-	-	-	-	-	57	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	0	29	$ 643.3
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	158	70	-	-	-	-	4	140
HCM Lane V/C Ratio	0.052	0.722	-	-	-	-	4.124	0.486
HCM Control Delay (s)	29	137.4	-	-	-	-	$ 3078.9	52.9
HCM Lane LOS	D	F	-	-	-	-	F	F
HCM 95th %tile Q(veh)	0.2	3.3	-	-	-	-	3.4	2.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

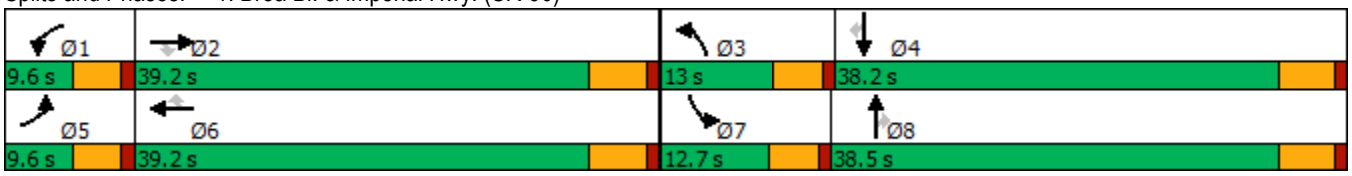
APPENDIX 6.2: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS

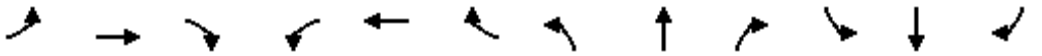
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	1492	399	170	1385	112	466	585	182	200	720	170
Future Volume (vph)	172	1492	399	170	1385	112	466	585	182	200	720	170
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.9	33.9	5.0	33.9	33.9	8.4	27.1	27.1	8.1	26.7	26.7
Actuated g/C Ratio	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.28	0.28
v/c Ratio	1.08	0.86	0.60	1.07	0.79	0.18	1.73	0.42	0.36	0.78	0.75	0.34
Control Delay	135.5	34.3	15.5	132.3	31.5	4.8	373.3	27.7	11.4	63.6	35.7	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	135.5	34.3	15.5	132.3	31.5	4.8	373.3	27.7	11.4	63.6	35.7	10.4
LOS	F	C	B	F	C	A	F	C	B	E	D	B
Approach Delay		39.1			40.0			155.9			36.9	
Approach LOS		D			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 93.9	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.73	
Intersection Signal Delay: 62.8	Intersection LOS: E
Intersection Capacity Utilization 87.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	1492	399	170	1385	112	466	585	182	200	720	170
Future Volume (veh/h)	172	1492	399	170	1385	112	466	585	182	200	720	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	181	1571	412	179	1458	110	491	616	184	211	758	162
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1827	557	174	1827	565	292	1454	444	275	993	438
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.28	0.28	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	181	1571	412	179	1458	110	491	616	184	211	758	162
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	26.1	21.1	5.0	23.5	4.4	8.4	9.0	8.8	5.9	17.9	7.6
Cycle Q Clear(g_c), s	5.0	26.1	21.1	5.0	23.5	4.4	8.4	9.0	8.8	5.9	17.9	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1827	557	174	1827	565	292	1454	444	275	993	438
V/C Ratio(X)	1.04	0.86	0.74	1.03	0.80	0.19	1.68	0.42	0.41	0.77	0.76	0.37
Avail Cap(c_a), veh/h	174	1886	575	174	1886	583	292	1858	567	282	1282	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	27.3	25.7	43.3	26.4	20.3	41.6	26.6	26.5	40.9	30.2	26.5
Incr Delay (d2), s/veh	79.4	4.2	4.9	76.1	2.4	0.2	320.8	0.2	0.6	10.6	2.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.9	15.8	12.8	6.8	14.8	2.9	26.5	6.4	5.8	4.8	12.1	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	122.7	31.4	30.5	119.4	28.9	20.5	362.3	26.8	27.2	51.5	32.3	27.0
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2164			1747			1291			1131	
Approach Delay, s/veh		38.9			37.6			154.5			35.1	
Approach LOS		D			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.1	13.0	30.8	9.6	38.1	12.5	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	28.1	10.4	19.9	7.0	25.5	7.9	11.0
Green Ext Time (p_c), s	0.0	4.6	0.0	4.7	0.0	6.1	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	61.4
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.741
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	42	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	466	585	179	200	720	170	172	1485	399	164	1372	112
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	466	585	179	200	720	170	172	1485	399	164	1372	112
Added Vol:	0	0	3	0	0	0	0	7	0	6	13	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	466	585	182	200	720	170	172	1492	399	170	1385	112
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	466	585	182	200	720	170	172	1492	399	170	1385	112
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	466	585	182	200	720	170	172	1492	399	170	1385	112
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	466	585	182	200	720	170	172	1492	399	170	1385	112
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.14	0.11	0.11	0.06	0.21	0.10	0.05	0.29	0.23	0.05	0.27	0.07
Crit Moves:	****			****			****			****		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	726	23	18	837	6	13	1	19	0	0	18
Future Vol, veh/h	0	726	23	18	837	6	13	1	19	0	0	18
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	825	26	20	951	7	15	1	22	0	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	852	0	0	1342	1828	414	-	-	483
Stage 1	-	-	-	-	-	-	826	826	-	-	-	-
Stage 2	-	-	-	-	-	-	516	1002	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	783	-	-	110	76	587	0	0	530
Stage 1	0	-	-	-	-	-	332	385	-	0	0	-
Stage 2	0	-	-	-	-	-	510	318	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	782	-	-	104	74	586	-	-	528
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	189	-	-	-	-
Stage 1	-	-	-	-	-	-	332	385	-	-	-	-
Stage 2	-	-	-	-	-	-	478	308	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.7	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	345	-	-	782	-	-	528
HCM Lane V/C Ratio	0.109	-	-	0.026	-	-	0.039
HCM Control Delay (s)	16.7	-	-	9.7	-	-	12.1
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	5.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	24	21	29	38	21
Future Vol, veh/h	43	24	21	29	38	21
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	42	37	51	67	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	238	74	0	0	92	0
Stage 1	67	-	-	-	-	-
Stage 2	171	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	750	988	-	-	1503	-
Stage 1	956	-	-	-	-	-
Stage 2	859	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	713	978	-	-	1497	-
Mov Cap-2 Maneuver	713	-	-	-	-	-
Stage 1	952	-	-	-	-	-
Stage 2	819	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	4.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	790	1497	-
HCM Lane V/C Ratio	-	-	0.149	0.045	-
HCM Control Delay (s)	-	-	10.4	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0.1	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2116	15	0	2109	50	0	0	41	0	0	64
Future Vol, veh/h	0	2116	15	0	2109	50	0	0	41	0	0	64
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2181	15	0	2174	52	0	0	42	0	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1101	-	-	1113
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	216	0	0	212
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	215	-	-	212
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

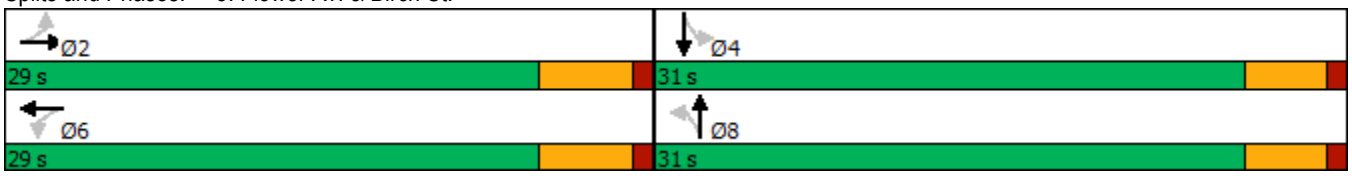
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25.8	29.5
HCM LOS			D	D

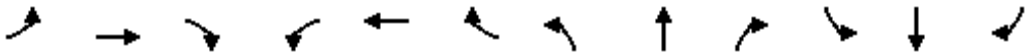
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	215	-	-	-	-	212
HCM Lane V/C Ratio	0.197	-	-	-	-	0.311
HCM Control Delay (s)	25.8	-	-	-	-	29.5
HCM Lane LOS	D	-	-	-	-	D
HCM 95th %tile Q(veh)	0.7	-	-	-	-	1.3

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	21	742	73	734	94	54	54	12
Future Volume (vph)	21	742	73	734	94	54	54	12
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	21.9	21.9	21.9	21.9		14.7		14.7
Actuated g/C Ratio	0.56	0.56	0.56	0.56		0.38		0.38
v/c Ratio	0.09	0.45	0.30	0.45		0.40		0.18
Control Delay	10.0	9.7	13.7	9.7		12.9		10.4
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	10.0	9.7	13.7	9.7		12.9		10.4
LOS	A	A	B	A		B		B
Approach Delay		9.7		10.0		12.9		10.4
Approach LOS		A		B		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 39.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.45	
Intersection Signal Delay: 10.2	Intersection LOS: B
Intersection Capacity Utilization 62.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	742	16	73	734	12	94	54	40	54	12	15
Future Volume (veh/h)	21	742	16	73	734	12	94	54	40	54	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	873	18	86	864	14	111	64	32	64	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	1588	33	325	1596	26	362	196	78	471	100	55
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	598	3558	73	590	3577	58	717	602	241	1003	307	168
Grp Volume(v), veh/h	25	436	455	86	429	449	207	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	598	1777	1855	590	1777	1858	1560	0	0	1478	0	0
Q Serve(g_s), s	1.4	7.7	7.7	5.4	7.6	7.6	2.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.9	7.7	7.7	13.1	7.6	7.6	4.2	0.0	0.0	1.5	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.54		0.15	0.73		0.11
Lane Grp Cap(c), veh/h	329	793	828	325	793	829	636	0	0	626	0	0
V/C Ratio(X)	0.08	0.55	0.55	0.26	0.54	0.54	0.33	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	395	987	1030	389	987	1032	1080	0	0	1019	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.9	8.7	8.7	13.5	8.7	8.7	11.1	0.0	0.0	10.3	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.4	0.6	0.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.3	4.5	1.1	3.8	4.0	2.4	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	9.3	9.3	13.9	9.2	9.2	11.4	0.0	0.0	10.4	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		916			964			207			88	
Approach Delay, s/veh		9.4			9.6			11.4			10.4	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		24.3		18.5		24.3		18.5				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.9		3.5		15.1		6.2				
Green Ext Time (p_c), s		5.1		0.4		4.0		1.2				

Intersection Summary												
HCM 6th Ctrl Delay			9.7									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	30	0	34	0	0	2	65	192	14	21	117	32
Future Vol, veh/h	30	0	34	0	0	2	65	192	14	21	117	32
Conflicting Peds, #/hr	0	0	52	0	0	56	0	0	44	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	0	58	0	0	3	110	325	24	36	198	54

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	921	919	286	979	934	437	261	0	0	393	0	0
Stage 1	306	306	-	601	601	-	-	-	-	-	-	-
Stage 2	615	613	-	378	333	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	251	271	753	229	266	620	1303	-	-	1166	-	-
Stage 1	704	662	-	487	489	-	-	-	-	-	-	-
Stage 2	479	483	-	644	644	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	209	221	710	171	217	562	1292	-	-	1117	-	-
Mov Cap-2 Maneuver	209	221	-	171	217	-	-	-	-	-	-	-
Stage 1	624	631	-	417	419	-	-	-	-	-	-	-
Stage 2	403	413	-	541	614	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	20.9	11.4	1.9	1
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1292	-	-	334	562	1117	-	-
HCM Lane V/C Ratio	0.085	-	-	0.325	0.006	0.032	-	-
HCM Control Delay (s)	8	0	-	20.9	11.4	8.3	0	-
HCM Lane LOS	A	A	-	C	B	A	A	-
HCM 95th %tile Q(veh)	0.3	-	-	1.4	0	0.1	-	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	104	2005	4	0	2051	168	0	0	5	14	0	108
Future Vol, veh/h	104	2005	4	0	2051	168	0	0	5	14	0	108
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	112	2156	4	0	2205	181	0	0	5	15	0	116

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2391	0	0	-	-	0	-	-	1082	3387	-	1198
Stage 1	-	-	-	-	-	-	-	-	-	2301	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1086	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	~ 79	-	-	0	-	-	0	0	183	~ 8	0	153
Stage 1	-	-	-	0	-	-	0	0	-	23	0	-
Stage 2	-	-	-	0	-	-	0	0	-	208	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 79	-	-	-	-	-	-	-	183	-	-	152
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	23	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	0	25.3	
HCM LOS			D	-

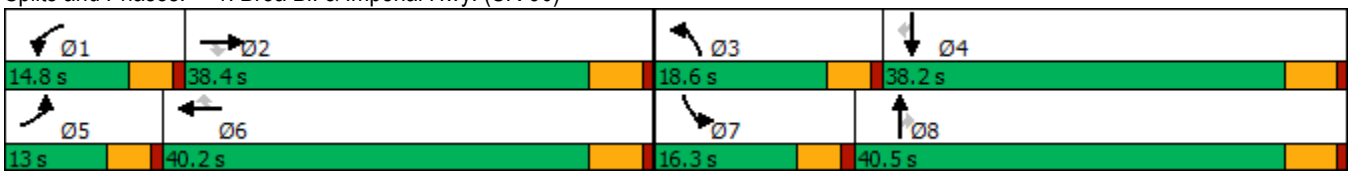
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	183	~ 79	-	-	-	-	-	152
HCM Lane V/C Ratio	0.029	1.416	-	-	-	-	-	0.764
HCM Control Delay (s)	25.3	$ 338.4	-	-	-	-	-	80.3
HCM Lane LOS	D	F	-	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	8.8	-	-	-	-	-	4.7

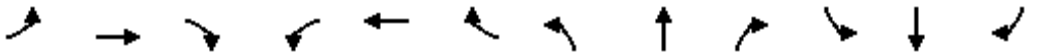
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	1512	387	338	1637	181	456	677	264	317	640	275
Future Volume (vph)	290	1512	387	338	1637	181	456	677	264	317	640	275
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	29.8	29.8	11.7	27.5	27.5
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.33	0.33	0.13	0.28	0.28	0.11	0.26	0.26
v/c Ratio	1.23	1.01	0.65	1.18	1.04	0.33	1.16	0.50	0.50	0.96	0.74	0.55
Control Delay	174.3	62.1	20.6	150.7	68.0	13.7	135.6	32.3	14.7	87.4	40.5	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	174.3	62.1	20.6	150.7	68.0	13.7	135.6	32.3	14.7	87.4	40.5	17.3
LOS	F	E	C	F	E	B	F	C	B	F	D	B
Approach Delay		69.6			76.3			62.7			47.4	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 104.7	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.23	
Intersection Signal Delay: 66.4	Intersection LOS: E
Intersection Capacity Utilization 91.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	1512	387	338	1637	181	456	677	264	317	640	275
Future Volume (veh/h)	290	1512	387	338	1637	181	456	677	264	317	640	275
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	312	1626	274	363	1760	138	490	728	181	341	688	237
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.25	0.25
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1564
Grp Volume(v), veh/h	312	1626	274	363	1760	138	490	728	181	341	688	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1564
Q Serve(g_s), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.9	11.0	18.5	13.7
Cycle Q Clear(g_c), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.9	11.0	18.5	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
V/C Ratio(X)	1.20	0.99	0.55	1.15	1.02	0.26	1.13	0.52	0.42	0.94	0.77	0.60
Avail Cap(c_a), veh/h	259	1635	497	315	1724	530	432	1749	531	361	1138	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	34.9	28.9	46.4	34.1	24.8	44.5	31.6	30.6	45.4	35.7	33.9
Incr Delay (d2), s/veh	122.0	20.9	1.3	98.7	27.1	0.3	85.0	0.3	0.7	32.7	2.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.9	22.5	9.5	13.8	25.9	4.4	16.7	8.7	6.6	9.9	12.8	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	169.4	55.9	30.2	145.1	61.2	25.0	129.6	31.9	31.3	78.1	38.1	35.4
LnGrp LOS	F	E	C	F	F	C	F	C	C	E	D	D
Approach Vol, veh/h		2212			2261			1399			1266	
Approach Delay, s/veh		68.7			72.5			66.0			48.3	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.3	13.0	40.2	16.3	33.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	34.7	16.0	20.5	10.4	36.8	13.0	14.4
Green Ext Time (p_c), s	0.0	0.0	0.0	4.4	0.0	0.0	0.0	5.6

Intersection Summary	
HCM 6th Ctrl Delay	65.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.779
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	48	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	456	677	263	317	640	275	290	1510	387	337	1634	181
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	456	677	263	317	640	275	290	1510	387	337	1634	181
Added Vol:	0	0	1	0	0	0	0	2	0	1	3	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	456	677	264	317	640	275	290	1512	387	338	1637	181
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	456	677	264	317	640	275	290	1512	387	338	1637	181
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	456	677	264	317	640	275	290	1512	387	338	1637	181
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	456	677	264	317	640	275	290	1512	387	338	1637	181
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.13	0.13	0.16	0.09	0.19	0.16	0.09	0.30	0.23	0.10	0.32	0.11
Crit Moves:	****			****			****			****		

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	44	27	1151	23	17	1	78	0	0	25
Future Vol, veh/h	0	1035	44	27	1151	23	17	1	78	0	0	25
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1176	50	31	1308	26	19	1	89	0	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1235	0	0	1901	2584	597	-	-	670
Stage 1	-	-	-	-	-	-	1185	1185	-	-	-	-
Stage 2	-	-	-	-	-	-	716	1399	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	560	-	-	42	25	446	0	0	399
Stage 1	0	-	-	-	-	-	201	261	-	0	0	-
Stage 2	0	-	-	-	-	-	387	206	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	555	-	-	37	23	442	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	112	-	-	-	-
Stage 1	-	-	-	-	-	-	201	259	-	-	-	-
Stage 2	-	-	-	-	-	-	339	194	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	23.2	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	305	-	-	555	-	-	398
HCM Lane V/C Ratio	0.358	-	-	0.055	-	-	0.071
HCM Control Delay (s)	23.2	-	-	11.9	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.6	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	3.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	22	23	33	18	28	56
Future Vol, veh/h	22	23	33	18	28	56
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	35	50	27	42	85

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	234	68	0	0	78	0
Stage 1	65	-	-	-	-	-
Stage 2	169	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	754	995	-	-	1520	-
Stage 1	958	-	-	-	-	-
Stage 2	861	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	731	991	-	-	1519	-
Mov Cap-2 Maneuver	731	-	-	-	-	-
Stage 1	957	-	-	-	-	-
Stage 2	836	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	2.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	844	1519	-
HCM Lane V/C Ratio	-	-	0.081	0.028	-
HCM Control Delay (s)	-	-	9.6	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2122	25	0	2260	51	0	0	27	0	0	79
Future Vol, veh/h	0	2122	25	0	2260	51	0	0	27	0	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2467	29	0	2628	59	0	0	31	0	0	92

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1248	-	-	1344
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	267	0	0	242
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	267	-	-	242
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

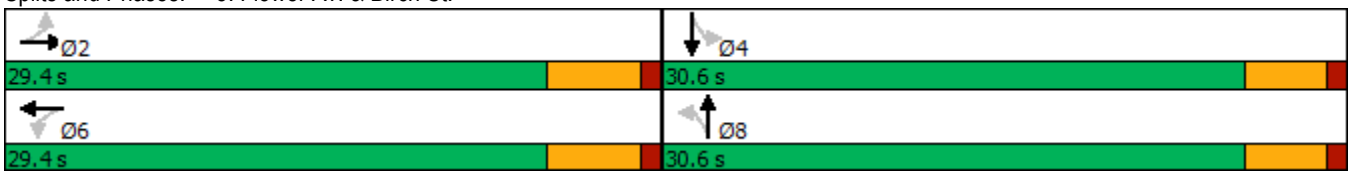
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.3	28.7
HCM LOS			C	D

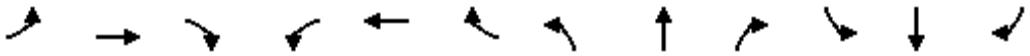
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	267	-	-	-	-	242
HCM Lane V/C Ratio	0.118	-	-	-	-	0.38
HCM Control Delay (s)	20.3	-	-	-	-	28.7
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.7

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	29	1087	91	1132	50	41	39	4
Future Volume (vph)	29	1087	91	1132	50	41	39	4
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	26.4	26.4	26.4	26.4		13.5		13.5
Actuated g/C Ratio	0.61	0.61	0.61	0.61		0.31		0.31
v/c Ratio	0.19	0.58	0.57	0.60		0.36		0.16
Control Delay	12.7	11.3	31.3	11.9		14.5		11.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.7	11.3	31.3	11.9		14.5		11.3
LOS	B	B	C	B		B		B
Approach Delay		11.4		13.3		14.5		11.3
Approach LOS		B		B		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 43.4	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 12.5	Intersection LOS: B
Intersection Capacity Utilization 73.6%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1087	22	91	1132	22	50	41	62	39	4	23
Future Volume (veh/h)	29	1087	22	91	1132	22	50	41	62	39	4	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1221	24	102	1272	23	56	46	43	44	4	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	1735	34	238	1739	31	252	200	148	445	48	76
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	403	3564	70	423	3571	65	479	635	469	1006	152	241
Grp Volume(v), veh/h	33	609	636	102	633	662	145	0	0	58	0	0
Grp Sat Flow(s),veh/h/ln	403	1777	1857	423	1777	1858	1583	0	0	1400	0	0
Q Serve(g_s), s	3.5	13.3	13.3	10.9	14.1	14.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.6	13.3	13.3	24.2	14.1	14.1	3.1	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.39		0.30	0.76		0.17
Lane Grp Cap(c), veh/h	227	865	904	238	865	905	600	0	0	570	0	0
V/C Ratio(X)	0.15	0.70	0.70	0.43	0.73	0.73	0.24	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	227	865	904	238	865	905	921	0	0	842	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.2	9.9	9.9	19.9	10.2	10.2	12.7	0.0	0.0	12.0	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.6	2.5	1.2	3.2	3.1	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	8.3	8.5	2.0	8.2	8.5	2.0	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	12.5	12.4	21.1	13.3	13.2	12.9	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1278			1397			145			58	
Approach Delay, s/veh		12.6			13.9			12.9			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.3		29.4		20.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.6		3.1		26.2		5.1				
Green Ext Time (p_c), s		3.2		0.3		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	2	0	12	0	0	1	19	116	9	12	83	6
Future Vol, veh/h	2	0	12	0	0	1	19	116	9	12	83	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	3	0	15	0	0	1	24	149	12	15	106	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	344	349	110	351	347	155	114	0	0	161	0	0
Stage 1	140	140	-	203	203	-	-	-	-	-	-	-
Stage 2	204	209	-	148	144	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	610	575	943	604	576	891	1475	-	-	1418	-	-
Stage 1	863	781	-	799	733	-	-	-	-	-	-	-
Stage 2	798	729	-	855	778	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	596	558	943	581	559	891	1475	-	-	1418	-	-
Mov Cap-2 Maneuver	596	558	-	581	559	-	-	-	-	-	-	-
Stage 1	847	772	-	785	720	-	-	-	-	-	-	-
Stage 2	783	716	-	832	769	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.2	9	1	0.9
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1475	-	-	871	891	1418	-	-
HCM Lane V/C Ratio	0.017	-	-	0.021	0.001	0.011	-	-
HCM Control Delay (s)	7.5	0	-	9.2	9	7.6	0	-
HCM Lane LOS	A	A	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	2053	15	0	2232	87	0	0	4	15	0	79
Future Vol, veh/h	58	2053	15	0	2232	87	0	0	4	15	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	2281	17	0	2480	97	0	0	4	17	0	88

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2577	0	0	-	-	0	-	-	1149	3569	-	1289
Stage 1	-	-	-	-	-	-	-	-	-	2529	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1040	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	~ 63	-	-	0	-	-	0	0	165	~ 6	0	133
Stage 1	-	-	-	0	-	-	0	0	-	~ 16	0	-
Stage 2	-	-	-	0	-	-	0	0	-	222	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 63	-	-	-	-	-	-	-	165	-	-	133
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 16	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	6.3	0	27.4	
HCM LOS			D	-

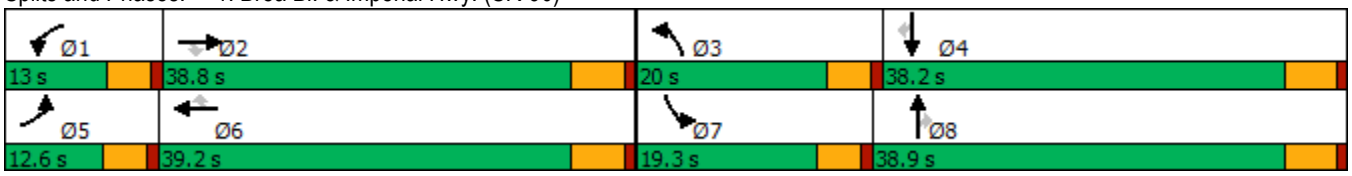
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	165	~ 63	-	-	-	-	-	133
HCM Lane V/C Ratio	0.027	1.023	-	-	-	-	-	0.66
HCM Control Delay (s)	27.4	229.6	-	-	-	-	-	73.4
HCM Lane LOS	D	F	-	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	5	-	-	-	-	-	3.6

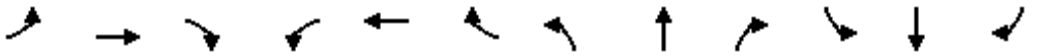
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	1618	475	277	1596	174	545	839	255	310	787	243
Future Volume (vph)	242	1618	475	277	1596	174	545	839	255	310	787	243
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.4	33.4	8.4	33.8	33.8	15.4	32.0	32.0	13.5	30.1	30.1
Actuated g/C Ratio	0.07	0.31	0.31	0.08	0.32	0.32	0.14	0.30	0.30	0.13	0.28	0.28
v/c Ratio	1.05	1.04	0.74	1.14	1.01	0.31	1.22	0.56	0.45	0.79	0.81	0.45
Control Delay	120.9	71.0	23.8	146.4	63.4	13.0	159.1	33.5	13.6	61.0	43.0	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	120.9	71.0	23.8	146.4	63.4	13.0	159.1	33.5	13.6	61.0	43.0	14.4
LOS	F	E	C	F	E	B	F	C	B	E	D	B
Approach Delay		66.6			70.4			72.1			42.0	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 107.2	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.22	
Intersection Signal Delay: 64.4	Intersection LOS: E
Intersection Capacity Utilization 95.7%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	1618	475	277	1596	174	545	839	255	310	787	243
Future Volume (veh/h)	242	1618	475	277	1596	174	545	839	255	310	787	243
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	247	1651	315	283	1629	118	556	856	156	316	803	207
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	247	1651	315	283	1629	118	556	856	156	316	803	207
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	33.4	18.3	8.4	33.7	5.8	15.4	14.9	8.2	10.3	22.5	11.8
Cycle Q Clear(g_c), s	8.0	33.4	18.3	8.4	33.7	5.8	15.4	14.9	8.2	10.3	22.5	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
V/C Ratio(X)	1.02	1.02	0.64	1.12	1.00	0.23	1.20	0.56	0.33	0.84	0.83	0.49
Avail Cap(c_a), veh/h	241	1615	492	253	1634	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.1	31.0	48.6	35.9	26.4	45.1	31.2	28.8	45.6	36.3	32.4
Incr Delay (d2), s/veh	64.5	28.3	2.8	92.0	21.5	0.2	108.5	0.4	0.4	10.6	5.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	24.6	11.4	11.2	23.8	3.9	20.4	10.1	5.5	8.0	15.4	7.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.3	64.4	33.7	140.6	57.4	26.6	153.6	31.6	29.2	56.2	41.2	33.3
LnGrp LOS	F	F	C	F	E	C	F	C	C	E	D	C
Approach Vol, veh/h		2213			2030			1568			1326	
Approach Delay, s/veh		65.5			67.2			74.6			43.6	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.8	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	35.4	17.4	24.5	10.0	35.7	12.3	16.9
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	63.9
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Brea Gaslight Square (JN 14783)

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy. (SR-90)

Cycle (sec):	100	Critical Vol./Cap.(X):	0.840
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	62	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	545	839	252	310	787	243	242	1612	475	275	1592	174
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	545	839	252	310	787	243	242	1612	475	275	1592	174
Added Vol:	0	0	3	0	0	0	0	6	0	2	4	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	545	839	255	310	787	243	242	1618	475	277	1596	174
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	545	839	255	310	787	243	242	1618	475	277	1596	174
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	545	839	255	310	787	243	242	1618	475	277	1596	174
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	545	839	255	310	787	243	242	1618	475	277	1596	174
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.15	0.09	0.23	0.14	0.07	0.32	0.28	0.08	0.31	0.10
Crit Moves:	****			****			****			****		

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1175	42	35	1295	22	8	7	48	0	0	30
Future Vol, veh/h	0	1175	42	35	1295	22	8	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1277	46	38	1408	24	9	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1325	0	0	2059	2793	641	-	-	722
Stage 1	-	-	-	-	-	-	1279	1279	-	-	-	-
Stage 2	-	-	-	-	-	-	780	1514	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	517	-	-	32	18	417	0	0	369
Stage 1	0	-	-	-	-	-	176	235	-	0	0	-
Stage 2	0	-	-	-	-	-	354	181	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	516	-	-	27	17	416	-	-	367
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	97	-	-	-	-
Stage 1	-	-	-	-	-	-	176	235	-	-	-	-
Stage 2	-	-	-	-	-	-	299	167	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	25.4	15.8
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	-	-	516	-	-	367
HCM Lane V/C Ratio	0.281	-	-	0.074	-	-	0.089
HCM Control Delay (s)	25.4	-	-	12.5	-	-	15.8
HCM Lane LOS	D	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.1	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	2.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	9	41	19	11	42
Future Vol, veh/h	24	9	41	19	11	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	34	13	58	27	15	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	161	72	0	0	85	0
Stage 1	72	-	-	-	-	-
Stage 2	89	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	830	990	-	-	1512	-
Stage 1	951	-	-	-	-	-
Stage 2	934	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	822	990	-	-	1512	-
Mov Cap-2 Maneuver	822	-	-	-	-	-
Stage 1	951	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	1.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	862	1512	-
HCM Lane V/C Ratio	-	-	0.054	0.01	-
HCM Control Delay (s)	-	-	9.4	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2277	21	0	2347	60	0	0	30	0	0	66
Future Vol, veh/h	0	2277	21	0	2347	60	0	0	30	0	0	66
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2372	22	0	2445	63	0	0	31	0	0	69

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1197	-	-	1254
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.9	-	-	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	231	0	0	216
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	231	-	-	216
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

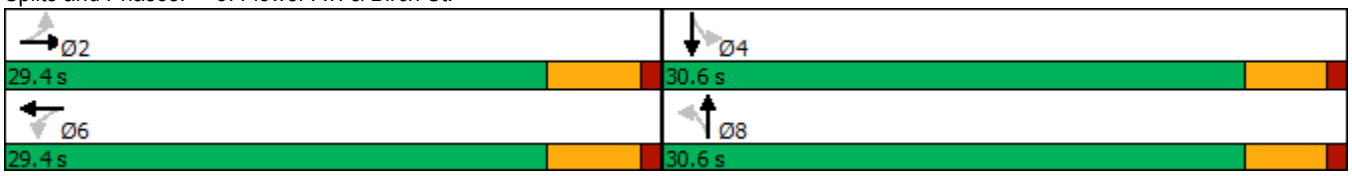
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23	29.3
HCM LOS			C	D

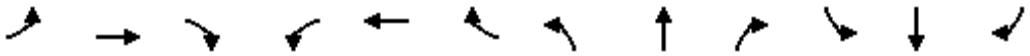
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	231	-	-	-	-	216
HCM Lane V/C Ratio	0.135	-	-	-	-	0.318
HCM Control Delay (s)	23	-	-	-	-	29.3
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	-	1.3

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	28	1226	108	1268	18	12	30	2
Future Volume (vph)	28	1226	108	1268	18	12	30	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	28.9	28.9	28.9	28.9		13.0		13.0
Actuated g/C Ratio	0.70	0.70	0.70	0.70		0.31		0.31
v/c Ratio	0.13	0.50	0.48	0.52		0.20		0.12
Control Delay	11.0	9.6	24.5	10.0		11.5		10.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	11.0	9.6	24.5	10.0		11.5		10.3
LOS	B	A	C	B		B		B
Approach Delay		9.7		11.2		11.5		10.3
Approach LOS		A		B		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 41.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.52	
Intersection Signal Delay: 10.5	Intersection LOS: B
Intersection Capacity Utilization 66.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1226	8	108	1268	9	18	12	67	30	2	18
Future Volume (veh/h)	28	1226	8	108	1268	9	18	12	67	30	2	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1238	7	109	1281	9	18	12	38	30	2	14
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	341	2151	12	353	2147	15	158	67	132	272	41	68
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	405	3623	20	423	3616	25	257	455	902	777	276	461
Grp Volume(v), veh/h	28	607	638	109	629	661	68	0	0	46	0	0
Grp Sat Flow(s),veh/h/ln	405	1777	1867	423	1777	1865	1615	0	0	1513	0	0
Q Serve(g_s), s	1.8	8.0	8.0	8.1	8.4	8.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.2	8.0	8.0	16.1	8.4	8.4	1.3	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.26		0.56	0.65		0.30
Lane Grp Cap(c), veh/h	341	1055	1108	353	1055	1107	358	0	0	380	0	0
V/C Ratio(X)	0.08	0.58	0.58	0.31	0.60	0.60	0.19	0.00	0.00	0.12	0.00	0.00
Avail Cap(c_a), veh/h	360	1139	1197	373	1139	1195	1206	0	0	1154	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.0	4.7	4.7	9.7	4.8	4.8	14.3	0.0	0.0	14.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.5	0.8	0.7	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.0	3.1	1.0	2.4	2.5	0.8	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.1	5.4	5.3	10.2	5.6	5.5	14.6	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1273			1399			68			46	
Approach Delay, s/veh		5.4			5.9			14.6			14.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.6		10.1		27.6		10.1				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		12.2		2.9		18.1		3.3				
Green Ext Time (p_c), s		7.0		0.2		4.4		0.3				

Intersection Summary												
HCM 6th Ctrl Delay			6.0									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	11	0	23	1	0	1	46	103	4	5	74	28
Future Vol, veh/h	11	0	23	1	0	1	46	103	4	5	74	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	0	32	1	0	1	64	143	6	7	103	39

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	413	415	124	427	431	146	143	0	0	149	0	0
Stage 1	138	138	-	274	274	-	-	-	-	-	-	-
Stage 2	275	277	-	153	157	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	549	528	927	538	517	901	1440	-	-	1432	-	-
Stage 1	865	782	-	732	683	-	-	-	-	-	-	-
Stage 2	731	681	-	849	768	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	525	499	926	498	489	901	1439	-	-	1432	-	-
Mov Cap-2 Maneuver	525	499	-	498	489	-	-	-	-	-	-	-
Stage 1	822	777	-	696	650	-	-	-	-	-	-	-
Stage 2	694	648	-	816	763	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.2	10.6	2.3	0.4
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1439	-	-	743	641	1432	-	-
HCM Lane V/C Ratio	0.044	-	-	0.064	0.004	0.005	-	-
HCM Control Delay (s)	7.6	0	-	10.2	10.6	7.5	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.2	0	0	-	-

Intersection	
Int Delay, s/veh	29.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	2273	6	0	2328	94	0	0	8	18	0	80
Future Vol, veh/h	59	2273	6	0	2328	94	0	0	8	18	0	80
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	61	2343	6	0	2400	97	0	0	8	19	0	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2502	0	0	-	-	0	-	-	1178	3513	-	1254
Stage 1	-	-	-	-	-	-	-	-	-	2454	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1059	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	69	-	-	0	-	-	0	0	158	~ 7	0	140
Stage 1	-	-	-	0	-	-	0	0	-	~ 18	0	-
Stage 2	-	-	-	0	-	-	0	0	-	216	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	69	-	-	-	-	-	-	-	158	~ 2	-	139
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 2	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 2	-	-
Stage 2	-	-	-	-	-	-	-	-	-	24	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.5	0	29	$ 1333.8
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	158	69	-	-	-	-	2	139
HCM Lane V/C Ratio	0.052	0.882	-	-	-	-	9.278	0.593
HCM Control Delay (s)	29	176.8	-	-	-	-	$ 6982	63
HCM Lane LOS	D	F	-	-	-	-	F	F
HCM 95th %tile Q(veh)	0.2	4.3	-	-	-	-	3.9	3.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

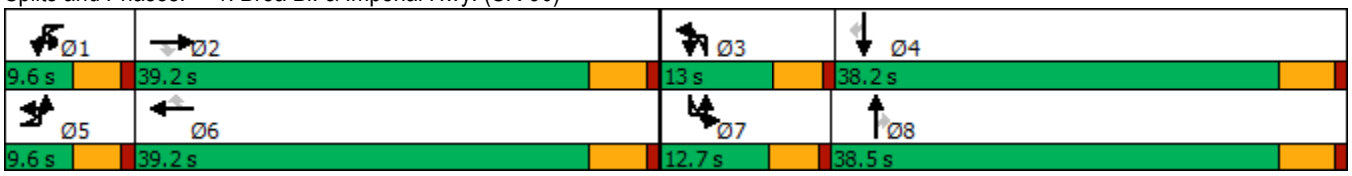
APPENDIX 6.3: GENERAL PLAN BUILDOUT WITHOUT PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

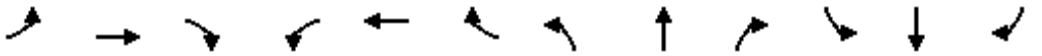
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	242	1469	399	164	1293	112	466	585	179	200	720	241
Future Volume (vph)	242	1469	399	164	1293	112	466	585	179	200	720	241
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.7	33.7	5.0	33.7	33.7	8.4	27.6	27.6	8.1	27.3	27.3
Actuated g/C Ratio	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.29	0.29
v/c Ratio	1.52	0.85	0.60	1.03	0.75	0.19	1.74	0.41	0.34	0.78	0.74	0.47
Control Delay	295.2	34.3	15.7	124.6	30.4	4.8	376.6	27.4	10.9	64.2	35.0	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	295.2	34.3	15.7	124.6	30.4	4.8	376.6	27.4	10.9	64.2	35.0	16.1
LOS	F	C	B	F	C	A	F	C	B	E	D	B
Approach Delay		60.7			38.4			157.4			36.1	
Approach LOS		E			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 94.3	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.74	
Intersection Signal Delay: 69.8	Intersection LOS: E
Intersection Capacity Utilization 86.5%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	1469	399	164	1293	112	466	585	179	200	720	241
Future Volume (veh/h)	242	1469	399	164	1293	112	466	585	179	200	720	241
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	255	1546	412	173	1361	110	491	616	180	211	758	237
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1817	554	174	1817	562	292	1464	447	275	1000	441
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	255	1546	412	173	1361	110	491	616	180	211	758	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	25.6	21.2	5.0	21.4	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Cycle Q Clear(g_c), s	5.0	25.6	21.2	5.0	21.4	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1817	554	174	1817	562	292	1464	447	275	1000	441
V/C Ratio(X)	1.47	0.85	0.74	0.99	0.75	0.20	1.68	0.42	0.40	0.77	0.76	0.54
Avail Cap(c_a), veh/h	174	1886	575	174	1886	583	292	1858	567	282	1281	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	27.2	25.8	43.2	25.9	20.4	41.6	26.5	26.3	40.9	30.0	27.8
Incr Delay (d2), s/veh	238.5	3.8	5.0	66.6	1.6	0.2	320.8	0.2	0.6	10.6	2.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.4	15.5	12.9	6.4	13.6	2.9	26.5	6.4	5.6	4.8	12.1	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	281.8	31.1	30.8	109.8	27.5	20.6	362.4	26.7	26.9	51.5	32.0	28.9
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2213			1644			1287			1206	
Approach Delay, s/veh		59.9			35.7			154.8			34.8	
Approach LOS		E			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.0	13.0	30.9	9.6	38.0	12.5	31.4
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	27.6	10.4	19.8	7.0	23.4	7.9	11.0
Green Ext Time (p_c), s	0.0	4.9	0.0	4.9	0.0	6.9	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	68.1
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy.

Cycle (sec):	100	Critical Vol./Cap.(X):	0.735
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	41	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	466	585	179	200	720	241	242	1469	399	164	1293	112
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	466	585	179	200	720	241	242	1469	399	164	1293	112
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	466	585	179	200	720	241	242	1469	399	164	1293	112
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	466	585	179	200	720	241	242	1469	399	164	1293	112
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	466	585	179	200	720	241	242	1469	399	164	1293	112
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.14	0.11	0.11	0.06	0.21	0.14	0.07	0.29	0.23	0.05	0.25	0.07
Crit Moves:	****				****			****			****	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	813	17	17	915	6	7	1	19	0	0	17
Future Vol, veh/h	0	813	17	17	915	6	7	1	19	0	0	17
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	924	19	19	1040	7	8	1	22	0	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	944	0	0	1483	2014	463	-	-	528
Stage 1	-	-	-	-	-	-	925	925	-	-	-	-
Stage 2	-	-	-	-	-	-	558	1089	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	722	-	-	87	58	546	0	0	495
Stage 1	0	-	-	-	-	-	290	346	-	0	0	-
Stage 2	0	-	-	-	-	-	482	290	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	721	-	-	82	56	545	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	167	-	-	-	-
Stage 1	-	-	-	-	-	-	290	346	-	-	-	-
Stage 2	-	-	-	-	-	-	451	281	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.2	12.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	353	-	-	721	-	-	493
HCM Lane V/C Ratio	0.087	-	-	0.027	-	-	0.039
HCM Control Delay (s)	16.2	-	-	10.1	-	-	12.6
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	17	21	1	32	21
Future Vol, veh/h	5	17	21	1	32	21
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	9	30	37	2	56	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	191	49	0	0	43	0
Stage 1	42	-	-	-	-	-
Stage 2	149	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	798	1020	-	-	1566	-
Stage 1	980	-	-	-	-	-
Stage 2	879	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	765	1009	-	-	1560	-
Mov Cap-2 Maneuver	765	-	-	-	-	-
Stage 1	976	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	4.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	941	1560	-
HCM Lane V/C Ratio	-	-	0.041	0.036	-
HCM Control Delay (s)	-	-	9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1996	15	0	2028	22	0	0	41	0	0	26
Future Vol, veh/h	0	1996	15	0	2028	22	0	0	41	0	0	26
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2058	15	0	2091	23	0	0	42	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1040	-	-	1057
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	235	0	0	229
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	234	-	-	229
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

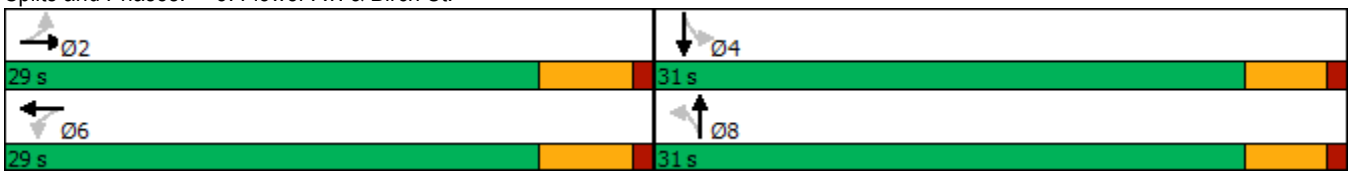
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.7	22.8
HCM LOS			C	C

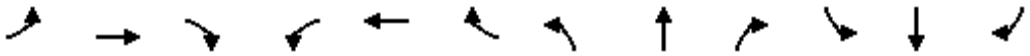
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	234	-	-	-	-	229
HCM Lane V/C Ratio	0.181	-	-	-	-	0.117
HCM Control Delay (s)	23.7	-	-	-	-	22.8
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.4

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	21	736	205	728	177	53	53	12
Future Volume (vph)	21	736	205	728	177	53	53	12
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.1	24.1	24.1	24.1		16.5		15.9
Actuated g/C Ratio	0.48	0.48	0.48	0.48		0.33		0.31
v/c Ratio	0.11	0.60	1.29	0.52		0.69		0.22
Control Delay	11.5	12.4	188.4	11.7		22.3		11.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	11.5	12.4	188.4	11.7		22.3		11.0
LOS	B	B	F	B		C		B
Approach Delay		12.4		50.1		22.3		11.0
Approach LOS		B		D		C		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 50.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.29	
Intersection Signal Delay: 30.1	Intersection LOS: C
Intersection Capacity Utilization 69.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	736	109	205	728	12	177	53	37	53	12	15
Future Volume (veh/h)	21	736	109	205	728	12	177	53	37	53	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	866	127	241	856	14	208	62	29	62	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	334	1481	217	293	1711	28	442	124	48	442	97	55
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	602	3096	454	537	3576	58	984	383	147	978	298	168
Grp Volume(v), veh/h	25	497	496	241	425	445	299	0	0	86	0	0
Grp Sat Flow(s),veh/h/ln	602	1777	1773	537	1777	1858	1514	0	0	1445	0	0
Q Serve(g_s), s	1.5	10.1	10.1	13.7	8.2	8.2	6.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.6	10.1	10.1	23.8	8.2	8.2	8.0	0.0	0.0	1.9	0.0	0.0
Prop In Lane	1.00		0.26	1.00		0.03	0.70		0.10	0.72		0.12
Lane Grp Cap(c), veh/h	334	850	848	293	850	889	614	0	0	594	0	0
V/C Ratio(X)	0.07	0.58	0.58	0.82	0.50	0.50	0.49	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	334	850	848	293	850	889	918	0	0	875	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.2	9.4	9.4	20.7	8.9	8.9	13.9	0.0	0.0	11.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.0	1.0	17.1	0.5	0.4	0.6	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	6.1	6.1	7.1	4.3	4.5	4.6	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.3	10.4	10.4	37.8	9.4	9.3	14.5	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	B	B	D	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1018			1111			299			86	
Approach Delay, s/veh		10.5			15.5			14.5			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		20.8		29.0		20.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		12.1		3.9		25.8		10.0				
Green Ext Time (p_c), s		5.4		0.4		0.0		1.7				

Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	23	0	0	0	0	2	0	0	0	35	0	53
Future Vol, veh/h	23	0	0	0	0	2	0	0	0	35	0	53
Conflicting Peds, #/hr	0	0	0	0	0	56	0	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	59	59	59	59	59	59	59	59	59	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	39	0	0	0	0	3	0	0	0	59	0	90

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	230	172	54	163	217	56	99	0	0	0	0	0
Stage 1	172	172	-	0	0	-	-	-	-	-	-	-
Stage 2	58	0	-	163	217	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	725	721	1013	802	681	1011	1494	-	-	-	-	-
Stage 1	830	756	-	-	-	-	-	-	-	-	-	-
Stage 2	954	-	-	839	723	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	678	715	1004	802	675	957	1481	-	-	-	-	-
Mov Cap-2 Maneuver	678	715	-	802	675	-	-	-	-	-	-	-
Stage 1	823	749	-	-	-	-	-	-	-	-	-	-
Stage 2	900	-	-	839	716	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.6	8.8	0	
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1481	-	-	678	957	-	-	-
HCM Lane V/C Ratio	-	-	-	0.057	0.004	-	-	-
HCM Control Delay (s)	0	-	-	10.6	8.8	-	-	-
HCM Lane LOS	A	-	-	B	A	-	-	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1989	3	0	2050	0	5
Future Vol, veh/h	0	1989	3	0	2050	0	5
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2139	3	0	2204	0	5

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1609	0	0	-	-	-	1073
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	200	-	-	0	-	0	185
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	200	-	-	-	-	-	185
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

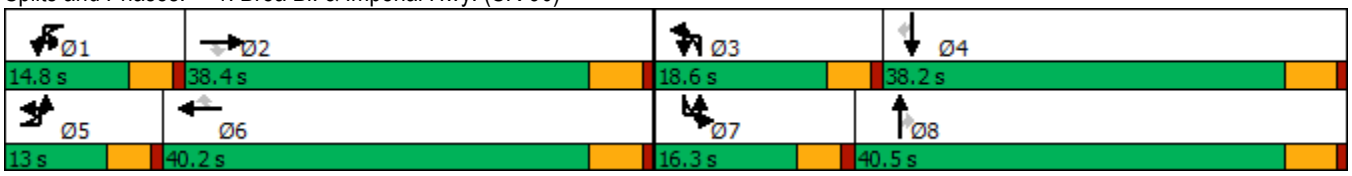
Approach	EB	WB	NB
HCM Control Delay, s	0	0	25
HCM LOS			D

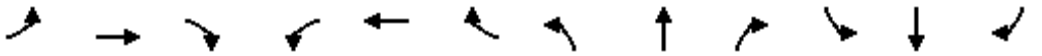
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	185	200	-	-	-
HCM Lane V/C Ratio	0.029	-	-	-	-
HCM Control Delay (s)	25	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	341	1445	384	335	1552	180	452	672	261	315	635	342
Future Volume (vph)	341	1445	384	335	1552	180	452	672	261	315	635	342
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	30.0	30.0	11.7	27.7	27.7
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.33	0.33	0.13	0.29	0.29	0.11	0.26	0.26
v/c Ratio	1.45	0.97	0.64	1.17	0.99	0.33	1.15	0.50	0.49	0.96	0.73	0.69
Control Delay	259.5	52.8	19.5	148.5	55.0	13.0	133.7	32.1	14.4	86.8	40.0	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	259.5	52.8	19.5	148.5	55.0	13.0	133.7	32.1	14.4	86.8	40.0	24.6
LOS	F	D	B	F	D	B	F	C	B	F	D	C
Approach Delay		79.4			66.4			61.9			47.4	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 104.9	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.45	
Intersection Signal Delay: 66.0	Intersection LOS: E
Intersection Capacity Utilization 94.9%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	341	1445	384	335	1552	180	452	672	261	315	635	342
Future Volume (veh/h)	341	1445	384	335	1552	180	452	672	261	315	635	342
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	367	1554	271	360	1669	137	486	723	178	339	683	309
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.26	0.26
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1565
Grp Volume(v), veh/h	367	1554	271	360	1669	137	486	723	178	339	683	309
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1565
Q Serve(g_s), s	8.4	30.9	14.9	10.2	33.4	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Cycle Q Clear(g_c), s	8.4	30.9	14.9	10.2	33.4	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
V/C Ratio(X)	1.42	0.96	0.55	1.15	0.97	0.26	1.13	0.51	0.41	0.94	0.75	0.77
Avail Cap(c_a), veh/h	258	1627	494	313	1716	528	430	1740	529	360	1132	499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.6	34.6	29.1	46.7	33.9	25.0	44.8	31.4	30.4	45.6	35.4	35.7
Incr Delay (d2), s/veh	210.9	13.2	1.3	97.3	15.7	0.3	83.7	0.3	0.6	32.6	2.2	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	18.0	20.3	9.5	13.7	22.7	4.4	16.5	8.6	6.5	9.9	12.6	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	258.5	47.8	30.4	144.0	49.6	25.3	128.5	31.7	31.1	78.2	37.6	41.4
LnGrp LOS	F	D	C	F	D	C	F	C	C	E	D	D
Approach Vol, veh/h		2192			2166			1387			1331	
Approach Delay, s/veh		80.9			63.8			65.5			48.8	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.8	13.0	40.2	16.3	34.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	32.9	16.0	20.9	10.4	35.4	13.0	14.3
Green Ext Time (p_c), s	0.0	0.1	0.0	4.5	0.0	0.0	0.0	5.5

Intersection Summary	
HCM 6th Ctrl Delay	66.6
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy.

Cycle (sec):	100	Critical Vol./Cap.(X):	0.789
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	50	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	452	672	261	315	635	342	341	1445	384	335	1552	180
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	452	672	261	315	635	342	341	1445	384	335	1552	180
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	452	672	261	315	635	342	341	1445	384	335	1552	180
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	452	672	261	315	635	342	341	1445	384	335	1552	180
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	452	672	261	315	635	342	341	1445	384	335	1552	180
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.13	0.13	0.15	0.09	0.19	0.20	0.10	0.28	0.23	0.10	0.30	0.11
Crit Moves:	****					****	****				****	

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1081	42	27	1210	23	16	1	78	0	0	24
Future Vol, veh/h	0	1081	42	27	1210	23	16	1	78	0	0	24
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1228	48	31	1375	26	18	1	89	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1285	0	0	1987	2703	623	-	-	704
Stage 1	-	-	-	-	-	-	1237	1237	-	-	-	-
Stage 2	-	-	-	-	-	-	750	1466	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	536	-	-	36	21	429	0	0	379
Stage 1	0	-	-	-	-	-	186	246	-	0	0	-
Stage 2	0	-	-	-	-	-	369	191	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	531	-	-	32	20	425	-	-	378
Mov Cap-2 Maneuver	-	-	-	-	-	-	121	103	-	-	-	-
Stage 1	-	-	-	-	-	-	186	244	-	-	-	-
Stage 2	-	-	-	-	-	-	322	179	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.4	15.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	292	-	-	531	-	-	378
HCM Lane V/C Ratio	0.37	-	-	0.058	-	-	0.072
HCM Control Delay (s)	24.4	-	-	12.2	-	-	15.3
HCM Lane LOS	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.6	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	9	22	32	7	26	56
Future Vol, veh/h	9	22	32	7	26	56
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	33	48	11	39	85

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	218	58	0	0	60	0
Stage 1	55	-	-	-	-	-
Stage 2	163	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	770	1008	-	-	1544	-
Stage 1	968	-	-	-	-	-
Stage 2	866	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	748	1004	-	-	1543	-
Mov Cap-2 Maneuver	748	-	-	-	-	-
Stage 1	967	-	-	-	-	-
Stage 2	843	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.2	0	2.3
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	913	1543	-
HCM Lane V/C Ratio	-	-	0.051	0.026	-
HCM Control Delay (s)	-	-	9.2	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2048	24	0	2182	39	0	0	27	0	0	65
Future Vol, veh/h	0	2048	24	0	2182	39	0	0	27	0	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2381	28	0	2537	45	0	0	31	0	0	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1205	-	-	1291
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	280	0	0	256
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	280	-	-	256
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

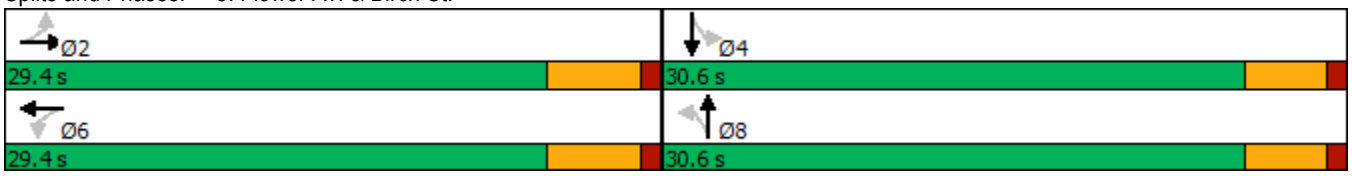
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.5	24.8
HCM LOS			C	C

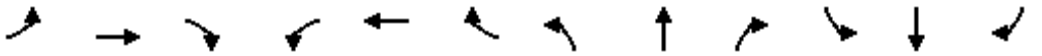
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	280	-	-	-	-	256
HCM Lane V/C Ratio	0.112	-	-	-	-	0.295
HCM Control Delay (s)	19.5	-	-	-	-	24.8
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.2

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	29	1078	162	1123	118	41	38	3
Future Volume (vph)	29	1078	162	1123	118	41	38	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.5	24.5	24.5	24.5		14.7		14.5
Actuated g/C Ratio	0.50	0.50	0.50	0.50		0.30		0.30
v/c Ratio	0.23	0.74	1.27	0.73		0.61		0.17
Control Delay	15.0	15.2	190.0	15.1		19.6		10.7
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	15.0	15.2	190.0	15.1		19.6		10.7
LOS	B	B	F	B		B		B
Approach Delay		15.2		36.7		19.6		10.7
Approach LOS		B		D		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 49.1	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.27	
Intersection Signal Delay: 25.6	Intersection LOS: C
Intersection Capacity Utilization 75.5%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1078	75	162	1123	22	118	41	73	38	3	23
Future Volume (veh/h)	29	1078	75	162	1123	22	118	41	73	38	3	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1211	83	182	1262	23	133	46	55	43	3	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	1621	111	219	1716	31	362	127	116	456	41	80
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	407	3372	231	403	3570	65	770	391	357	1015	126	248
Grp Volume(v), veh/h	33	637	657	182	628	657	234	0	0	56	0	0
Grp Sat Flow(s),veh/h/ln	407	1777	1826	403	1777	1858	1517	0	0	1389	0	0
Q Serve(g_s), s	3.6	14.6	14.7	9.5	14.3	14.3	4.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.9	14.6	14.7	24.2	14.3	14.3	6.0	0.0	0.0	1.2	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.04	0.57		0.24	0.77		0.18
Lane Grp Cap(c), veh/h	223	854	878	219	854	893	605	0	0	577	0	0
V/C Ratio(X)	0.15	0.75	0.75	0.83	0.74	0.74	0.39	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	223	854	878	219	854	893	891	0	0	828	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.7	10.6	10.6	23.2	10.5	10.5	13.4	0.0	0.0	11.9	0.0	0.0
Incr Delay (d2), s/veh	0.3	3.6	3.6	22.6	3.3	3.2	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	9.2	9.5	6.0	8.4	8.7	3.5	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.0	14.2	14.2	45.8	13.8	13.7	13.8	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	D	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1327			1467			234			56	
Approach Delay, s/veh		14.3			17.7			13.8			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.9		29.4		20.9				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.9		3.2		26.2		8.0				
Green Ext Time (p_c), s		3.2		0.2		0.0		1.3				

Intersection Summary												
HCM 6th Ctrl Delay			15.8									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	0	0	1	0	0	0	21	0	7
Future Vol, veh/h	0	0	0	0	0	1	0	0	0	21	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	92	92	78	78	92	92	92	78	92	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	1	0	0	0	27	0	9

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	60	59	5	59	63	0	9	0	0	0	0	0
Stage 1	59	59	-	0	0	-	-	-	-	-	-	-
Stage 2	1	0	-	59	63	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	936	832	1078	937	828	-	1611	-	-	-	-	-
Stage 1	953	846	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	953	842	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	832	1078	937	828	-	1611	-	-	-	-	-
Mov Cap-2 Maneuver	-	832	-	937	828	-	-	-	-	-	-	-
Stage 1	953	846	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	953	842	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0		0	
HCM LOS	A	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1611	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-	-	-	-
HCM Lane LOS	A	-	-	A	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2037	15	0	2222	0	3
Future Vol, veh/h	0	2037	15	0	2222	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2263	17	0	2469	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1802	0	0	-	-	-	1140
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	156	-	-	0	-	0	167
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	156	-	-	-	-	-	167
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

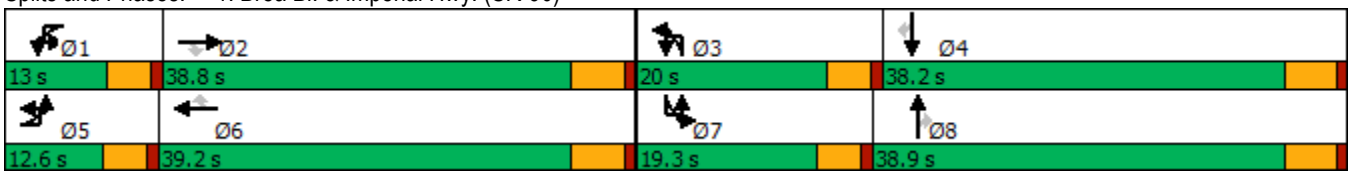
Approach	EB	WB	NB
HCM Control Delay, s	0	0	27
HCM LOS			D

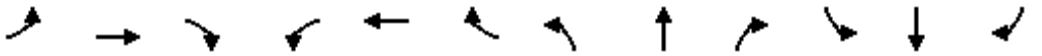
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	167	156	-	-	-
HCM Lane V/C Ratio	0.02	-	-	-	-
HCM Control Delay (s)	27	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	1565	475	275	1552	174	545	839	252	310	787	256
Future Volume (vph)	265	1565	475	275	1552	174	545	839	252	310	787	256
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.4	33.4	8.4	33.8	33.8	15.4	32.0	32.0	13.5	30.1	30.1
Actuated g/C Ratio	0.07	0.31	0.31	0.08	0.32	0.32	0.14	0.30	0.30	0.13	0.28	0.28
v/c Ratio	1.14	1.01	0.73	1.13	0.99	0.31	1.22	0.56	0.44	0.79	0.81	0.48
Control Delay	148.9	61.9	22.9	143.9	56.9	13.0	159.1	33.5	13.4	61.0	43.0	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	148.9	61.9	22.9	143.9	56.9	13.0	159.1	33.5	13.4	61.0	43.0	15.5
LOS	F	E	C	F	E	B	F	C	B	E	D	B
Approach Delay		63.9			65.0			72.2			41.9	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 107.2	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.22	
Intersection Signal Delay: 62.0	Intersection LOS: E
Intersection Capacity Utilization 94.6%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	1565	475	275	1552	174	545	839	252	310	787	256
Future Volume (veh/h)	265	1565	475	275	1552	174	545	839	252	310	787	256
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	270	1597	315	281	1584	118	556	856	153	316	803	220
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	270	1597	315	281	1584	118	556	856	153	316	803	220
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	32.9	18.3	8.4	32.3	5.8	15.4	14.9	8.0	10.3	22.5	12.7
Cycle Q Clear(g_c), s	8.0	32.9	18.3	8.4	32.3	5.8	15.4	14.9	8.0	10.3	22.5	12.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
V/C Ratio(X)	1.12	0.99	0.64	1.11	0.97	0.23	1.20	0.56	0.33	0.84	0.83	0.52
Avail Cap(c_a), veh/h	241	1614	492	253	1633	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.0	31.0	48.6	35.4	26.4	45.1	31.2	28.8	45.7	36.2	32.7
Incr Delay (d2), s/veh	94.2	19.8	2.8	89.5	15.7	0.2	108.6	0.4	0.4	10.6	5.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.7	22.5	11.4	11.0	22.1	3.9	20.4	10.1	5.4	8.0	15.4	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	143.0	55.8	33.8	138.1	51.1	26.7	153.7	31.6	29.2	56.3	41.2	33.7
LnGrp LOS	F	E	C	F	D	C	F	C	C	E	D	C
Approach Vol, veh/h		2182			1983			1565			1339	
Approach Delay, s/veh		63.4			62.0			74.7			43.5	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.9	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	34.9	17.4	24.5	10.0	34.3	12.3	16.9
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	61.7
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Base Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy.

Cycle (sec):	100	Critical Vol./Cap.(X):	0.830
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	59	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	545	839	252	310	787	256	265	1565	475	275	1552	174
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	545	839	252	310	787	256	265	1565	475	275	1552	174
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	545	839	252	310	787	256	265	1565	475	275	1552	174
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	545	839	252	310	787	256	265	1565	475	275	1552	174
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	545	839	252	310	787	256	265	1565	475	275	1552	174
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.15	0.09	0.23	0.15	0.08	0.31	0.28	0.08	0.30	0.10
Crit Moves:	****				****			****			****	

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1214	37	35	1349	22	6	7	48	0	0	30
Future Vol, veh/h	0	1214	37	35	1349	22	6	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1320	40	38	1466	24	7	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1362	0	0	2131	2894	662	-	-	751
Stage 1	-	-	-	-	-	-	1322	1322	-	-	-	-
Stage 2	-	-	-	-	-	-	809	1572	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	501	-	-	28	16	404	0	0	353
Stage 1	0	-	-	-	-	-	165	224	-	0	0	-
Stage 2	0	-	-	-	-	-	340	169	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	500	-	-	24	15	403	-	-	351
Mov Cap-2 Maneuver	-	-	-	-	-	-	105	90	-	-	-	-
Stage 1	-	-	-	-	-	-	165	224	-	-	-	-
Stage 2	-	-	-	-	-	-	285	155	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	25.6	16.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	240	-	-	500	-	-	351
HCM Lane V/C Ratio	0.276	-	-	0.076	-	-	0.093
HCM Control Delay (s)	25.6	-	-	12.8	-	-	16.3
HCM Lane LOS	D	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.1	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	7	41	1	6	42
Future Vol, veh/h	6	7	41	1	6	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	10	58	1	8	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	134	59	0	0	59	0
Stage 1	59	-	-	-	-	-
Stage 2	75	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	860	1007	-	-	1545	-
Stage 1	964	-	-	-	-	-
Stage 2	948	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	856	1007	-	-	1545	-
Mov Cap-2 Maneuver	856	-	-	-	-	-
Stage 1	964	-	-	-	-	-
Stage 2	943	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.9	0	0.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	931	1545	-
HCM Lane V/C Ratio	-	-	0.02	0.005	-
HCM Control Delay (s)	-	-	8.9	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2200	21	0	2274	42	0	0	30	0	0	48
Future Vol, veh/h	0	2200	21	0	2274	42	0	0	30	0	0	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2292	22	0	2369	44	0	0	31	0	0	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1157	-	-	1207
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	235	0	0	221
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	235	-	-	221
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

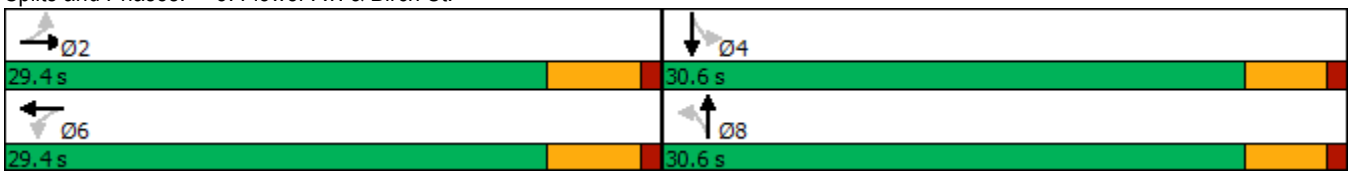
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.7	26
HCM LOS			C	D

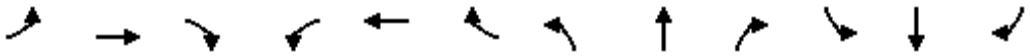
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	235	-	-	-	-	221
HCM Lane V/C Ratio	0.133	-	-	-	-	0.226
HCM Control Delay (s)	22.7	-	-	-	-	26
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	-	0.8

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	28	1216	176	1258	82	12	30	2
Future Volume (vph)	28	1216	176	1258	82	12	30	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	27.1	27.1	27.1	27.1		13.2		13.2
Actuated g/C Ratio	0.61	0.61	0.61	0.61		0.30		0.30
v/c Ratio	0.16	0.60	1.06	0.60		0.40		0.11
Control Delay	12.3	11.8	114.0	11.7		15.1		9.9
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.3	11.8	114.0	11.7		15.1		9.9
LOS	B	B	F	B		B		A
Approach Delay		11.8		24.2		15.1		9.9
Approach LOS		B		C		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.6	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.06	
Intersection Signal Delay: 18.0	Intersection LOS: B
Intersection Capacity Utilization 70.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1216	57	176	1258	9	82	12	79	30	2	17
Future Volume (veh/h)	28	1216	57	176	1258	9	82	12	79	30	2	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1228	57	178	1271	9	83	12	50	30	2	13
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	305	1963	91	303	2053	15	276	60	107	324	42	92
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	409	3457	160	407	3616	26	707	296	528	907	206	452
Grp Volume(v), veh/h	28	631	654	178	624	656	145	0	0	45	0	0
Grp Sat Flow(s),veh/h/ln	409	1777	1841	407	1777	1865	1531	0	0	1565	0	0
Q Serve(g_s), s	2.1	10.1	10.2	14.0	10.0	10.0	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.1	10.1	10.2	24.2	10.0	10.0	3.4	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.57		0.34	0.67		0.29
Lane Grp Cap(c), veh/h	305	1009	1045	303	1009	1059	443	0	0	458	0	0
V/C Ratio(X)	0.09	0.63	0.63	0.59	0.62	0.62	0.33	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	305	1009	1045	303	1009	1059	1048	0	0	1035	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.2	6.2	6.2	16.0	6.1	6.1	14.8	0.0	0.0	13.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.2	1.2	2.9	1.2	1.1	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.9	5.1	3.2	4.1	4.3	2.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.3	7.4	7.4	19.0	7.3	7.3	15.3	0.0	0.0	14.0	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1313			1458			145			45	
Approach Delay, s/veh		7.4			8.7			15.3			14.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		13.2		29.4		13.2				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		14.1		2.9		26.2		5.4				
Green Ext Time (p_c), s		6.3		0.2		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			8.5									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	14	0	0	0	0	2	0	0	0	8	0	41
Future Vol, veh/h	14	0	0	0	0	2	0	0	0	8	0	41
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	92	92	72	72	92	92	92	72	92	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	0	0	0	0	3	0	0	0	11	0	57

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	54	52	30	51	80	0	58	0	0	0	0	0
Stage 1	52	52	-	0	0	-	-	-	-	-	-	-
Stage 2	2	0	-	51	80	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	944	839	1044	948	810	-	1546	-	-	-	-	-
Stage 1	961	852	-	-	-	-	-	-	-	-	-	-
Stage 2	1021	-	-	962	828	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	838	1043	948	809	-	1545	-	-	-	-	-
Mov Cap-2 Maneuver	-	838	-	948	809	-	-	-	-	-	-	-
Stage 1	960	851	-	-	-	-	-	-	-	-	-	-
Stage 2	1021	-	-	962	827	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1545	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	-	-	-	-
HCM Lane LOS	A	-	-	-	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2255	6	0	2316	0	8
Future Vol, veh/h	0	2255	6	0	2316	0	8
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2325	6	0	2388	0	8

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1743	0	0	-	-	-	1169
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	168	-	-	0	-	0	160
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	168	-	-	-	-	-	160
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	28.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	160	168	-	-	-
HCM Lane V/C Ratio	0.052	-	-	-	-
HCM Control Delay (s)	28.7	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.2	0	-	-	-

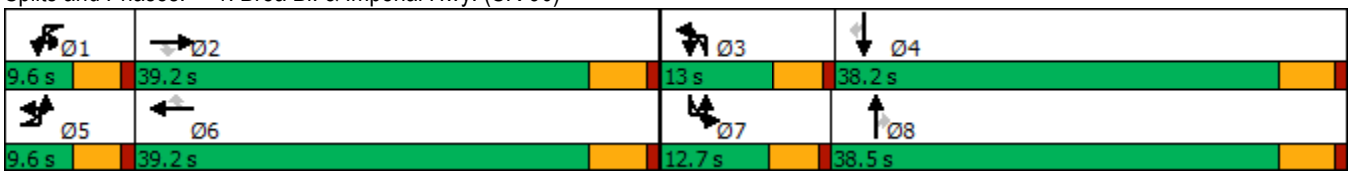
APPENDIX 6.4: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

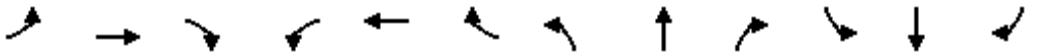
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	1472	399	170	1306	112	466	588	179	200	720	241
Future Volume (vph)	245	1472	399	170	1306	112	466	588	179	200	720	241
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	9.6	39.2	39.2	9.6	39.2	39.2	13.0	38.5	38.5	12.7	38.2	38.2
Total Split (%)	9.6%	39.2%	39.2%	9.6%	39.2%	39.2%	13.0%	38.5%	38.5%	12.7%	38.2%	38.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	5.0	33.7	33.7	5.0	33.7	33.7	8.4	27.6	27.6	8.1	27.3	27.3
Actuated g/C Ratio	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.29	0.29
v/c Ratio	1.54	0.85	0.60	1.07	0.76	0.19	1.74	0.42	0.34	0.78	0.74	0.47
Control Delay	302.4	34.4	15.8	133.7	30.6	4.8	376.6	27.5	10.9	64.3	35.1	16.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	302.4	34.4	15.8	133.7	30.6	4.8	376.6	27.5	10.9	64.3	35.1	16.1
LOS	F	C	B	F	C	A	F	C	B	E	D	B
Approach Delay		61.9			39.8			157.2			36.2	
Approach LOS		E			D			F			D	

Intersection Summary	
Cycle Length: 100	
Actuated Cycle Length: 94.3	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.74	
Intersection Signal Delay: 70.5	Intersection LOS: E
Intersection Capacity Utilization 86.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	1472	399	170	1306	112	466	588	179	200	720	241
Future Volume (veh/h)	245	1472	399	170	1306	112	466	588	179	200	720	241
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	258	1549	412	179	1375	110	491	619	180	211	758	237
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1818	554	174	1818	562	292	1464	447	275	1000	441
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	258	1549	412	179	1375	110	491	619	180	211	758	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	25.7	21.2	5.0	21.7	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Cycle Q Clear(g_c), s	5.0	25.7	21.2	5.0	21.7	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1818	554	174	1818	562	292	1464	447	275	1000	441
V/C Ratio(X)	1.48	0.85	0.74	1.03	0.76	0.20	1.68	0.42	0.40	0.77	0.76	0.54
Avail Cap(c_a), veh/h	174	1885	575	174	1885	583	292	1857	567	282	1281	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	27.2	25.8	43.3	26.0	20.4	41.6	26.5	26.3	40.9	30.1	27.9
Incr Delay (d2), s/veh	246.0	3.9	5.0	76.3	1.7	0.2	321.1	0.2	0.6	10.6	2.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.7	15.6	12.9	6.9	13.8	2.9	26.6	6.4	5.6	4.8	12.1	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	289.2	31.1	30.8	119.5	27.7	20.6	362.6	26.7	26.9	51.5	32.0	28.9
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2219			1664			1290			1206	
Approach Delay, s/veh		61.1			37.1			154.6			34.8	
Approach LOS		E			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.0	13.0	31.0	9.6	38.0	12.5	31.4
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	27.7	10.4	19.8	7.0	23.7	7.9	11.0
Green Ext Time (p_c), s	0.0	4.9	0.0	4.9	0.0	6.8	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	68.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy.

Cycle (sec):	100	Critical Vol./Cap.(X):	0.737
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	42	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	466	585	179	200	720	241	242	1469	399	164	1293	112
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	466	585	179	200	720	241	242	1469	399	164	1293	112
Added Vol:	0	3	0	0	0	0	3	3	0	6	13	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	466	588	179	200	720	241	245	1472	399	170	1306	112
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	466	588	179	200	720	241	245	1472	399	170	1306	112
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	466	588	179	200	720	241	245	1472	399	170	1306	112
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	466	588	179	200	720	241	245	1472	399	170	1306	112
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.14	0.12	0.11	0.06	0.21	0.14	0.07	0.29	0.23	0.05	0.26	0.07
Crit Moves:	****			****			****			****		

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	813	29	17	915	6	13	1	19	0	0	17
Future Vol, veh/h	0	813	29	17	915	6	13	1	19	0	0	17
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	924	33	19	1040	7	15	1	22	0	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	958	0	0	1483	2014	463	-	-	528
Stage 1	-	-	-	-	-	-	925	925	-	-	-	-
Stage 2	-	-	-	-	-	-	558	1089	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	714	-	-	87	58	546	0	0	495
Stage 1	0	-	-	-	-	-	290	346	-	0	0	-
Stage 2	0	-	-	-	-	-	482	290	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	713	-	-	82	56	545	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	167	-	-	-	-
Stage 1	-	-	-	-	-	-	290	346	-	-	-	-
Stage 2	-	-	-	-	-	-	451	281	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.3	12.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	308	-	-	713	-	-	493
HCM Lane V/C Ratio	0.122	-	-	0.027	-	-	0.039
HCM Control Delay (s)	18.3	-	-	10.2	-	-	12.6
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	5.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	66	23	21	53	44	21
Future Vol, veh/h	66	23	21	53	44	21
Conflicting Peds, #/hr	0	7	0	4	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	116	40	37	93	77	37

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	279	95	0	0	134	0
Stage 1	88	-	-	-	-	-
Stage 2	191	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	711	962	-	-	1451	-
Stage 1	935	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	670	952	-	-	1445	-
Mov Cap-2 Maneuver	670	-	-	-	-	-
Stage 1	931	-	-	-	-	-
Stage 2	796	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	5.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	726	1445	-
HCM Lane V/C Ratio	-	-	0.215	0.053	-
HCM Control Delay (s)	-	-	11.3	7.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.8	0.2	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1999	15	0	1986	74	0	0	41	0	0	87
Future Vol, veh/h	0	1999	15	0	1986	74	0	0	41	0	0	87
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2061	15	0	2047	76	0	0	42	0	0	90

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1041	-	-	1062
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.4
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	234	0	0	235
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	233	-	-	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

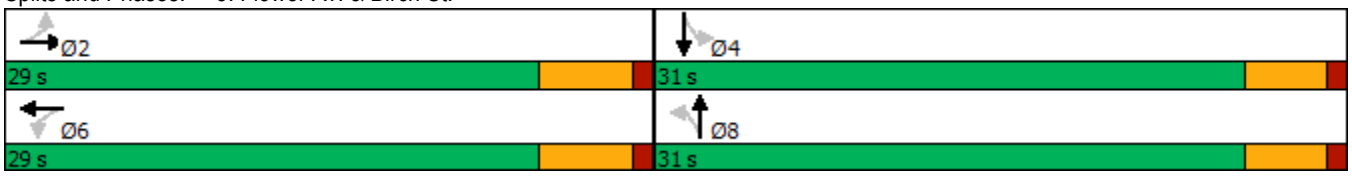
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.8	29.5
HCM LOS			C	D

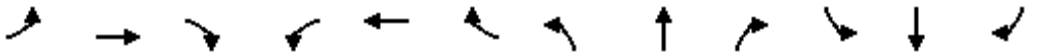
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	233	-	-	-	-	235
HCM Lane V/C Ratio	0.181	-	-	-	-	0.382
HCM Control Delay (s)	23.8	-	-	-	-	29.5
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.6	-	-	-	-	1.7

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	21	736	217	728	177	53	53	12
Future Volume (vph)	21	736	217	728	177	53	53	12
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.0	29.0	29.0	29.0	31.0	31.0	31.0	31.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	51.7%	51.7%	51.7%	51.7%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.1	24.1	24.1	24.1		16.8		16.1
Actuated g/C Ratio	0.47	0.47	0.47	0.47		0.33		0.32
v/c Ratio	0.11	0.60	1.39	0.52		0.72		0.22
Control Delay	11.6	12.6	228.1	11.9		22.8		11.0
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	11.6	12.6	228.1	11.9		22.8		11.0
LOS	B	B	F	B		C		B
Approach Delay		12.6		60.9		22.8		11.0
Approach LOS		B		E		C		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 50.8	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.39	
Intersection Signal Delay: 35.0	Intersection LOS: D
Intersection Capacity Utilization 70.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	736	109	217	728	12	177	53	54	53	12	15
Future Volume (veh/h)	21	736	109	217	728	12	177	53	54	53	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	866	127	255	856	14	208	62	49	62	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	1462	214	286	1689	28	422	123	78	441	97	55
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	602	3096	454	537	3576	58	913	369	233	955	290	164
Grp Volume(v), veh/h	25	497	496	255	425	445	319	0	0	86	0	0
Grp Sat Flow(s),veh/h/ln	602	1777	1773	537	1777	1858	1514	0	0	1409	0	0
Q Serve(g_s), s	1.5	10.3	10.3	13.5	8.4	8.4	6.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.9	10.3	10.3	23.8	8.4	8.4	8.7	0.0	0.0	1.9	0.0	0.0
Prop In Lane	1.00		0.26	1.00		0.03	0.65		0.15	0.72		0.12
Lane Grp Cap(c), veh/h	327	839	837	286	839	878	623	0	0	592	0	0
V/C Ratio(X)	0.08	0.59	0.59	0.89	0.51	0.51	0.51	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	327	839	837	286	839	878	904	0	0	850	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.7	9.7	9.7	21.4	9.2	9.2	14.0	0.0	0.0	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.1	1.1	27.3	0.5	0.5	0.7	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	6.3	6.3	8.6	4.5	4.7	5.0	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.8	10.9	10.9	48.7	9.7	9.7	14.6	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	D	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1018			1125			319			86	
Approach Delay, s/veh		10.9			18.6			14.6			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		21.4		29.0		21.4				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		12.3		3.9		25.8		10.7				
Green Ext Time (p_c), s		5.4		0.4		0.0		1.8				

Intersection Summary												
HCM 6th Ctrl Delay			14.8									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	40	0	0	0	0	2	0	0	0	35	0	65
Future Vol, veh/h	40	0	0	0	0	2	0	0	0	35	0	65
Conflicting Peds, #/hr	0	0	0	0	0	56	0	0	0	0	0	9
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	59	92	92	59	59	92	92	92	59	92	59
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	68	0	0	0	0	3	0	0	0	59	0	110

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	240	182	64	173	237	56	119	0	0	0	0	0
Stage 1	182	182	-	0	0	-	-	-	-	-	-	-
Stage 2	58	0	-	173	237	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	714	712	1000	790	664	1011	1469	-	-	-	-	-
Stage 1	820	749	-	-	-	-	-	-	-	-	-	-
Stage 2	954	-	-	829	709	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	668	706	991	790	658	957	1456	-	-	-	-	-
Mov Cap-2 Maneuver	668	706	-	790	658	-	-	-	-	-	-	-
Stage 1	813	742	-	-	-	-	-	-	-	-	-	-
Stage 2	900	-	-	829	703	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11	8.8	0	
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1456	-	-	668	957	-	-	-
HCM Lane V/C Ratio	-	-	-	0.101	0.004	-	-	-
HCM Control Delay (s)	0	-	-	11	8.8	-	-	-
HCM Lane LOS	A	-	-	B	A	-	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1992	3	0	2060	0	5
Future Vol, veh/h	0	1992	3	0	2060	0	5
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2142	3	0	2215	0	5

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1617	0	0	-	-	-	1075
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	198	-	-	0	-	0	185
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	198	-	-	-	-	-	185
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

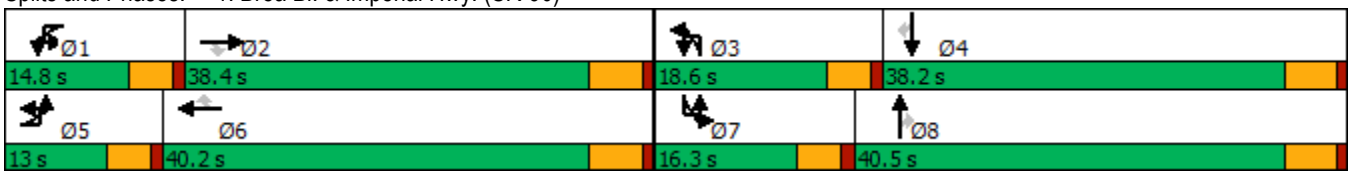
Approach	EB	WB	NB
HCM Control Delay, s	0	0	25
HCM LOS			D

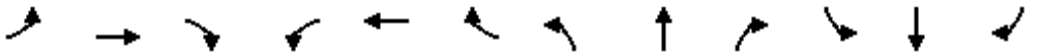
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	185	198	-	-	-
HCM Lane V/C Ratio	0.029	-	-	-	-
HCM Control Delay (s)	25	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	342	1446	384	336	1555	180	452	673	261	315	635	342
Future Volume (vph)	342	1446	384	336	1555	180	452	673	261	315	635	342
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	13.0	38.4	38.4	14.8	40.2	40.2	18.6	40.5	40.5	16.3	38.2	38.2
Total Split (%)	11.8%	34.9%	34.9%	13.5%	36.5%	36.5%	16.9%	36.8%	36.8%	14.8%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.4	33.1	33.1	10.2	34.9	34.9	14.0	30.0	30.0	11.7	27.7	27.7
Actuated g/C Ratio	0.08	0.32	0.32	0.10	0.33	0.33	0.13	0.29	0.29	0.11	0.26	0.26
v/c Ratio	1.45	0.97	0.64	1.17	0.99	0.33	1.15	0.50	0.49	0.96	0.73	0.69
Control Delay	261.1	52.9	19.5	149.6	55.4	13.1	133.7	32.2	14.4	86.8	40.0	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	261.1	52.9	19.5	149.6	55.4	13.1	133.7	32.2	14.4	86.8	40.0	24.6
LOS	F	D	B	F	E	B	F	C	B	F	D	C
Approach Delay		79.8			67.0			61.9			47.4	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 104.9	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.45	
Intersection Signal Delay: 66.3	Intersection LOS: E
Intersection Capacity Utilization 95.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	342	1446	384	336	1555	180	452	673	261	315	635	342
Future Volume (veh/h)	342	1446	384	336	1555	180	452	673	261	315	635	342
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	368	1555	271	361	1672	137	486	724	178	339	683	309
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.26	0.26
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1565
Grp Volume(v), veh/h	368	1555	271	361	1672	137	486	724	178	339	683	309
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1565
Q Serve(g_s), s	8.4	30.9	14.9	10.2	33.5	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Cycle Q Clear(g_c), s	8.4	30.9	14.9	10.2	33.5	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
V/C Ratio(X)	1.43	0.96	0.55	1.15	0.97	0.26	1.13	0.51	0.41	0.94	0.75	0.77
Avail Cap(c_a), veh/h	258	1627	494	313	1716	528	430	1740	529	360	1132	499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.6	34.6	29.1	46.7	33.9	25.0	44.8	31.4	30.4	45.6	35.4	35.7
Incr Delay (d2), s/veh	212.5	13.3	1.3	98.5	16.1	0.3	83.7	0.3	0.6	32.6	2.2	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	18.1	20.3	9.5	13.8	22.8	4.4	16.5	8.7	6.5	9.9	12.6	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	260.1	47.9	30.4	145.1	50.0	25.3	128.5	31.7	31.1	78.2	37.6	41.4
LnGrp LOS	F	D	C	F	D	C	F	C	C	E	D	D
Approach Vol, veh/h		2194			2170			1388			1331	
Approach Delay, s/veh		81.3			64.3			65.5			48.8	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.8	13.0	40.2	16.3	34.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	32.9	16.0	20.9	10.4	35.5	13.0	14.3
Green Ext Time (p_c), s	0.0	0.1	0.0	4.5	0.0	0.0	0.0	5.5

Intersection Summary	
HCM 6th Ctrl Delay	66.9
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy.

Cycle (sec):	100	Critical Vol./Cap.(X):	0.790
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	50	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	452	672	261	315	635	342	341	1445	384	335	1552	180
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	452	672	261	315	635	342	341	1445	384	335	1552	180
Added Vol:	0	1	0	0	0	0	1	1	0	1	3	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	452	673	261	315	635	342	342	1446	384	336	1555	180
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	452	673	261	315	635	342	342	1446	384	336	1555	180
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	452	673	261	315	635	342	342	1446	384	336	1555	180
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	452	673	261	315	635	342	342	1446	384	336	1555	180
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.13	0.13	0.15	0.09	0.19	0.20	0.10	0.28	0.23	0.10	0.30	0.11
Crit Moves:	****					****	****				****	

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1081	46	27	1210	23	17	1	78	0	0	24
Future Vol, veh/h	0	1081	46	27	1210	23	17	1	78	0	0	24
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1228	52	31	1375	26	19	1	89	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1289	0	0	1987	2703	623	-	-	704
Stage 1	-	-	-	-	-	-	1237	1237	-	-	-	-
Stage 2	-	-	-	-	-	-	750	1466	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	534	-	-	36	21	429	0	0	379
Stage 1	0	-	-	-	-	-	186	246	-	0	0	-
Stage 2	0	-	-	-	-	-	369	191	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	529	-	-	32	20	425	-	-	378
Mov Cap-2 Maneuver	-	-	-	-	-	-	121	103	-	-	-	-
Stage 1	-	-	-	-	-	-	186	244	-	-	-	-
Stage 2	-	-	-	-	-	-	322	179	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.9	15.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	288	-	-	529	-	-	378
HCM Lane V/C Ratio	0.379	-	-	0.058	-	-	0.072
HCM Control Delay (s)	24.9	-	-	12.2	-	-	15.3
HCM Lane LOS	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.7	-	-	0.2	-	-	0.2

Intersection	
Int Delay, s/veh	3.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	32	23	32	30	30	56
Future Vol, veh/h	32	23	32	30	30	56
Conflicting Peds, #/hr	0	3	0	1	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	66	66	66	66	66	66
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	35	48	45	45	85

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	247	75	0	0	94	0
Stage 1	72	-	-	-	-	-
Stage 2	175	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	741	986	-	-	1500	-
Stage 1	951	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	717	982	-	-	1499	-
Mov Cap-2 Maneuver	717	-	-	-	-	-
Stage 1	950	-	-	-	-	-
Stage 2	828	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10	0	2.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	808	1499	-
HCM Lane V/C Ratio	-	-	0.103	0.03	-
HCM Control Delay (s)	-	-	10	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1	-

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2049	24	0	2163	62	0	0	27	0	0	88
Future Vol, veh/h	0	2049	24	0	2163	62	0	0	27	0	0	88
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2383	28	0	2515	72	0	0	31	0	0	102

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1206	-	-	1294
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	279	0	0	255
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	279	-	-	255
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

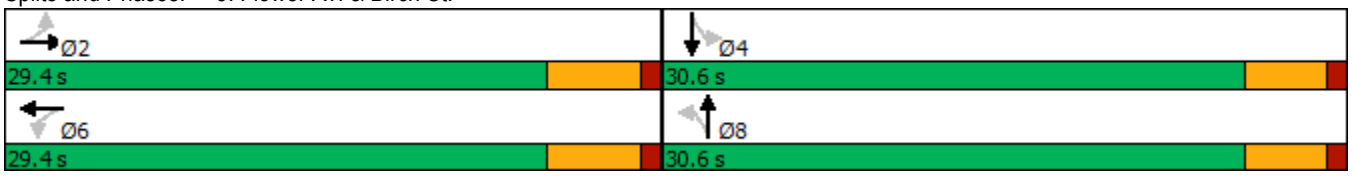
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.5	28.3
HCM LOS			C	D

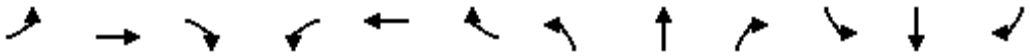
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	279	-	-	-	-	255
HCM Lane V/C Ratio	0.113	-	-	-	-	0.401
HCM Control Delay (s)	19.5	-	-	-	-	28.3
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.8

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	29	1078	166	1123	118	41	38	3
Future Volume (vph)	29	1078	166	1123	118	41	38	3
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	24.5	24.5	24.5	24.5		14.8		14.6
Actuated g/C Ratio	0.50	0.50	0.50	0.50		0.30		0.30
v/c Ratio	0.23	0.74	1.31	0.73		0.61		0.17
Control Delay	15.1	15.3	203.3	15.2		19.8		10.7
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	15.1	15.3	203.3	15.2		19.8		10.7
LOS	B	B	F	B		B		B
Approach Delay		15.3		39.0		19.8		10.7
Approach LOS		B		D		B		B

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 49.2	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.31	
Intersection Signal Delay: 26.7	Intersection LOS: C
Intersection Capacity Utilization 75.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1078	75	166	1123	22	118	41	77	38	3	23
Future Volume (veh/h)	29	1078	75	166	1123	22	118	41	77	38	3	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1211	83	187	1262	23	133	46	60	43	3	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	1621	111	219	1716	31	355	126	124	454	41	80
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	407	3372	231	403	3570	65	750	387	381	1008	125	246
Grp Volume(v), veh/h	33	637	657	187	628	657	239	0	0	56	0	0
Grp Sat Flow(s),veh/h/ln	407	1777	1826	403	1777	1858	1518	0	0	1380	0	0
Q Serve(g_s), s	3.6	14.6	14.7	9.5	14.3	14.3	4.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.9	14.6	14.7	24.2	14.3	14.3	6.2	0.0	0.0	1.2	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.04	0.56		0.25	0.77		0.18
Lane Grp Cap(c), veh/h	223	854	878	219	854	893	604	0	0	575	0	0
V/C Ratio(X)	0.15	0.75	0.75	0.85	0.74	0.74	0.40	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	223	854	878	219	854	893	890	0	0	824	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.7	10.6	10.6	23.2	10.5	10.5	13.5	0.0	0.0	11.9	0.0	0.0
Incr Delay (d2), s/veh	0.3	3.6	3.6	26.3	3.3	3.2	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	9.2	9.5	6.5	8.4	8.7	3.6	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.0	14.2	14.2	49.5	13.8	13.7	13.9	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	D	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1327			1472			239			56	
Approach Delay, s/veh		14.3			18.3			13.9			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		21.0		29.4		21.0				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.9		3.2		26.2		8.2				
Green Ext Time (p_c), s		3.2		0.2		0.0		1.4				

Intersection Summary												
HCM 6th Ctrl Delay			16.1									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	0	0	0	0	1	0	0	0	21	0	11
Future Vol, veh/h	4	0	0	0	0	1	0	0	0	21	0	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	92	92	78	78	92	92	92	78	92	78
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	5	0	0	0	0	1	0	0	0	27	0	14

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	62	61	7	61	68	0	14	0	0	0	0	0
Stage 1	61	61	-	0	0	-	-	-	-	-	-	-
Stage 2	1	0	-	61	68	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	933	830	1075	934	823	-	1604	-	-	-	-	-
Stage 1	950	844	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	950	838	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	830	1075	934	823	-	1604	-	-	-	-	-
Mov Cap-2 Maneuver	-	830	-	934	823	-	-	-	-	-	-	-
Stage 1	950	844	-	-	-	-	-	-	-	-	-	-
Stage 2	1022	-	-	950	838	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1604	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	-	-	-	-
HCM Lane LOS	A	-	-	-	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2038	15	0	2225	0	3
Future Vol, veh/h	0	2038	15	0	2225	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2264	17	0	2472	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1805	0	0	-	-	-	1141
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	155	-	-	0	-	0	167
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	155	-	-	-	-	-	167
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

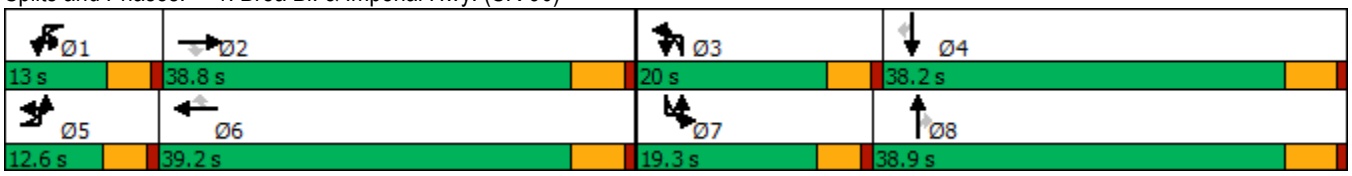
Approach	EB	WB	NB
HCM Control Delay, s	0	0	27
HCM LOS			D

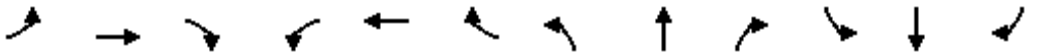
Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	167	155	-	-	-
HCM Lane V/C Ratio	0.02	-	-	-	-
HCM Control Delay (s)	27	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	268	1568	475	277	1556	174	545	842	252	310	787	256
Future Volume (vph)	268	1568	475	277	1556	174	545	842	252	310	787	256
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Detector Phase	5	2	2	1	6	6	3	8	8	7	4	4
Switch Phase												
Minimum Initial (s)	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	9.6	38.4	38.4	9.6	38.4	38.4	9.6	38.2	38.2	9.6	38.2	38.2
Total Split (s)	12.6	38.8	38.8	13.0	39.2	39.2	20.0	38.9	38.9	19.3	38.2	38.2
Total Split (%)	11.5%	35.3%	35.3%	11.8%	35.6%	35.6%	18.2%	35.4%	35.4%	17.5%	34.7%	34.7%
Yellow Time (s)	3.6	4.4	4.4	3.6	4.4	4.4	3.6	4.2	4.2	3.6	4.2	4.2
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	5.4	5.4	4.6	5.2	5.2	4.6	5.2	5.2
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	8.0	33.4	33.4	8.4	33.8	33.8	15.4	32.0	32.0	13.5	30.1	30.1
Actuated g/C Ratio	0.07	0.31	0.31	0.08	0.32	0.32	0.14	0.30	0.30	0.13	0.28	0.28
v/c Ratio	1.16	1.01	0.73	1.14	0.99	0.31	1.22	0.57	0.44	0.79	0.81	0.48
Control Delay	153.0	62.4	22.9	146.4	57.4	13.0	159.1	33.5	13.4	61.0	43.0	15.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	153.0	62.4	22.9	146.4	57.4	13.0	159.1	33.5	13.4	61.0	43.0	15.5
LOS	F	E	C	F	E	B	F	C	B	E	D	B
Approach Delay		64.8			65.9			72.2			41.9	
Approach LOS		E			E			E			D	

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 107.2	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.22	
Intersection Signal Delay: 62.5	Intersection LOS: E
Intersection Capacity Utilization 94.7%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 1: Brea Bl. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	268	1568	475	277	1556	174	545	842	252	310	787	256
Future Volume (veh/h)	268	1568	475	277	1556	174	545	842	252	310	787	256
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	273	1600	315	283	1588	118	556	859	153	316	803	220
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	273	1600	315	283	1588	118	556	859	153	316	803	220
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	33.0	18.3	8.4	32.4	5.8	15.4	15.0	8.0	10.3	22.5	12.7
Cycle Q Clear(g_c), s	8.0	33.0	18.3	8.4	32.4	5.8	15.4	15.0	8.0	10.3	22.5	12.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
V/C Ratio(X)	1.13	0.99	0.64	1.12	0.97	0.23	1.20	0.56	0.33	0.84	0.83	0.52
Avail Cap(c_a), veh/h	241	1614	492	253	1633	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.0	31.0	48.6	35.5	26.4	45.1	31.2	28.8	45.7	36.2	32.7
Incr Delay (d2), s/veh	98.4	20.3	2.8	92.1	16.1	0.2	108.6	0.4	0.4	10.6	5.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.0	22.6	11.4	11.2	22.2	3.9	20.4	10.1	5.4	8.0	15.4	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	147.3	56.3	33.8	140.8	51.6	26.7	153.7	31.6	29.2	56.3	41.2	33.7
LnGrp LOS	F	E	C	F	D	C	F	C	C	E	D	C
Approach Vol, veh/h		2188			1989			1568			1339	
Approach Delay, s/veh		64.4			62.8			74.7			43.5	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.9	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	35.0	17.4	24.5	10.0	34.4	12.3	17.0
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	62.3
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Level Of Service Computation Report
ICU 1(Loss as Cycle Length %) Method (Future Volume Alternative)

Intersection #1 Brea Bl. & Imperial Hwy.

Cycle (sec):	100	Critical Vol./Cap.(X):	0.826
Loss Time (sec):	5	Average Delay (sec/veh):	xxxxxx
Optimal Cycle:	58	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Y+R:	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lanes:	2 0	3 0	1	2 0	2 0	1	2 0	3 0	1	2 0	3 0	1
Volume Module:												
Base Vol:	545	839	252	310	787	256	265	1565	475	275	1552	174
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	545	839	252	310	787	256	265	1565	475	275	1552	174
Added Vol:	0	3	0	0	0	0	3	3	0	2	4	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	545	842	252	310	787	256	268	1568	475	277	1556	174
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	545	842	252	310	787	256	268	1568	475	277	1556	174
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	545	842	252	310	787	256	268	1568	475	277	1556	174
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	545	842	252	310	787	256	268	1568	475	277	1556	174
Saturation Flow Module:												
Sat/Lane:	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	2.00	3.00	1.00	2.00	2.00	1.00	2.00	3.00	1.00	2.00	3.00	1.00
Final Sat.:	3400	5100	1700	3400	3400	1700	3400	5100	1700	3400	5100	1700
Capacity Analysis Module:												
Vol/Sat:	0.16	0.17	0.15	0.09	0.23	0.15	0.08	0.31	0.28	0.08	0.31	0.10
Crit Moves:	****				****		****				****	

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↔				↱
Traffic Vol, veh/h	0	1214	48	35	1349	22	8	7	48	0	0	30
Future Vol, veh/h	0	1214	48	35	1349	22	8	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1320	52	38	1466	24	9	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1374	0	0	2131	2894	662	-	-	751
Stage 1	-	-	-	-	-	-	1322	1322	-	-	-	-
Stage 2	-	-	-	-	-	-	809	1572	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	495	-	-	28	16	404	0	0	353
Stage 1	0	-	-	-	-	-	165	224	-	0	0	-
Stage 2	0	-	-	-	-	-	340	169	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	494	-	-	24	15	403	-	-	351
Mov Cap-2 Maneuver	-	-	-	-	-	-	105	90	-	-	-	-
Stage 1	-	-	-	-	-	-	165	224	-	-	-	-
Stage 2	-	-	-	-	-	-	285	155	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	27	16.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	231	-	-	494	-	-	351
HCM Lane V/C Ratio	0.296	-	-	0.077	-	-	0.093
HCM Control Delay (s)	27	-	-	12.9	-	-	16.3
HCM Lane LOS	D	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.2	-	-	0.2	-	-	0.3

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	9	41	36	17	42
Future Vol, veh/h	37	9	41	36	17	42
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	71	71	71	71	71	71
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	52	13	58	51	24	59

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	191	84	0	0	109	0
Stage 1	84	-	-	-	-	-
Stage 2	107	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	798	975	-	-	1481	-
Stage 1	939	-	-	-	-	-
Stage 2	917	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	784	975	-	-	1481	-
Mov Cap-2 Maneuver	784	-	-	-	-	-
Stage 1	939	-	-	-	-	-
Stage 2	901	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	2.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	815	1481	-
HCM Lane V/C Ratio	-	-	0.079	0.016	-
HCM Control Delay (s)	-	-	9.8	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2203	21	0	2249	77	0	0	30	0	0	79
Future Vol, veh/h	0	2203	21	0	2249	77	0	0	30	0	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2295	22	0	2343	80	0	0	31	0	0	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1159	-	-	1212
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.9	-	-	5.8
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	242	0	0	235
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	242	-	-	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

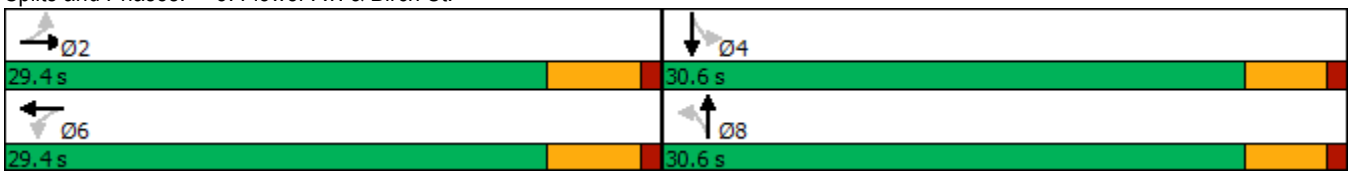
Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.1	28.4
HCM LOS			C	D

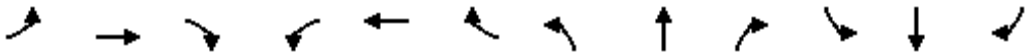
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	242	-	-	-	-	235
HCM Lane V/C Ratio	0.129	-	-	-	-	0.35
HCM Control Delay (s)	22.1	-	-	-	-	28.4
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.5

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	28	1216	187	1258	82	12	30	2
Future Volume (vph)	28	1216	187	1258	82	12	30	2
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	2	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	27.2	27.2	27.2	27.2	30.6	30.6	30.6	30.6
Total Split (s)	29.4	29.4	29.4	29.4	30.6	30.6	30.6	30.6
Total Split (%)	49.0%	49.0%	49.0%	49.0%	51.0%	51.0%	51.0%	51.0%
Yellow Time (s)	4.2	4.2	4.2	4.2	3.6	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0		0.0		0.0
Total Lost Time (s)	5.2	5.2	5.2	5.2		4.6		4.6
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	27.0	27.0	27.0	27.0		13.3		13.3
Actuated g/C Ratio	0.61	0.61	0.61	0.61		0.30		0.30
v/c Ratio	0.16	0.60	1.12	0.60		0.41		0.11
Control Delay	12.4	11.9	134.7	11.8		15.3		9.9
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	12.4	11.9	134.7	11.8		15.3		9.9
LOS	B	B	F	B		B		A
Approach Delay		11.9		27.6		15.3		9.9
Approach LOS		B		C		B		A

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 44.6	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.13	
Intersection Signal Delay: 19.7	Intersection LOS: B
Intersection Capacity Utilization 71.8%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Flower Av. & Birch St.





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1216	57	187	1258	9	82	12	85	30	2	17
Future Volume (veh/h)	28	1216	57	187	1258	9	82	12	85	30	2	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1228	57	189	1271	9	83	12	56	30	2	13
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	304	1957	91	301	2047	14	268	61	117	327	42	93
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	409	3457	160	407	3616	26	670	296	570	910	204	453
Grp Volume(v), veh/h	28	631	654	189	624	656	151	0	0	45	0	0
Grp Sat Flow(s),veh/h/ln	409	1777	1841	407	1777	1865	1536	0	0	1566	0	0
Q Serve(g_s), s	2.1	10.2	10.2	14.0	10.1	10.1	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.2	10.2	10.2	24.2	10.1	10.1	3.5	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.55		0.37	0.67		0.29
Lane Grp Cap(c), veh/h	304	1006	1042	301	1006	1055	445	0	0	461	0	0
V/C Ratio(X)	0.09	0.63	0.63	0.63	0.62	0.62	0.34	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	304	1006	1042	301	1006	1055	1045	0	0	1030	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.3	6.2	6.2	16.5	6.2	6.2	14.9	0.0	0.0	13.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.2	1.2	4.1	1.2	1.1	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	5.0	5.2	3.6	4.2	4.3	2.1	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.4	7.5	7.5	20.5	7.4	7.3	15.3	0.0	0.0	14.0	0.0	0.0
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1313			1469			151			45	
Approach Delay, s/veh		7.5			9.1			15.3			14.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		13.4		29.4		13.4				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		14.2		2.9		26.2		5.5				
Green Ext Time (p_c), s		6.3		0.2		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	0	0	0	0	2	0	0	0	8	0	52
Future Vol, veh/h	20	0	0	0	0	2	0	0	0	8	0	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	92	92	72	72	92	92	92	72	92	72
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	28	0	0	0	0	3	0	0	0	11	0	72

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	61	59	37	58	95	0	73	0	0	0	0	0
Stage 1	59	59	-	0	0	-	-	-	-	-	-	-
Stage 2	2	0	-	58	95	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	934	832	1035	939	795	-	1527	-	-	-	-	-
Stage 1	953	846	-	-	-	-	-	-	-	-	-	-
Stage 2	1021	-	-	954	816	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	831	1034	939	794	-	1526	-	-	-	-	-
Mov Cap-2 Maneuver	-	831	-	939	794	-	-	-	-	-	-	-
Stage 1	952	845	-	-	-	-	-	-	-	-	-	-
Stage 2	1021	-	-	954	815	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1526	-	-	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	-	-	-	-
HCM Lane LOS	A	-	-	-	-	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-	-	-	-	-

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2258	6	0	2325	0	8
Future Vol, veh/h	0	2258	6	0	2325	0	8
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2328	6	0	2397	0	8

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1750	0	0	-	-	-	1170
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	167	-	-	0	-	0	160
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	167	-	-	-	-	-	160
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	28.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	160	167	-	-	-
HCM Lane V/C Ratio	0.052	-	-	-	-
HCM Control Delay (s)	28.7	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.2	0	-	-	-

APPENDIX 6.5: GENERAL PLAN BUILDOUT WITHOUT PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

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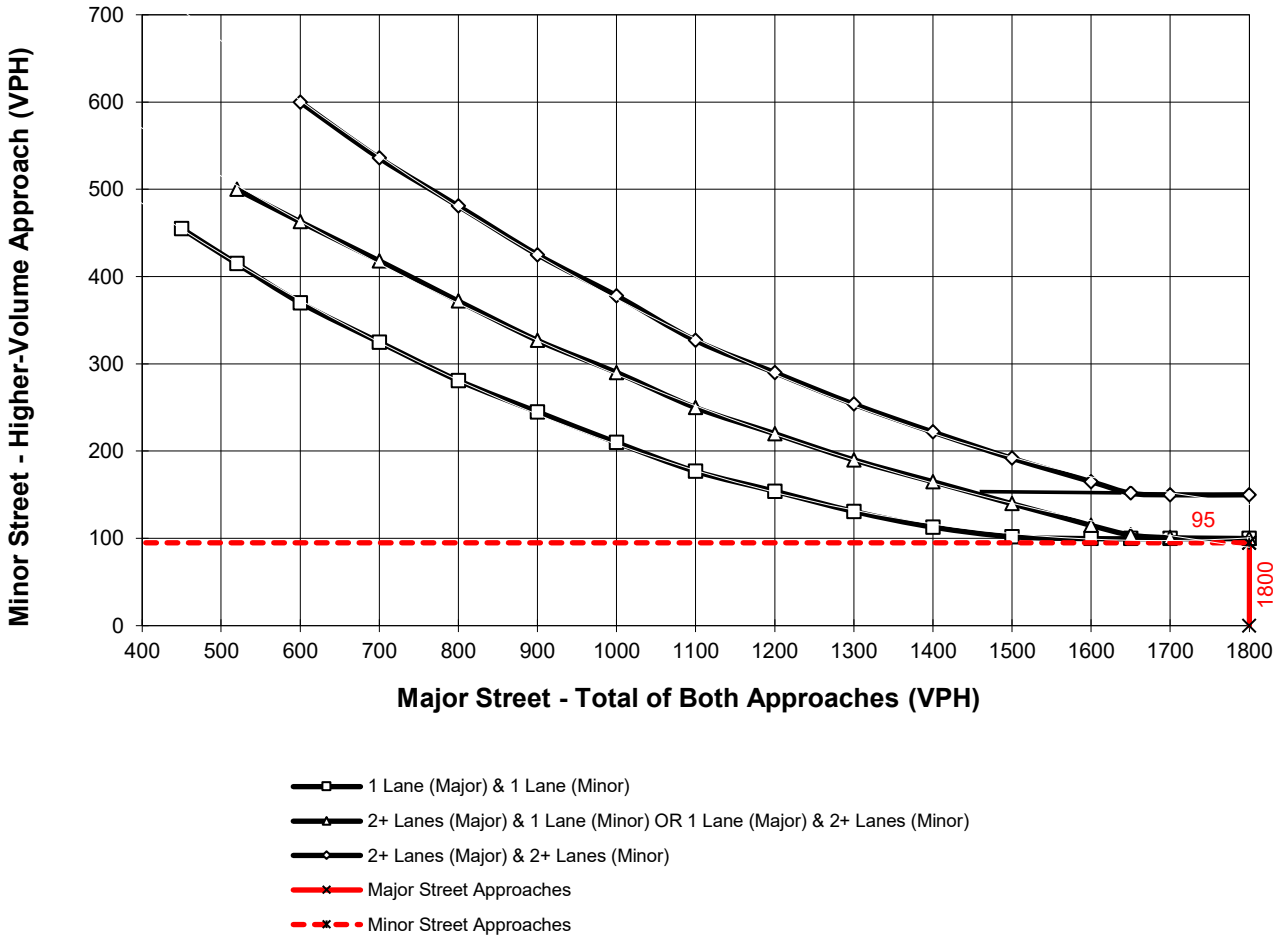
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Birch St.**
Total of Both Approaches (VPH) = **2278**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**
High Volume Approach (VPH) = **95**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

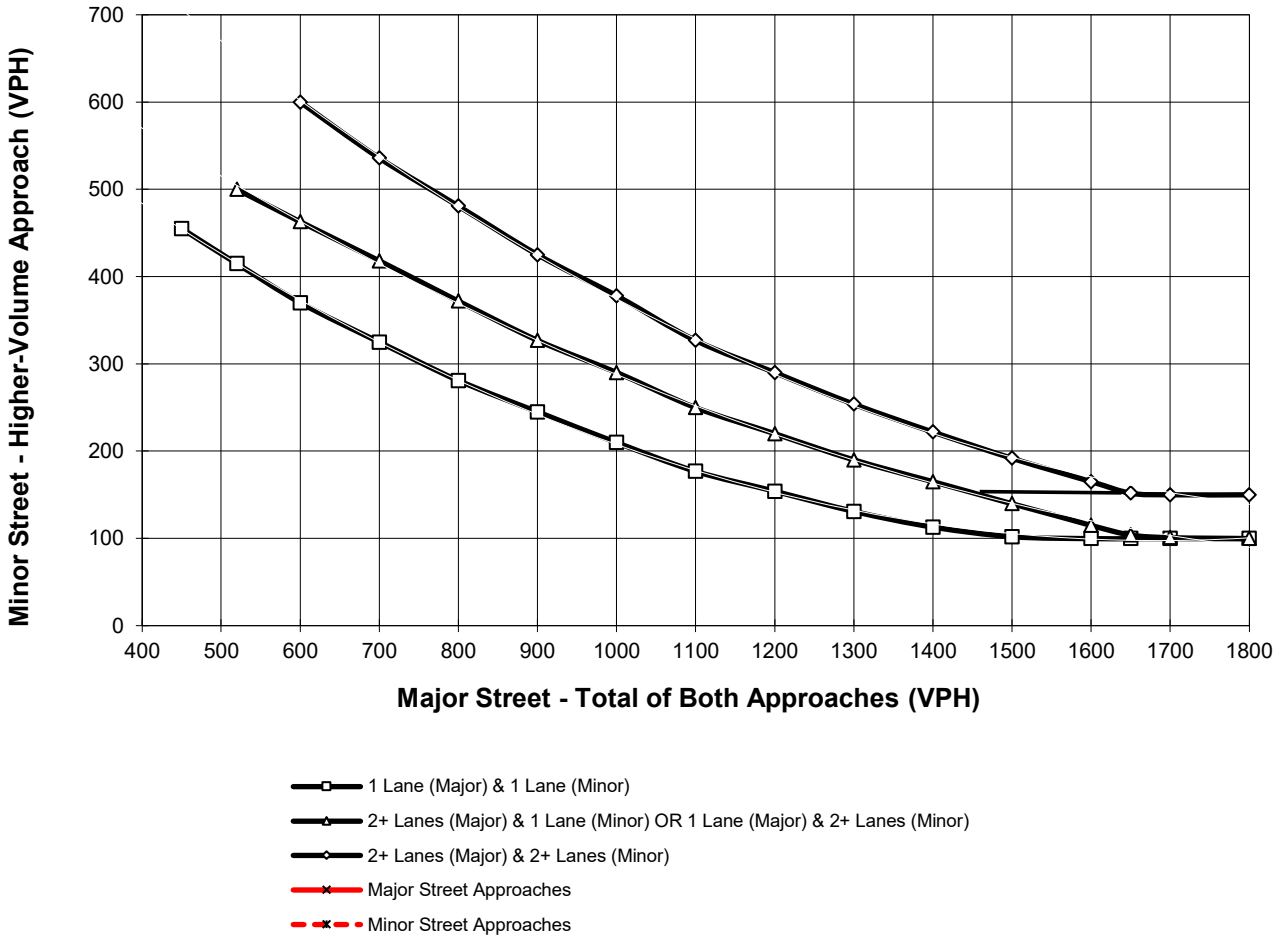
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **122**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **31**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

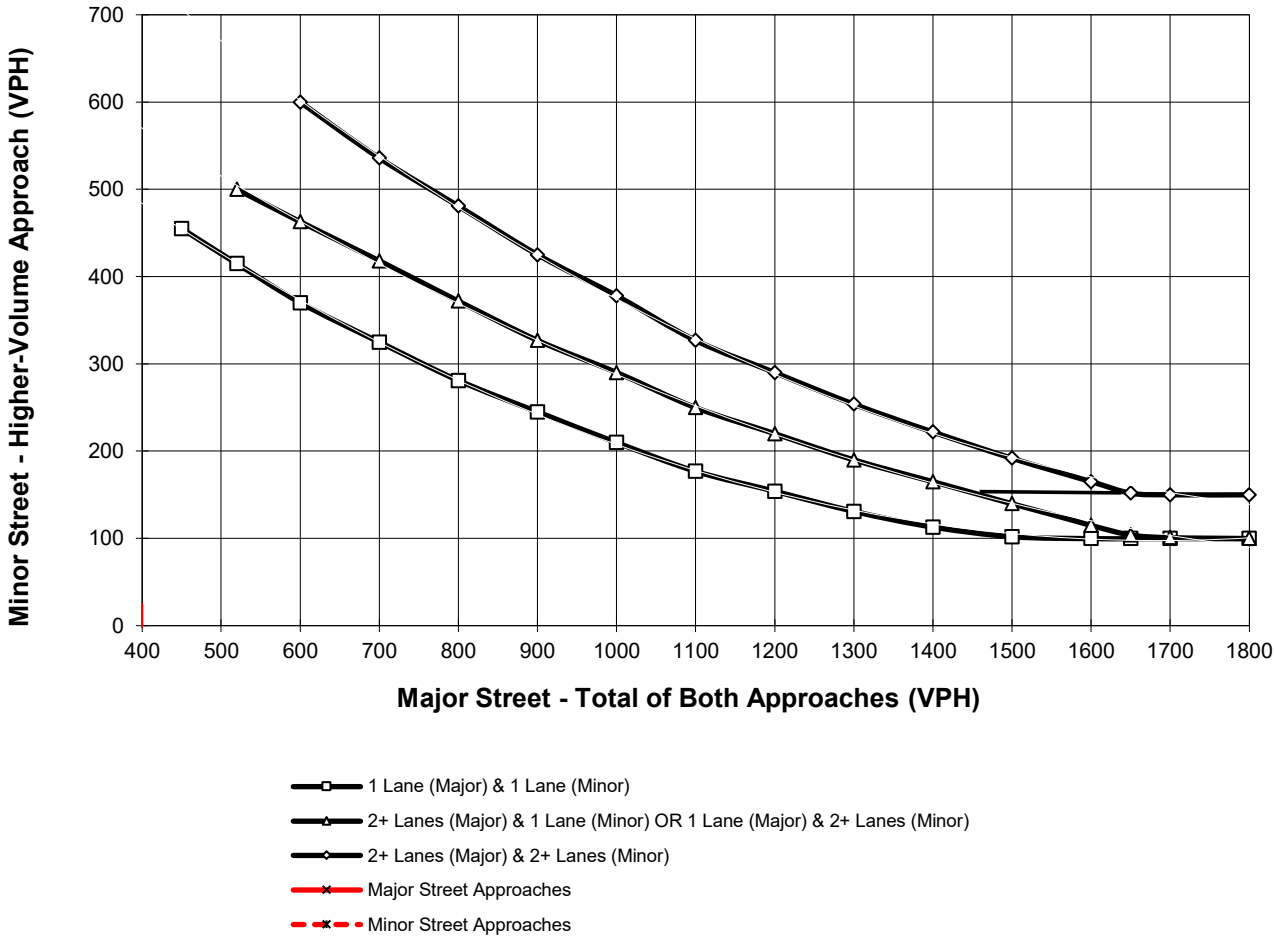
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **398**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **24**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

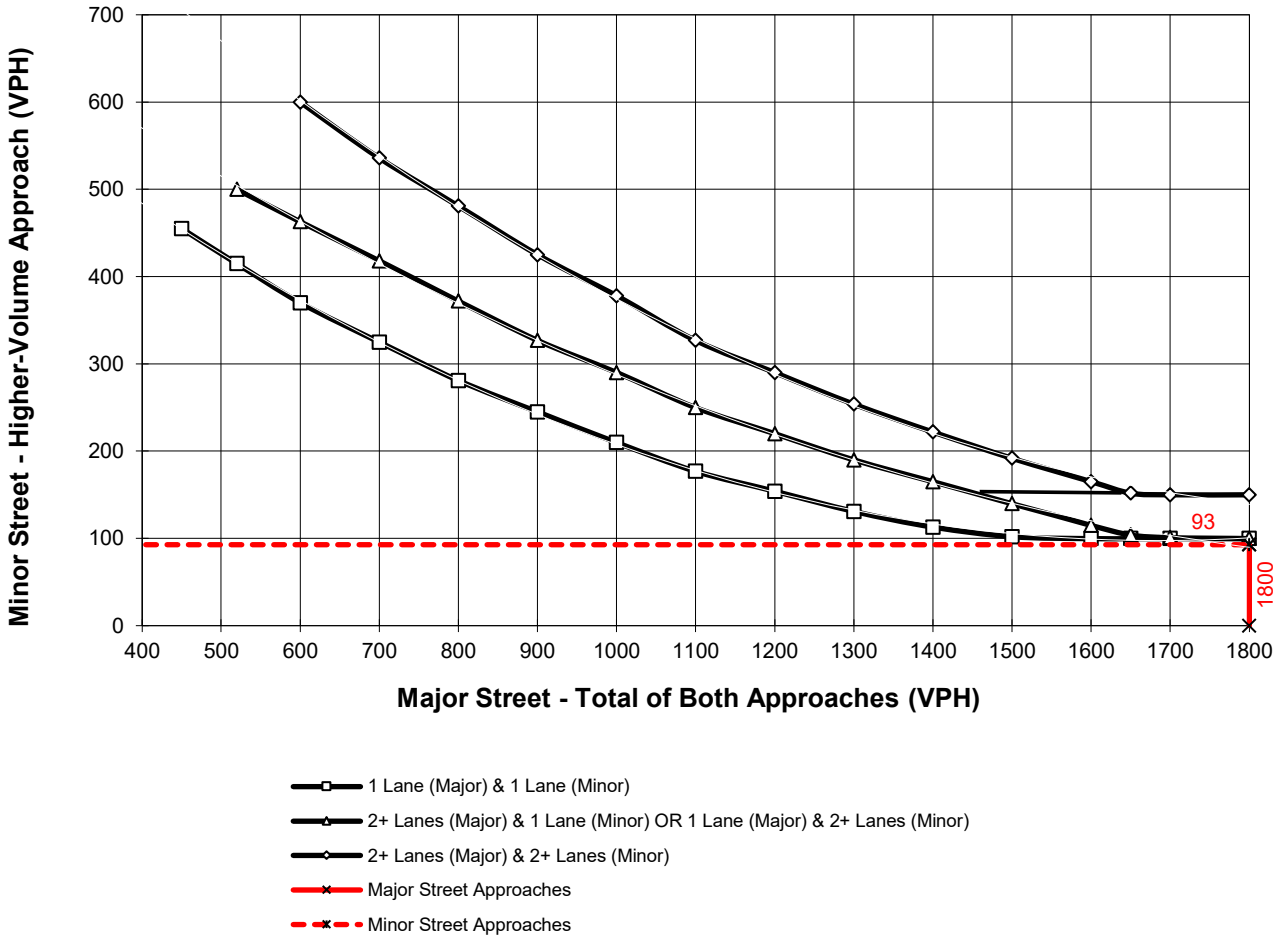
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Imperial Hwy. (SR-90)** Total of Both Approaches (VPH) = **4310**
Number of Approach Lanes on Major Street = **3**

Minor Street Name = **Flower Av.** High Volume Approach (VPH) = **93**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

APPENDIX 6.6: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS

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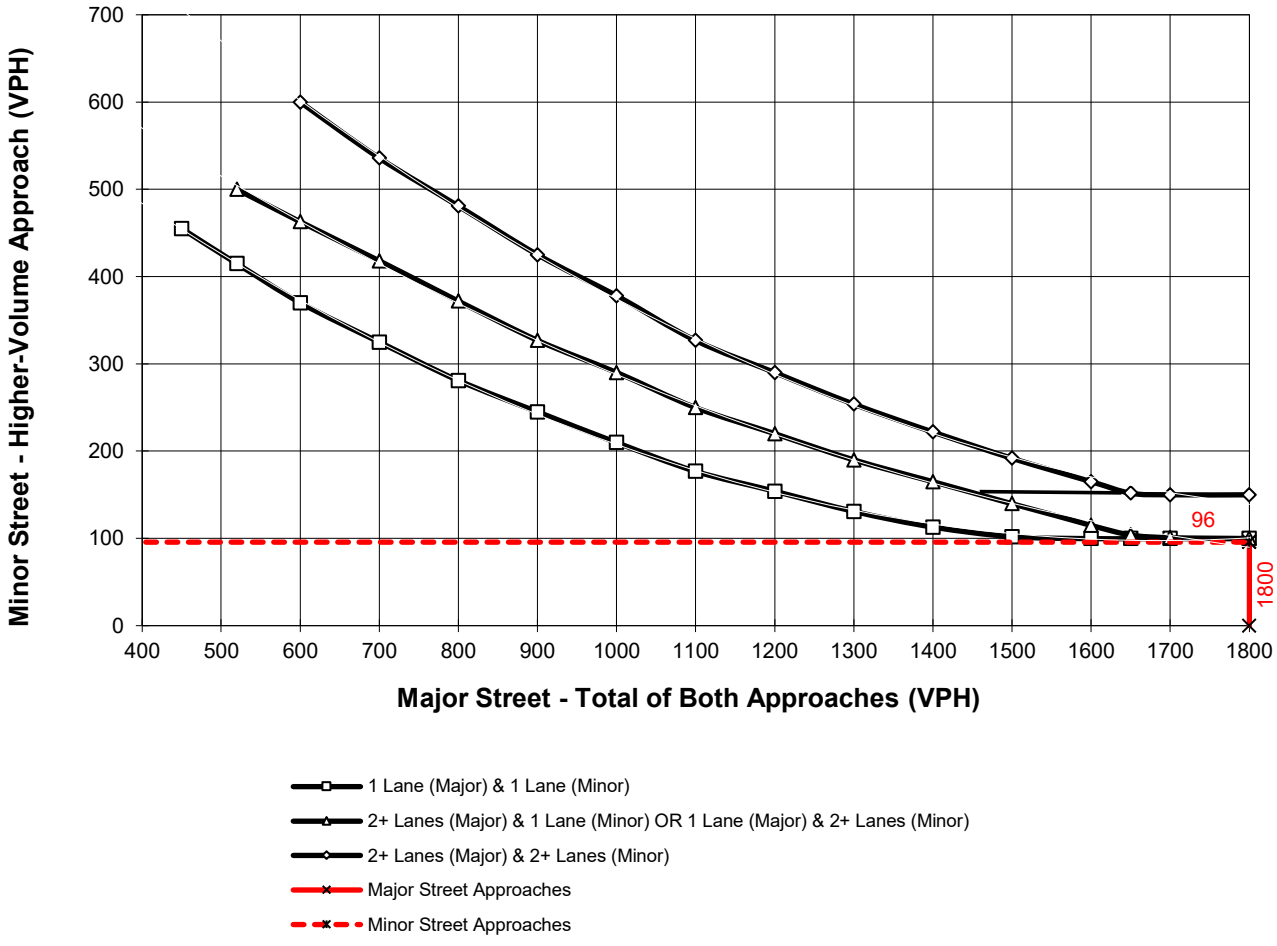
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO With Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Birch St.**
Total of Both Approaches (VPH) = **2280**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**
High Volume Approach (VPH) = **96**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

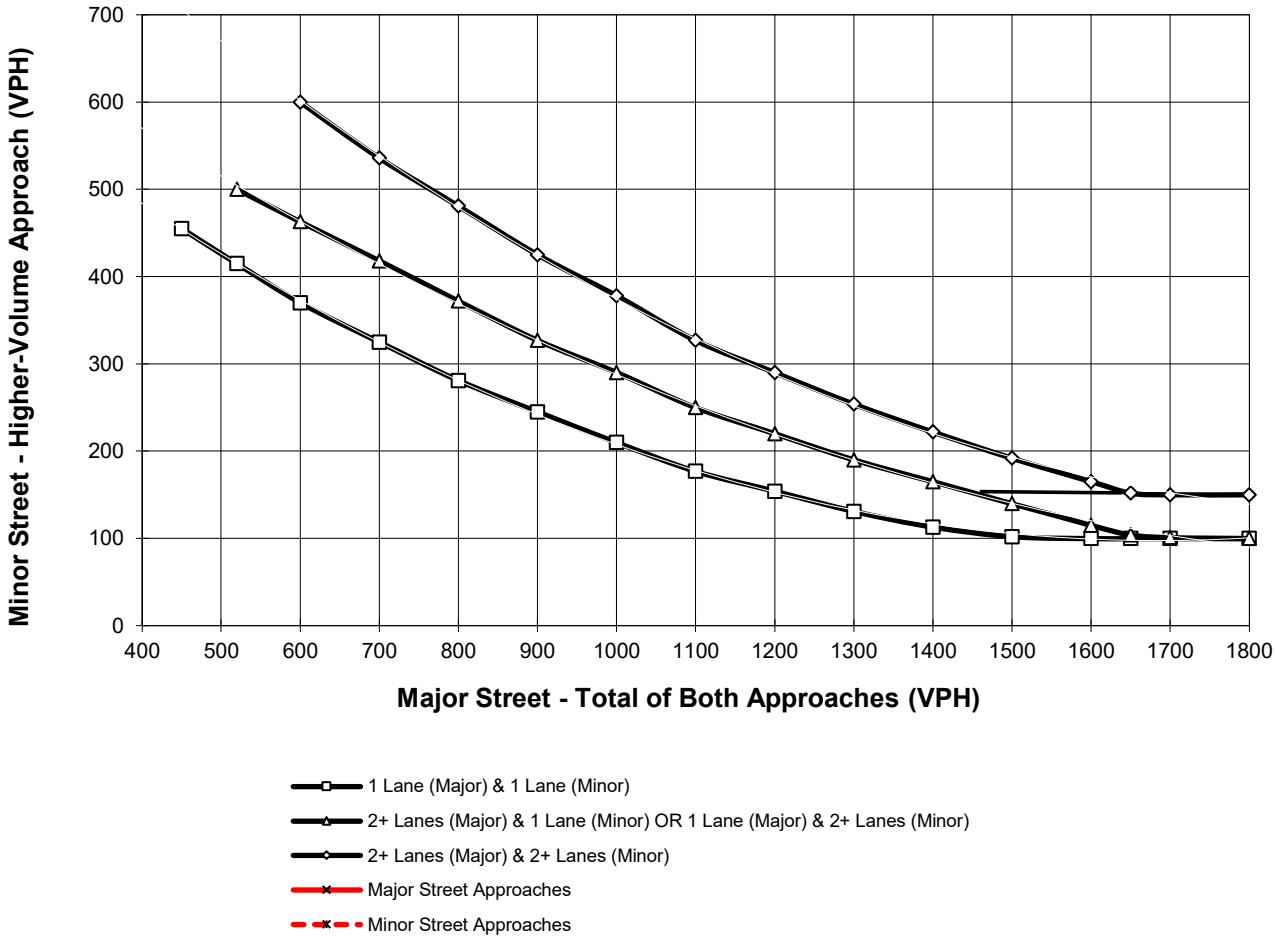
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO With Project Conditions - Weekday Mid-day Peak Hour**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **135**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **45**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

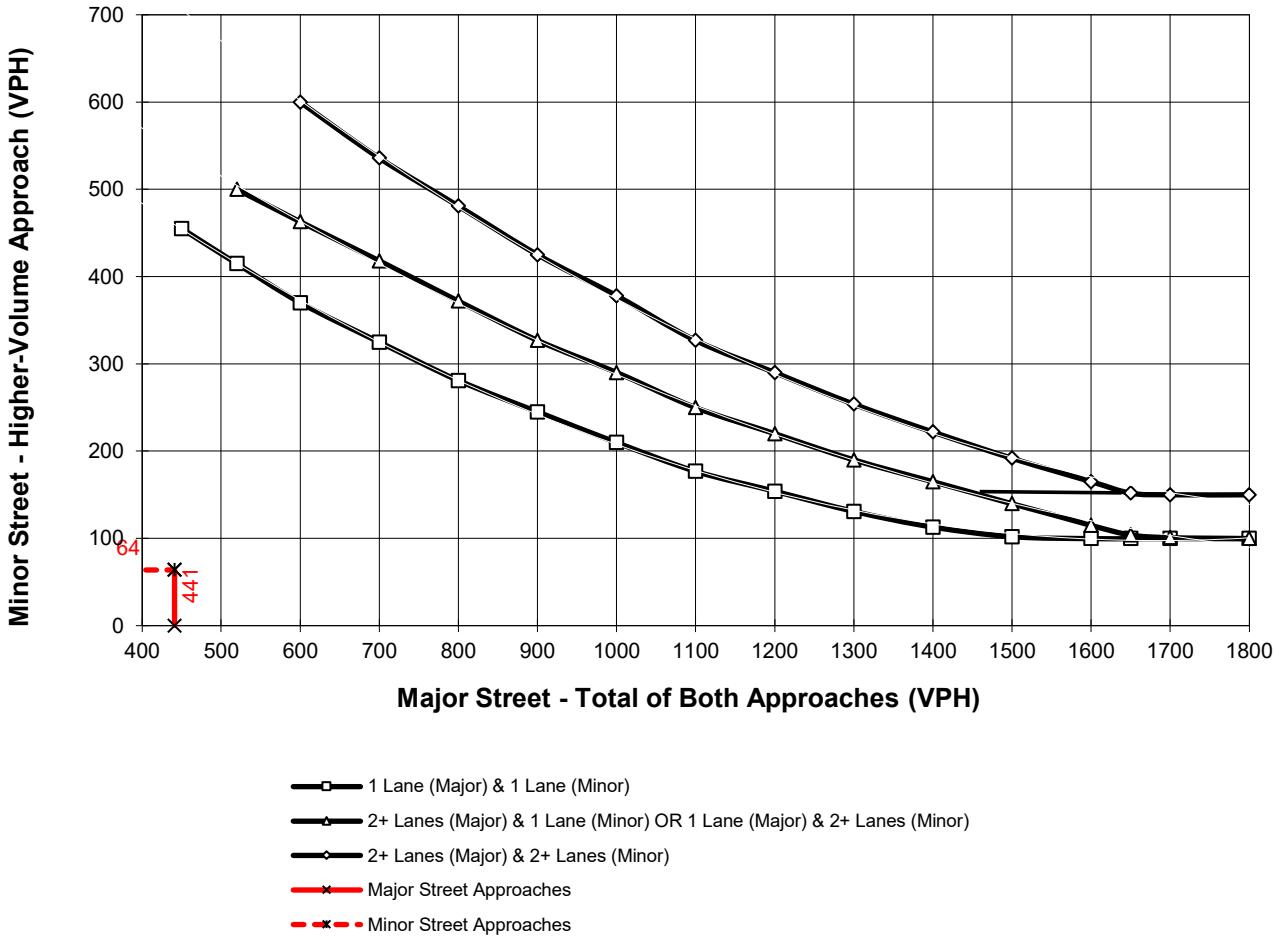
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO With Project Conditions - Weekday AM Peak Hour**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **441**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **64**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

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APPENDIX 6.7: GENERAL PLAN BUILDOUT WITHOUT PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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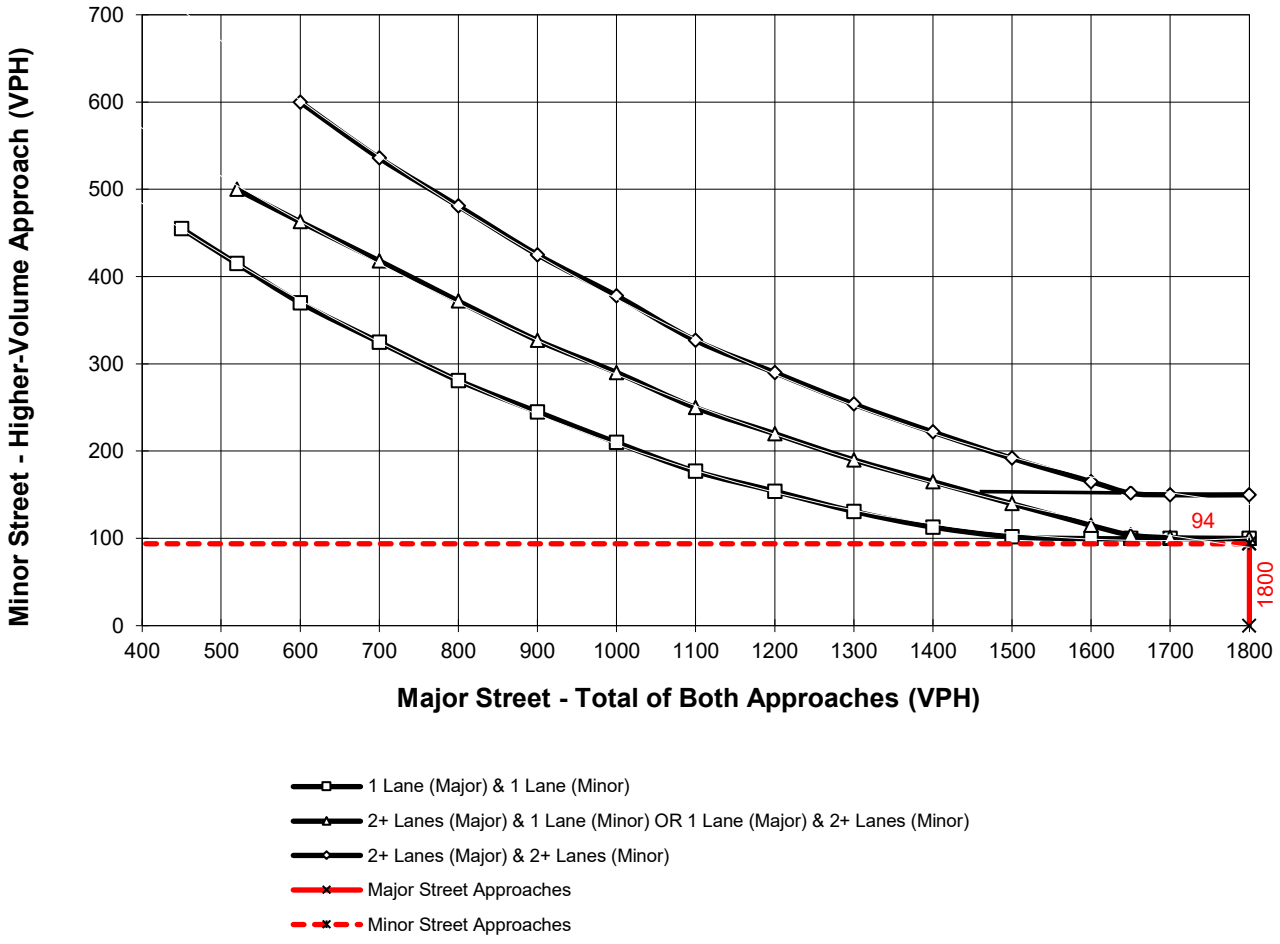
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

Major Street Name = **Birch St.**
Total of Both Approaches (VPH) = **2362**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**
High Volume Approach (VPH) = **94**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

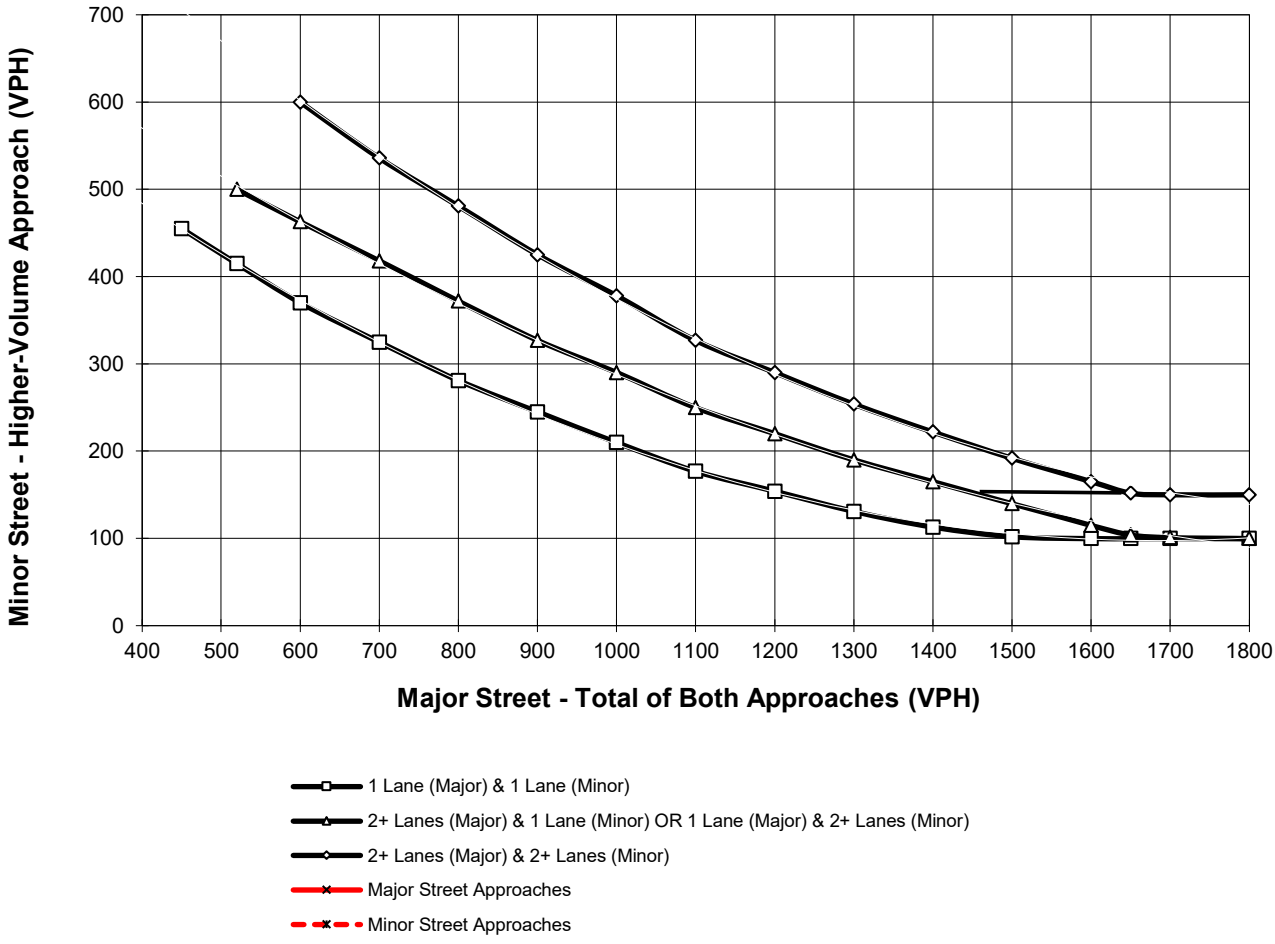
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **119**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **31**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

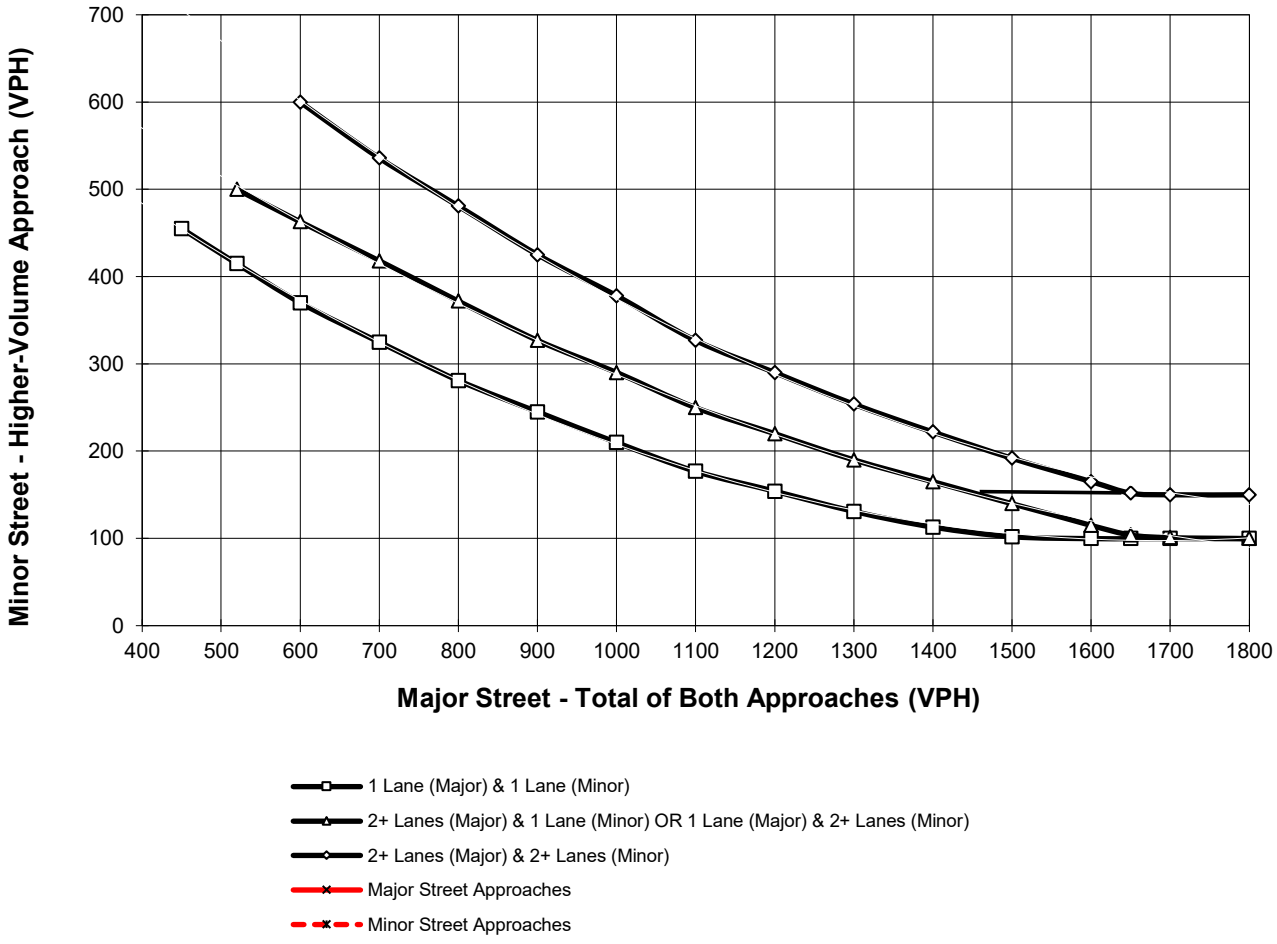
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO Without Project Conditions - Weekday AM Peak Hour (Without Flower)**

Major Street Name = **Flower Av.**
Total of Both Approaches (VPH) = **88**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**
High Volume Approach (VPH) = **23**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

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APPENDIX 6.8: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS TRAFFIC SIGNAL WARRANT ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO With Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

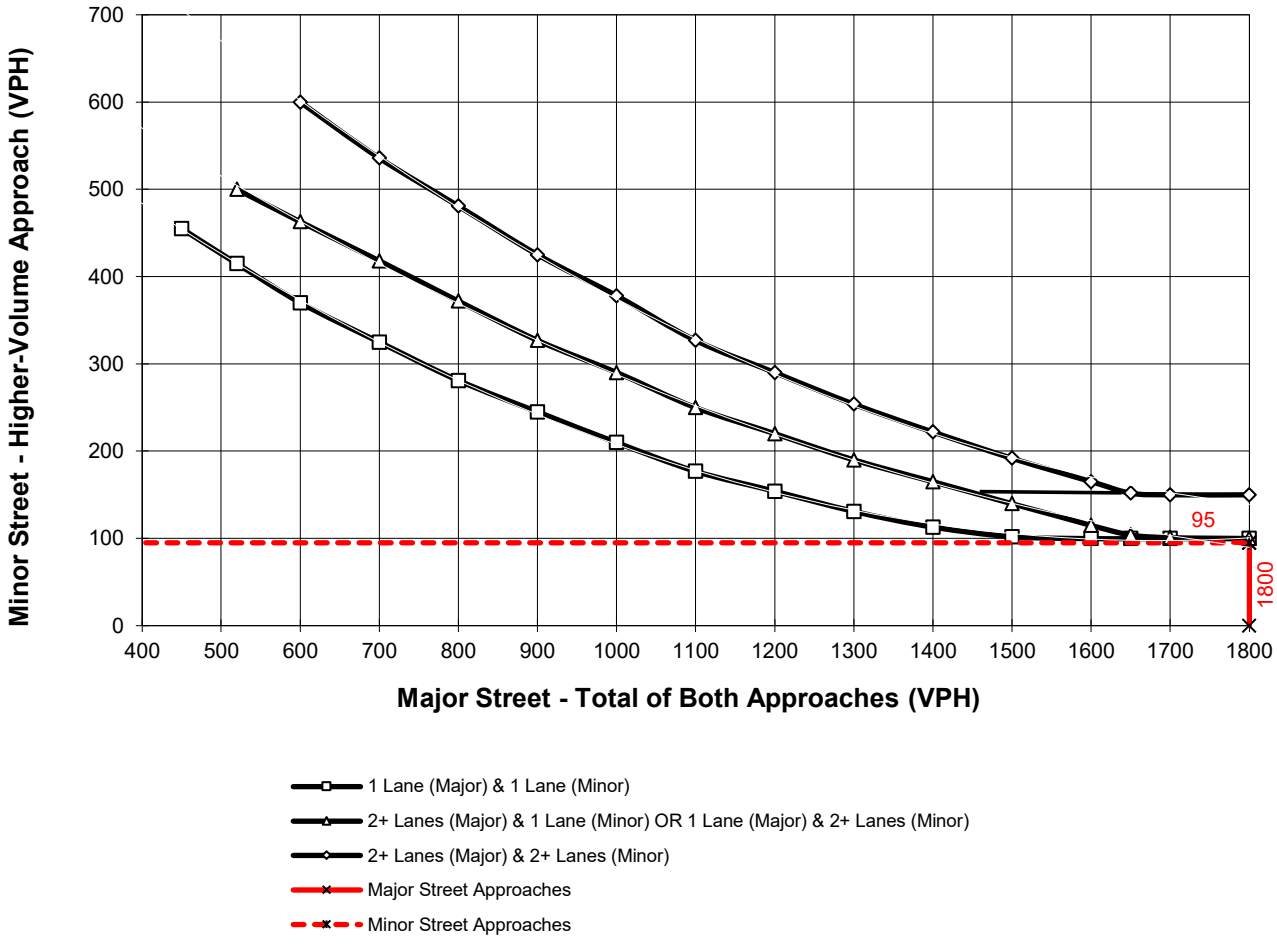
Major Street Name = **Birch St.**

Total of Both Approaches (VPH) = **2343**
Number of Approach Lanes on Major Street = **2**

Minor Street Name = **Orange Av.**

High Volume Approach (VPH) = **95**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

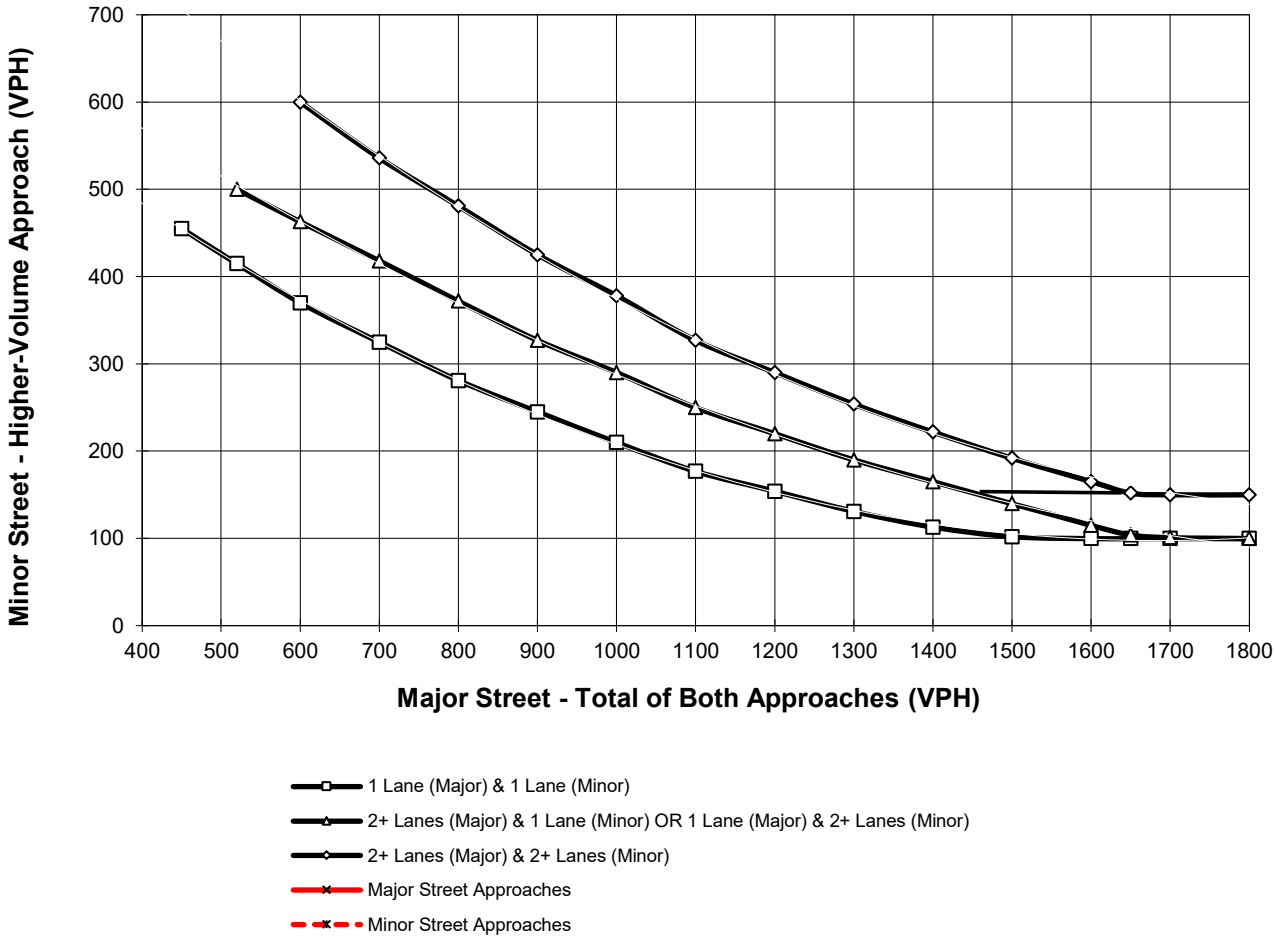
Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO With Project Conditions - Weekday Mid-day Peak Hour (Without Flower)**

Major Street Name = **Orange Av.**
Total of Both Approaches (VPH) = **146**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 1**
High Volume Approach (VPH) = **55**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

Figure 4C-3. Warrant 3, Peak Hour

Traffic Conditions = **GPBO With Project Conditions - Weekday AM Peak Hour (Without Flower)**

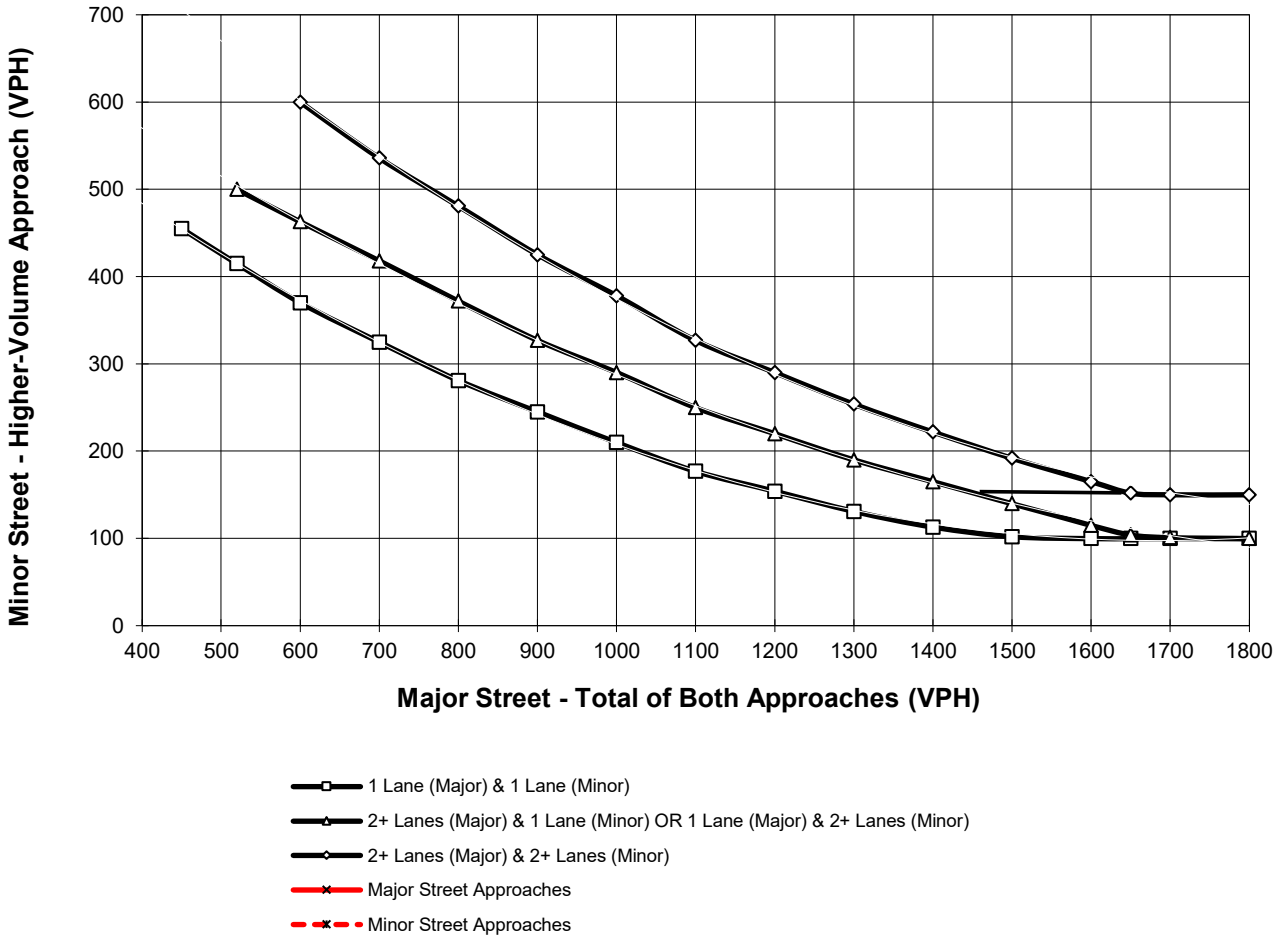
Major Street Name = **Flower Av.**

Total of Both Approaches (VPH) = **100**
Number of Approach Lanes on Major Street = **1**

Minor Street Name = **Driveway 2**

High Volume Approach (VPH) = **40**
Number of Approach Lanes On Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED

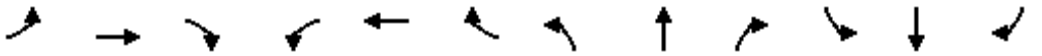


*Note: 150 vph applies as the lower threshold for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold for a minor-street approach with one lane

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APPENDIX 6.9: GENERAL PLAN BUILDOUT WITHOUT PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	1485	399	164	1372	112	466	585	179	200	720	170
Future Volume (veh/h)	172	1485	399	164	1372	112	466	585	179	200	720	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	181	1563	412	173	1444	110	491	616	180	211	758	162
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1825	557	174	1825	565	292	1455	444	275	993	438
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.28	0.28	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	181	1563	412	173	1444	110	491	616	180	211	758	162
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	25.9	21.1	5.0	23.2	4.4	8.4	9.0	8.5	5.9	17.9	7.6
Cycle Q Clear(g_c), s	5.0	25.9	21.1	5.0	23.2	4.4	8.4	9.0	8.5	5.9	17.9	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1825	557	174	1825	565	292	1455	444	275	993	438
V/C Ratio(X)	1.04	0.86	0.74	0.99	0.79	0.19	1.68	0.42	0.41	0.77	0.76	0.37
Avail Cap(c_a), veh/h	174	1887	576	174	1887	584	292	1860	567	282	1283	566
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.2	27.2	25.7	43.2	26.3	20.3	41.5	26.6	26.4	40.9	30.2	26.5
Incr Delay (d2), s/veh	79.1	4.0	4.9	66.3	2.3	0.2	320.2	0.2	0.6	10.5	2.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.9	15.7	12.8	6.4	14.6	2.9	26.5	6.4	5.6	4.8	12.1	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	122.4	31.3	30.6	109.5	28.6	20.5	361.7	26.8	27.0	51.4	32.2	27.0
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2156			1727			1287			1131	
Approach Delay, s/veh		38.8			36.2			154.6			35.0	
Approach LOS		D			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.1	13.0	30.8	9.6	38.1	12.5	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	27.9	10.4	19.9	7.0	25.2	7.9	11.0
Green Ext Time (p_c), s	0.0	4.7	0.0	4.7	0.0	6.2	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	61.1
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	726	18	18	837	6	7	1	19	0	0	18
Future Vol, veh/h	0	726	18	18	837	6	7	1	19	0	0	18
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	825	20	20	951	7	8	1	22	0	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	846	0	0	1342	1828	414	-	-	483
Stage 1	-	-	-	-	-	-	826	826	-	-	-	-
Stage 2	-	-	-	-	-	-	516	1002	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	787	-	-	110	76	587	0	0	530
Stage 1	0	-	-	-	-	-	332	385	-	0	0	-
Stage 2	0	-	-	-	-	-	510	318	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	786	-	-	104	74	586	-	-	528
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	190	-	-	-	-
Stage 1	-	-	-	-	-	-	332	385	-	-	-	-
Stage 2	-	-	-	-	-	-	478	309	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	15	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	392	-	-	786	-	-	528
HCM Lane V/C Ratio	0.078	-	-	0.026	-	-	0.039
HCM Control Delay (s)	15	-	-	9.7	-	-	12.1
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

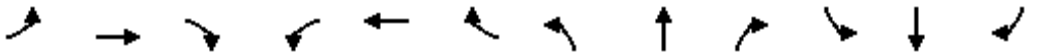
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2106	15	0	2128	22	0	0	41	0	0	26
Future Vol, veh/h	0	2106	15	0	2128	22	0	0	41	0	0	26
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2171	15	0	2194	23	0	0	42	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1096	-	-	1109
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	217	0	0	214
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	216	-	-	214
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25.7	24.2
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	216	-	-	-	-	214
HCM Lane V/C Ratio	0.196	-	-	-	-	0.125
HCM Control Delay (s)	25.7	-	-	-	-	24.2
HCM Lane LOS	D	-	-	-	-	C
HCM 95th %tile Q(veh)	0.7	-	-	-	-	0.4



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	742	16	66	734	12	94	54	29	54	12	15
Future Volume (veh/h)	21	742	16	66	734	12	94	54	29	54	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	873	18	78	864	14	111	64	19	64	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	1572	32	324	1580	26	388	205	50	474	100	55
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	598	3558	73	590	3577	58	779	628	153	1001	308	168
Grp Volume(v), veh/h	25	436	455	78	429	449	194	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	598	1777	1855	590	1777	1858	1559	0	0	1477	0	0
Q Serve(g_s), s	1.4	7.7	7.7	4.7	7.5	7.5	2.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.9	7.7	7.7	12.4	7.5	7.5	3.8	0.0	0.0	1.5	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.57		0.10	0.73		0.11
Lane Grp Cap(c), veh/h	329	785	819	324	785	821	642	0	0	629	0	0
V/C Ratio(X)	0.08	0.56	0.56	0.24	0.55	0.55	0.30	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	402	1003	1047	397	1003	1049	1101	0	0	1039	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.9	8.7	8.7	13.3	8.7	8.7	10.8	0.0	0.0	10.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.4	0.6	0.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.3	4.5	1.0	3.7	3.9	2.2	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	9.3	9.3	13.7	9.3	9.2	11.1	0.0	0.0	10.2	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		916			956			194			88	
Approach Delay, s/veh		9.4			9.6			11.1			10.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		23.8		18.3		23.8		18.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.9		3.5		14.4		5.8				
Green Ext Time (p_c), s		5.1		0.4		4.1		1.1				

Intersection Summary												
HCM 6th Ctrl Delay			9.7									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	6

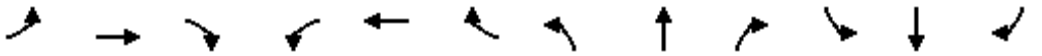
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	94	2005	4	0	2065	142	0	0	5	8	0	85
Future Vol, veh/h	94	2005	4	0	2065	142	0	0	5	8	0	85
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	101	2156	4	0	2220	153	0	0	5	9	0	91

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2378	0	0	-	-	0	-	-	1082	3366	-	1192
Stage 1	-	-	-	-	-	-	-	-	-	2302	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1064	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	~ 80	-	-	0	-	-	0	0	183	~ 8	0	154
Stage 1	-	-	-	0	-	-	0	0	-	23	0	-
Stage 2	-	-	-	0	-	-	0	0	-	215	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 80	-	-	-	-	-	-	-	183	-	-	153
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	23	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.5	0	25.3	
HCM LOS			D	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	183	~ 80	-	-	-	-	-	153
HCM Lane V/C Ratio	0.029	1.263	-	-	-	-	-	0.597
HCM Control Delay (s)	25.3	279.9	-	-	-	-	-	58.5
HCM Lane LOS	D	F	-	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	7.6	-	-	-	-	-	3.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	1510	387	337	1634	181	456	677	263	317	640	275
Future Volume (veh/h)	290	1510	387	337	1634	181	456	677	263	317	640	275
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	312	1624	274	362	1757	138	490	728	180	341	688	237
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.25	0.25
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1564
Grp Volume(v), veh/h	312	1624	274	362	1757	138	490	728	180	341	688	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1564
Q Serve(g_s), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.8	11.0	18.5	13.7
Cycle Q Clear(g_c), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.8	11.0	18.5	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
V/C Ratio(X)	1.20	0.99	0.55	1.15	1.02	0.26	1.13	0.52	0.42	0.94	0.77	0.60
Avail Cap(c_a), veh/h	259	1635	497	315	1724	530	432	1749	531	361	1138	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	34.9	28.9	46.4	34.1	24.8	44.5	31.6	30.6	45.4	35.7	33.9
Incr Delay (d2), s/veh	122.0	20.6	1.3	97.5	26.6	0.3	85.0	0.3	0.7	32.7	2.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.9	22.5	9.5	13.7	25.8	4.4	16.7	8.7	6.6	9.9	12.8	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	169.4	55.6	30.2	143.9	60.8	25.0	129.6	31.9	31.3	78.1	38.1	35.4
LnGrp LOS	F	E	C	F	F	C	F	C	C	E	D	D
Approach Vol, veh/h		2210			2257			1398			1266	
Approach Delay, s/veh		68.5			71.9			66.0			48.3	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.3	13.0	40.2	16.3	33.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	34.7	16.0	20.5	10.4	36.8	13.0	14.4
Green Ext Time (p_c), s	0.0	0.0	0.0	4.4	0.0	0.0	0.0	5.6

Intersection Summary	
HCM 6th Ctrl Delay	65.5
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	42	27	1151	23	16	1	78	0	0	25
Future Vol, veh/h	0	1035	42	27	1151	23	16	1	78	0	0	25
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1176	48	31	1308	26	18	1	89	0	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1233	0	0	1901	2584	597	-	-	670
Stage 1	-	-	-	-	-	-	1185	1185	-	-	-	-
Stage 2	-	-	-	-	-	-	716	1399	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	561	-	-	42	25	446	0	0	399
Stage 1	0	-	-	-	-	-	201	261	-	0	0	-
Stage 2	0	-	-	-	-	-	387	206	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	556	-	-	37	23	442	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	112	-	-	-	-
Stage 1	-	-	-	-	-	-	201	259	-	-	-	-
Stage 2	-	-	-	-	-	-	339	194	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	22.8	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	309	-	-	556	-	-	398
HCM Lane V/C Ratio	0.349	-	-	0.055	-	-	0.071
HCM Control Delay (s)	22.8	-	-	11.9	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.5	-	-	0.2	-	-	0.2

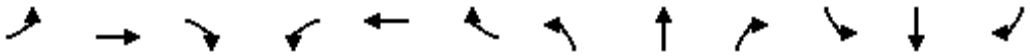
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2118	25	0	2269	40	0	0	27	0	0	66
Future Vol, veh/h	0	2118	25	0	2269	40	0	0	27	0	0	66
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2463	29	0	2638	47	0	0	31	0	0	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1246	-	-	1343
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	268	0	0	242
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	268	-	-	242
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.2	26.6
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	268	-	-	-	-	242
HCM Lane V/C Ratio	0.117	-	-	-	-	0.317
HCM Control Delay (s)	20.2	-	-	-	-	26.6
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1087	22	89	1132	22	50	41	60	39	4	23
Future Volume (veh/h)	29	1087	22	89	1132	22	50	41	60	39	4	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1221	24	100	1272	23	56	46	40	44	4	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	1737	34	238	1740	31	257	203	141	445	48	76
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	403	3564	70	423	3571	65	493	645	446	1006	152	241
Grp Volume(v), veh/h	33	609	636	100	633	662	142	0	0	58	0	0
Grp Sat Flow(s),veh/h/ln	403	1777	1857	423	1777	1858	1584	0	0	1400	0	0
Q Serve(g_s), s	3.5	13.3	13.3	10.9	14.1	14.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.6	13.3	13.3	24.2	14.1	14.1	3.0	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.39		0.28	0.76		0.17
Lane Grp Cap(c), veh/h	227	866	905	238	866	906	601	0	0	569	0	0
V/C Ratio(X)	0.15	0.70	0.70	0.42	0.73	0.73	0.24	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	227	866	905	238	866	906	923	0	0	843	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.2	9.9	9.9	19.7	10.1	10.1	12.7	0.0	0.0	12.0	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.6	2.5	1.2	3.2	3.1	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	8.2	8.5	1.9	8.2	8.5	1.9	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.4	12.5	12.4	20.9	13.3	13.2	12.9	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1278			1395			142			58	
Approach Delay, s/veh		12.6			13.8			12.9			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.3		29.4		20.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.6		3.1		26.2		5.0				
Green Ext Time (p_c), s		3.2		0.3		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	43.2

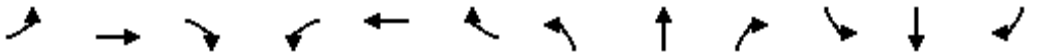
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	54	2053	15	0	2240	75	0	0	4	14	0	69
Future Vol, veh/h	54	2053	15	0	2240	75	0	0	4	14	0	69
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	2281	17	0	2489	83	0	0	4	16	0	77

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2572	0	0	-	-	0	-	-	1149	3563	-	1286
Stage 1	-	-	-	-	-	-	-	-	-	2531	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1032	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	64	-	-	0	-	-	0	0	165	~ 6	0	133
Stage 1	-	-	-	0	-	-	0	0	-	16	0	-
Stage 2	-	-	-	0	-	-	0	0	-	225	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	64	-	-	-	-	-	-	-	165	~ 1	-	133
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 1	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 1	-	-
Stage 2	-	-	-	-	-	-	-	-	-	~ 14	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.1	0	27.4	$ 2224.4
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	165	64	-	-	-	-	1	133
HCM Lane V/C Ratio	0.027	0.938	-	-	-	-	15.556	0.576
HCM Control Delay (s)	27.4	201.9	-	-	-	-	$ 12873.8	63.7
HCM Lane LOS	D	F	-	-	-	-	F	F
HCM 95th %tile Q(veh)	0.1	4.5	-	-	-	-	3.5	2.9

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	1612	475	275	1592	174	545	839	252	310	787	243
Future Volume (veh/h)	242	1612	475	275	1592	174	545	839	252	310	787	243
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	247	1645	315	281	1624	118	556	856	153	316	803	207
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	247	1645	315	281	1624	118	556	856	153	316	803	207
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	33.4	18.3	8.4	33.5	5.8	15.4	14.9	8.0	10.3	22.5	11.8
Cycle Q Clear(g_c), s	8.0	33.4	18.3	8.4	33.5	5.8	15.4	14.9	8.0	10.3	22.5	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
V/C Ratio(X)	1.02	1.02	0.64	1.11	0.99	0.23	1.20	0.56	0.33	0.84	0.83	0.49
Avail Cap(c_a), veh/h	241	1615	492	253	1634	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.1	31.0	48.6	35.8	26.4	45.1	31.2	28.8	45.6	36.3	32.4
Incr Delay (d2), s/veh	64.5	27.3	2.8	89.4	20.8	0.2	108.5	0.4	0.4	10.6	5.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	24.3	11.4	11.0	23.6	3.9	20.4	10.1	5.4	8.0	15.4	7.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.3	63.4	33.7	138.0	56.6	26.6	153.6	31.6	29.2	56.2	41.2	33.3
LnGrp LOS	F	F	C	F	E	C	F	C	C	E	D	C
Approach Vol, veh/h		2207			2023			1565			1326	
Approach Delay, s/veh		64.7			66.1			74.7			43.6	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.8	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	35.4	17.4	24.5	10.0	35.5	12.3	16.9
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	63.4
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1175	37	35	1295	22	6	7	48	0	0	30
Future Vol, veh/h	0	1175	37	35	1295	22	6	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1277	40	38	1408	24	7	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1319	0	0	2059	2793	641	-	-	722
Stage 1	-	-	-	-	-	-	1279	1279	-	-	-	-
Stage 2	-	-	-	-	-	-	780	1514	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	520	-	-	32	18	417	0	0	369
Stage 1	0	-	-	-	-	-	176	235	-	0	0	-
Stage 2	0	-	-	-	-	-	354	181	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	519	-	-	27	17	416	-	-	367
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	97	-	-	-	-
Stage 1	-	-	-	-	-	-	176	235	-	-	-	-
Stage 2	-	-	-	-	-	-	299	167	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.2	15.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	253	-	-	519	-	-	367
HCM Lane V/C Ratio	0.262	-	-	0.073	-	-	0.089
HCM Control Delay (s)	24.2	-	-	12.5	-	-	15.8
HCM Lane LOS	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1	-	-	0.2	-	-	0.3

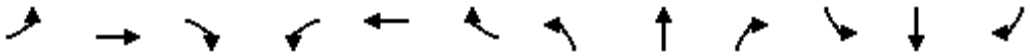
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2267	21	0	2358	42	0	0	30	0	0	48
Future Vol, veh/h	0	2267	21	0	2358	42	0	0	30	0	0	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2361	22	0	2456	44	0	0	31	0	0	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1192	-	-	1250
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	225	0	0	209
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	225	-	-	209
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.6	27.6
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	225	-	-	-	-	209
HCM Lane V/C Ratio	0.139	-	-	-	-	0.239
HCM Control Delay (s)	23.6	-	-	-	-	27.6
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	-	0.9



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1226	8	102	1268	9	18	12	63	30	2	18
Future Volume (veh/h)	28	1226	8	102	1268	9	18	12	63	30	2	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1238	7	103	1281	9	18	12	34	30	2	14
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	344	2151	12	356	2147	15	164	68	122	269	41	65
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.14	0.14	0.14	0.14	0.14	0.14
Sat Flow, veh/h	405	3623	20	423	3616	25	280	477	858	767	285	460
Grp Volume(v), veh/h	28	607	638	103	629	661	64	0	0	46	0	0
Grp Sat Flow(s),veh/h/ln	405	1777	1867	423	1777	1865	1615	0	0	1513	0	0
Q Serve(g_s), s	1.7	7.8	7.8	7.4	8.3	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.0	7.8	7.8	15.2	8.3	8.3	1.2	0.0	0.0	0.8	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.28		0.53	0.65		0.30
Lane Grp Cap(c), veh/h	344	1055	1108	356	1055	1107	354	0	0	375	0	0
V/C Ratio(X)	0.08	0.58	0.58	0.29	0.60	0.60	0.18	0.00	0.00	0.12	0.00	0.00
Avail Cap(c_a), veh/h	368	1159	1217	381	1159	1216	1228	0	0	1175	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.9	4.6	4.6	9.3	4.7	4.7	14.2	0.0	0.0	14.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.4	0.7	0.7	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	2.8	3.0	0.9	2.3	2.4	0.8	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.0	5.2	5.2	9.8	5.5	5.4	14.4	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1273			1393			64			46	
Approach Delay, s/veh		5.3			5.8			14.4			14.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.2		9.9		27.2		9.9				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		12.0		2.8		17.2		3.2				
Green Ext Time (p_c), s		7.0		0.2		4.8		0.3				

Intersection Summary												
HCM 6th Ctrl Delay			5.9									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	12.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	49	2273	6	0	2335	76	0	0	8	16	0	66
Future Vol, veh/h	49	2273	6	0	2335	76	0	0	8	16	0	66
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	2343	6	0	2407	78	0	0	8	16	0	68

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2490	0	0	-	-	0	-	-	1178	3490	-	1248
Stage 1	-	-	-	-	-	-	-	-	-	2451	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1039	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	70	-	-	0	-	-	0	0	158	~ 7	0	141
Stage 1	-	-	-	0	-	-	0	0	-	18	0	-
Stage 2	-	-	-	0	-	-	0	0	-	222	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	70	-	-	-	-	-	-	-	158	~ 3	-	140
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 4	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 5	-	-
Stage 2	-	-	-	-	-	-	-	-	-	57	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	0	29	$ 643.3
HCM LOS			D	F

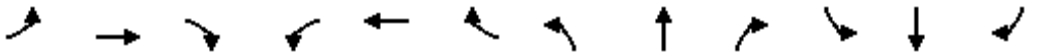
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	158	70	-	-	-	-	4	140
HCM Lane V/C Ratio	0.052	0.722	-	-	-	-	4.124	0.486
HCM Control Delay (s)	29	137.4	-	-	-	-	$ 3078.9	52.9
HCM Lane LOS	D	F	-	-	-	-	F	F
HCM 95th %tile Q(veh)	0.2	3.3	-	-	-	-	3.4	2.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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APPENDIX 6.10: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	172	1492	399	170	1385	112	466	585	182	200	720	170
Future Volume (veh/h)	172	1492	399	170	1385	112	466	585	182	200	720	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	181	1571	412	179	1458	110	491	616	184	211	758	162
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1827	557	174	1827	565	292	1454	444	275	993	438
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.28	0.28	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	181	1571	412	179	1458	110	491	616	184	211	758	162
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	26.1	21.1	5.0	23.5	4.4	8.4	9.0	8.8	5.9	17.9	7.6
Cycle Q Clear(g_c), s	5.0	26.1	21.1	5.0	23.5	4.4	8.4	9.0	8.8	5.9	17.9	7.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1827	557	174	1827	565	292	1454	444	275	993	438
V/C Ratio(X)	1.04	0.86	0.74	1.03	0.80	0.19	1.68	0.42	0.41	0.77	0.76	0.37
Avail Cap(c_a), veh/h	174	1886	575	174	1886	583	292	1858	567	282	1282	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	27.3	25.7	43.3	26.4	20.3	41.6	26.6	26.5	40.9	30.2	26.5
Incr Delay (d2), s/veh	79.4	4.2	4.9	76.1	2.4	0.2	320.8	0.2	0.6	10.6	2.1	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.9	15.8	12.8	6.8	14.8	2.9	26.5	6.4	5.8	4.8	12.1	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	122.7	31.4	30.5	119.4	28.9	20.5	362.3	26.8	27.2	51.5	32.3	27.0
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2164			1747			1291			1131	
Approach Delay, s/veh		38.9			37.6			154.5			35.1	
Approach LOS		D			D			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.1	13.0	30.8	9.6	38.1	12.5	31.3
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	28.1	10.4	19.9	7.0	25.5	7.9	11.0
Green Ext Time (p_c), s	0.0	4.6	0.0	4.7	0.0	6.1	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	61.4
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	726	23	18	837	6	13	1	19	0	0	18
Future Vol, veh/h	0	726	23	18	837	6	13	1	19	0	0	18
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	825	26	20	951	7	15	1	22	0	0	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	852	0	0	1342	1828	414	-	-	483
Stage 1	-	-	-	-	-	-	826	826	-	-	-	-
Stage 2	-	-	-	-	-	-	516	1002	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	783	-	-	110	76	587	0	0	530
Stage 1	0	-	-	-	-	-	332	385	-	0	0	-
Stage 2	0	-	-	-	-	-	510	318	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	782	-	-	104	74	586	-	-	528
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	189	-	-	-	-
Stage 1	-	-	-	-	-	-	332	385	-	-	-	-
Stage 2	-	-	-	-	-	-	478	308	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.7	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	345	-	-	782	-	-	528
HCM Lane V/C Ratio	0.109	-	-	0.026	-	-	0.039
HCM Control Delay (s)	16.7	-	-	9.7	-	-	12.1
HCM Lane LOS	C	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	-	0.1

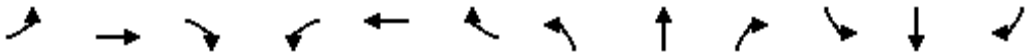
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2116	15	0	2109	50	0	0	41	0	0	64
Future Vol, veh/h	0	2116	15	0	2109	50	0	0	41	0	0	64
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2181	15	0	2174	52	0	0	42	0	0	66

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1101	-	-	1113
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	216	0	0	212
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	215	-	-	212
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25.8	29.5
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	215	-	-	-	-	212
HCM Lane V/C Ratio	0.197	-	-	-	-	0.311
HCM Control Delay (s)	25.8	-	-	-	-	29.5
HCM Lane LOS	D	-	-	-	-	D
HCM 95th %tile Q(veh)	0.7	-	-	-	-	1.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	742	16	73	734	12	94	54	40	54	12	15
Future Volume (veh/h)	21	742	16	73	734	12	94	54	40	54	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.95	0.96		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	873	18	86	864	14	111	64	32	64	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	1588	33	325	1596	26	362	196	78	471	100	55
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	598	3558	73	590	3577	58	717	602	241	1003	307	168
Grp Volume(v), veh/h	25	436	455	86	429	449	207	0	0	88	0	0
Grp Sat Flow(s),veh/h/ln	598	1777	1855	590	1777	1858	1560	0	0	1478	0	0
Q Serve(g_s), s	1.4	7.7	7.7	5.4	7.6	7.6	2.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	8.9	7.7	7.7	13.1	7.6	7.6	4.2	0.0	0.0	1.5	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.54		0.15	0.73		0.11
Lane Grp Cap(c), veh/h	329	793	828	325	793	829	636	0	0	626	0	0
V/C Ratio(X)	0.08	0.55	0.55	0.26	0.54	0.54	0.33	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	395	987	1030	389	987	1032	1080	0	0	1019	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.9	8.7	8.7	13.5	8.7	8.7	11.1	0.0	0.0	10.3	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.4	0.6	0.6	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.3	4.5	1.1	3.8	4.0	2.4	0.0	0.0	0.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.0	9.3	9.3	13.9	9.2	9.2	11.4	0.0	0.0	10.4	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		916			964			207			88	
Approach Delay, s/veh		9.4			9.6			11.4			10.4	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		24.3		18.5		24.3		18.5				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		10.9		3.5		15.1		6.2				
Green Ext Time (p_c), s		5.1		0.4		4.0		1.2				

Intersection Summary												
HCM 6th Ctrl Delay			9.7									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	7.9

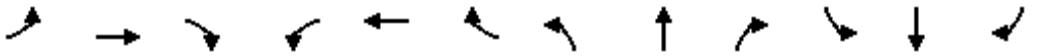
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	104	2005	4	0	2051	168	0	0	5	14	0	108
Future Vol, veh/h	104	2005	4	0	2051	168	0	0	5	14	0	108
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	112	2156	4	0	2205	181	0	0	5	15	0	116

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2391	0	0	-	-	0	-	-	1082	3387	-	1198
Stage 1	-	-	-	-	-	-	-	-	-	2301	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1086	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	~ 79	-	-	0	-	-	0	0	183	~ 8	0	153
Stage 1	-	-	-	0	-	-	0	0	-	23	0	-
Stage 2	-	-	-	0	-	-	0	0	-	208	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 79	-	-	-	-	-	-	-	183	-	-	152
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	23	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.7	0	25.3	
HCM LOS			D	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	183	~ 79	-	-	-	-	-	152
HCM Lane V/C Ratio	0.029	1.416	-	-	-	-	-	0.764
HCM Control Delay (s)	25.3	$ 338.4	-	-	-	-	-	80.3
HCM Lane LOS	D	F	-	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	8.8	-	-	-	-	-	4.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	290	1512	387	338	1637	181	456	677	264	317	640	275
Future Volume (veh/h)	290	1512	387	338	1637	181	456	677	264	317	640	275
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	312	1626	274	363	1760	138	490	728	181	341	688	237
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.25	0.25
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1564
Grp Volume(v), veh/h	312	1626	274	363	1760	138	490	728	181	341	688	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1564
Q Serve(g_s), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.9	11.0	18.5	13.7
Cycle Q Clear(g_c), s	8.4	32.7	15.0	10.2	34.8	6.6	14.0	12.4	9.9	11.0	18.5	13.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	259	1635	497	315	1724	530	432	1406	427	361	899	396
V/C Ratio(X)	1.20	0.99	0.55	1.15	1.02	0.26	1.13	0.52	0.42	0.94	0.77	0.60
Avail Cap(c_a), veh/h	259	1635	497	315	1724	530	432	1749	531	361	1138	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.3	34.9	28.9	46.4	34.1	24.8	44.5	31.6	30.6	45.4	35.7	33.9
Incr Delay (d2), s/veh	122.0	20.9	1.3	98.7	27.1	0.3	85.0	0.3	0.7	32.7	2.4	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.9	22.5	9.5	13.8	25.9	4.4	16.7	8.7	6.6	9.9	12.8	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	169.4	55.9	30.2	145.1	61.2	25.0	129.6	31.9	31.3	78.1	38.1	35.4
LnGrp LOS	F	E	C	F	F	C	F	C	C	E	D	D
Approach Vol, veh/h		2212			2261			1399			1266	
Approach Delay, s/veh		68.7			72.5			66.0			48.3	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.3	13.0	40.2	16.3	33.6
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	34.7	16.0	20.5	10.4	36.8	13.0	14.4
Green Ext Time (p_c), s	0.0	0.0	0.0	4.4	0.0	0.0	0.0	5.6

Intersection Summary	
HCM 6th Ctrl Delay	65.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1035	44	27	1151	23	17	1	78	0	0	25
Future Vol, veh/h	0	1035	44	27	1151	23	17	1	78	0	0	25
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1176	50	31	1308	26	19	1	89	0	0	28

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1235	0	0	1901	2584	597	-	-	670
Stage 1	-	-	-	-	-	-	1185	1185	-	-	-	-
Stage 2	-	-	-	-	-	-	716	1399	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	560	-	-	42	25	446	0	0	399
Stage 1	0	-	-	-	-	-	201	261	-	0	0	-
Stage 2	0	-	-	-	-	-	387	206	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	555	-	-	37	23	442	-	-	398
Mov Cap-2 Maneuver	-	-	-	-	-	-	131	112	-	-	-	-
Stage 1	-	-	-	-	-	-	201	259	-	-	-	-
Stage 2	-	-	-	-	-	-	339	194	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	23.2	14.7
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	305	-	-	555	-	-	398
HCM Lane V/C Ratio	0.358	-	-	0.055	-	-	0.071
HCM Control Delay (s)	23.2	-	-	11.9	-	-	14.7
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.6	-	-	0.2	-	-	0.2

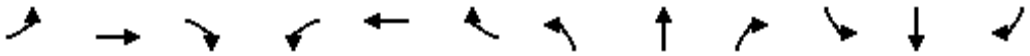
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2122	25	0	2260	51	0	0	27	0	0	79
Future Vol, veh/h	0	2122	25	0	2260	51	0	0	27	0	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2467	29	0	2628	59	0	0	31	0	0	92

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1248	-	-	1344
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	267	0	0	242
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	267	-	-	242
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	20.3	28.7
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	267	-	-	-	-	242
HCM Lane V/C Ratio	0.118	-	-	-	-	0.38
HCM Control Delay (s)	20.3	-	-	-	-	28.7
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1087	22	91	1132	22	50	41	62	39	4	23
Future Volume (veh/h)	29	1087	22	91	1132	22	50	41	62	39	4	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.94		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1221	24	102	1272	23	56	46	43	44	4	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	227	1735	34	238	1739	31	252	200	148	445	48	76
Arrive On Green	0.49	0.49	0.49	0.49	0.49	0.49	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	403	3564	70	423	3571	65	479	635	469	1006	152	241
Grp Volume(v), veh/h	33	609	636	102	633	662	145	0	0	58	0	0
Grp Sat Flow(s),veh/h/ln	403	1777	1857	423	1777	1858	1583	0	0	1400	0	0
Q Serve(g_s), s	3.5	13.3	13.3	10.9	14.1	14.1	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.6	13.3	13.3	24.2	14.1	14.1	3.1	0.0	0.0	1.1	0.0	0.0
Prop In Lane	1.00		0.04	1.00		0.03	0.39		0.30	0.76		0.17
Lane Grp Cap(c), veh/h	227	865	904	238	865	905	600	0	0	570	0	0
V/C Ratio(X)	0.15	0.70	0.70	0.43	0.73	0.73	0.24	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	227	865	904	238	865	905	921	0	0	842	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.2	9.9	9.9	19.9	10.2	10.2	12.7	0.0	0.0	12.0	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.6	2.5	1.2	3.2	3.1	0.2	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	8.3	8.5	2.0	8.2	8.5	2.0	0.0	0.0	0.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.5	12.5	12.4	21.1	13.3	13.2	12.9	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	B	B	C	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1278			1397			145			58	
Approach Delay, s/veh		12.6			13.9			12.9			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.3		29.4		20.3				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.6		3.1		26.2		5.1				
Green Ext Time (p_c), s		3.2		0.3		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	3

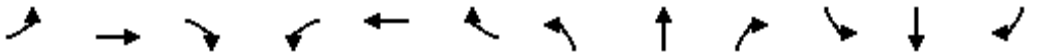
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	2053	15	0	2232	87	0	0	4	15	0	79
Future Vol, veh/h	58	2053	15	0	2232	87	0	0	4	15	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	64	2281	17	0	2480	97	0	0	4	17	0	88

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2577	0	0	-	-	0	-	-	1149	3569	-	1289
Stage 1	-	-	-	-	-	-	-	-	-	2529	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1040	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	~ 63	-	-	0	-	-	0	0	165	~ 6	0	133
Stage 1	-	-	-	0	-	-	0	0	-	~ 16	0	-
Stage 2	-	-	-	0	-	-	0	0	-	222	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	~ 63	-	-	-	-	-	-	-	165	-	-	133
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 16	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	6.3	0	27.4	
HCM LOS			D	-

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	165	~ 63	-	-	-	-	-	133
HCM Lane V/C Ratio	0.027	1.023	-	-	-	-	-	0.66
HCM Control Delay (s)	27.4	229.6	-	-	-	-	-	73.4
HCM Lane LOS	D	F	-	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	5	-	-	-	-	-	3.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	1618	475	277	1596	174	545	839	255	310	787	243
Future Volume (veh/h)	242	1618	475	277	1596	174	545	839	255	310	787	243
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	247	1651	315	283	1629	118	556	856	156	316	803	207
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	247	1651	315	283	1629	118	556	856	156	316	803	207
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	33.4	18.3	8.4	33.7	5.8	15.4	14.9	8.2	10.3	22.5	11.8
Cycle Q Clear(g_c), s	8.0	33.4	18.3	8.4	33.7	5.8	15.4	14.9	8.2	10.3	22.5	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1615	492	253	1634	504	464	1527	467	375	963	422
V/C Ratio(X)	1.02	1.02	0.64	1.12	1.00	0.23	1.20	0.56	0.33	0.84	0.83	0.49
Avail Cap(c_a), veh/h	241	1615	492	253	1634	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.1	31.0	48.6	35.9	26.4	45.1	31.2	28.8	45.6	36.3	32.4
Incr Delay (d2), s/veh	64.5	28.3	2.8	92.0	21.5	0.2	108.5	0.4	0.4	10.6	5.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	9.1	24.6	11.4	11.2	23.8	3.9	20.4	10.1	5.5	8.0	15.4	7.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	113.3	64.4	33.7	140.6	57.4	26.6	153.6	31.6	29.2	56.2	41.2	33.3
LnGrp LOS	F	F	C	F	E	C	F	C	C	E	D	C
Approach Vol, veh/h		2213			2030			1568			1326	
Approach Delay, s/veh		65.5			67.2			74.6			43.6	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.8	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	35.4	17.4	24.5	10.0	35.7	12.3	16.9
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	63.9
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1175	42	35	1295	22	8	7	48	0	0	30
Future Vol, veh/h	0	1175	42	35	1295	22	8	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1277	46	38	1408	24	9	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1325	0	0	2059	2793	641	-	-	722
Stage 1	-	-	-	-	-	-	1279	1279	-	-	-	-
Stage 2	-	-	-	-	-	-	780	1514	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	517	-	-	32	18	417	0	0	369
Stage 1	0	-	-	-	-	-	176	235	-	0	0	-
Stage 2	0	-	-	-	-	-	354	181	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	516	-	-	27	17	416	-	-	367
Mov Cap-2 Maneuver	-	-	-	-	-	-	113	97	-	-	-	-
Stage 1	-	-	-	-	-	-	176	235	-	-	-	-
Stage 2	-	-	-	-	-	-	299	167	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	25.4	15.8
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	244	-	-	516	-	-	367
HCM Lane V/C Ratio	0.281	-	-	0.074	-	-	0.089
HCM Control Delay (s)	25.4	-	-	12.5	-	-	15.8
HCM Lane LOS	D	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.1	-	-	0.2	-	-	0.3

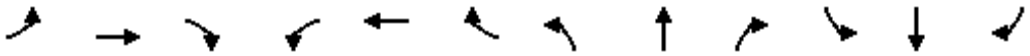
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2277	21	0	2347	60	0	0	30	0	0	66
Future Vol, veh/h	0	2277	21	0	2347	60	0	0	30	0	0	66
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2372	22	0	2445	63	0	0	31	0	0	69

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1197	-	-	1254
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.9	-	-	5.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	231	0	0	216
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	231	-	-	216
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23	29.3
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	231	-	-	-	-	216
HCM Lane V/C Ratio	0.135	-	-	-	-	0.318
HCM Control Delay (s)	23	-	-	-	-	29.3
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	-	1.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1226	8	108	1268	9	18	12	67	30	2	18
Future Volume (veh/h)	28	1226	8	108	1268	9	18	12	67	30	2	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1238	7	109	1281	9	18	12	38	30	2	14
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	341	2151	12	353	2147	15	158	67	132	272	41	68
Arrive On Green	0.59	0.59	0.59	0.59	0.59	0.59	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	405	3623	20	423	3616	25	257	455	902	777	276	461
Grp Volume(v), veh/h	28	607	638	109	629	661	68	0	0	46	0	0
Grp Sat Flow(s),veh/h/ln	405	1777	1867	423	1777	1865	1615	0	0	1513	0	0
Q Serve(g_s), s	1.8	8.0	8.0	8.1	8.4	8.4	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.2	8.0	8.0	16.1	8.4	8.4	1.3	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.01	1.00		0.01	0.26		0.56	0.65		0.30
Lane Grp Cap(c), veh/h	341	1055	1108	353	1055	1107	358	0	0	380	0	0
V/C Ratio(X)	0.08	0.58	0.58	0.31	0.60	0.60	0.19	0.00	0.00	0.12	0.00	0.00
Avail Cap(c_a), veh/h	360	1139	1197	373	1139	1195	1206	0	0	1154	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.0	4.7	4.7	9.7	4.8	4.8	14.3	0.0	0.0	14.1	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.6	0.6	0.5	0.8	0.7	0.3	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.2	3.0	3.1	1.0	2.4	2.5	0.8	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.1	5.4	5.3	10.2	5.6	5.5	14.6	0.0	0.0	14.2	0.0	0.0
LnGrp LOS	A	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1273			1399			68			46	
Approach Delay, s/veh		5.4			5.9			14.6			14.2	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.6		10.1		27.6		10.1				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		12.2		2.9		18.1		3.3				
Green Ext Time (p_c), s		7.0		0.2		4.4		0.3				

Intersection Summary												
HCM 6th Ctrl Delay			6.0									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	29.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	59	2273	6	0	2328	94	0	0	8	18	0	80
Future Vol, veh/h	59	2273	6	0	2328	94	0	0	8	18	0	80
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	125	-	-	-	-	-	-	-	0	0	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	61	2343	6	0	2400	97	0	0	8	19	0	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2502	0	0	-	-	0	-	-	1178	3513	-	1254
Stage 1	-	-	-	-	-	-	-	-	-	2454	-	-
Stage 2	-	-	-	-	-	-	-	-	-	1059	-	-
Critical Hdwy	5.34	-	-	-	-	-	-	-	7.14	6.44	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	7.34	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	6.74	-	-
Follow-up Hdwy	3.12	-	-	-	-	-	-	-	3.92	3.82	-	3.92
Pot Cap-1 Maneuver	69	-	-	0	-	-	0	0	158	~ 7	0	140
Stage 1	-	-	-	0	-	-	0	0	-	~ 18	0	-
Stage 2	-	-	-	0	-	-	0	0	-	216	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	69	-	-	-	-	-	-	-	158	~ 2	-	139
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	~ 2	-	-
Stage 1	-	-	-	-	-	-	-	-	-	~ 2	-	-
Stage 2	-	-	-	-	-	-	-	-	-	24	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.5	0	29	$ 1333.8
HCM LOS			D	F

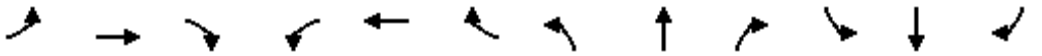
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	158	69	-	-	-	-	2	139
HCM Lane V/C Ratio	0.052	0.882	-	-	-	-	9.278	0.593
HCM Control Delay (s)	29	176.8	-	-	-	-	$ 6982	63
HCM Lane LOS	D	F	-	-	-	-	F	F
HCM 95th %tile Q(veh)	0.2	4.3	-	-	-	-	3.9	3.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

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APPENDIX 6.11: GENERAL PLAN BUILDOUT WITHOUT PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	242	1469	399	164	1293	112	466	585	179	200	720	241
Future Volume (veh/h)	242	1469	399	164	1293	112	466	585	179	200	720	241
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	255	1546	412	173	1361	110	491	616	180	211	758	237
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1817	554	174	1817	562	292	1464	447	275	1000	441
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	255	1546	412	173	1361	110	491	616	180	211	758	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	25.6	21.2	5.0	21.4	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Cycle Q Clear(g_c), s	5.0	25.6	21.2	5.0	21.4	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1817	554	174	1817	562	292	1464	447	275	1000	441
V/C Ratio(X)	1.47	0.85	0.74	0.99	0.75	0.20	1.68	0.42	0.40	0.77	0.76	0.54
Avail Cap(c_a), veh/h	174	1886	575	174	1886	583	292	1858	567	282	1281	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	27.2	25.8	43.2	25.9	20.4	41.6	26.5	26.3	40.9	30.0	27.8
Incr Delay (d2), s/veh	238.5	3.8	5.0	66.6	1.6	0.2	320.8	0.2	0.6	10.6	2.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.4	15.5	12.9	6.4	13.6	2.9	26.5	6.4	5.6	4.8	12.1	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	281.8	31.1	30.8	109.8	27.5	20.6	362.4	26.7	26.9	51.5	32.0	28.9
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2213			1644			1287			1206	
Approach Delay, s/veh		59.9			35.7			154.8			34.8	
Approach LOS		E			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.0	13.0	30.9	9.6	38.0	12.5	31.4
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	27.6	10.4	19.8	7.0	23.4	7.9	11.0
Green Ext Time (p_c), s	0.0	4.9	0.0	4.9	0.0	6.9	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	68.1
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	813	17	17	915	6	7	1	19	0	0	17
Future Vol, veh/h	0	813	17	17	915	6	7	1	19	0	0	17
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	924	19	19	1040	7	8	1	22	0	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	944	0	0	1483	2014	463	-	-	528
Stage 1	-	-	-	-	-	-	925	925	-	-	-	-
Stage 2	-	-	-	-	-	-	558	1089	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	722	-	-	87	58	546	0	0	495
Stage 1	0	-	-	-	-	-	290	346	-	0	0	-
Stage 2	0	-	-	-	-	-	482	290	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	721	-	-	82	56	545	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	167	-	-	-	-
Stage 1	-	-	-	-	-	-	290	346	-	-	-	-
Stage 2	-	-	-	-	-	-	451	281	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	16.2	12.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	353	-	-	721	-	-	493
HCM Lane V/C Ratio	0.087	-	-	0.027	-	-	0.039
HCM Control Delay (s)	16.2	-	-	10.1	-	-	12.6
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-	-	0.1

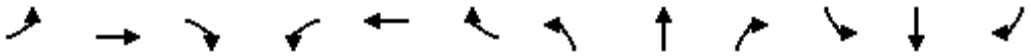
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1996	15	0	2028	22	0	0	41	0	0	26
Future Vol, veh/h	0	1996	15	0	2028	22	0	0	41	0	0	26
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2058	15	0	2091	23	0	0	42	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1040	-	-	1057
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.5
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	235	0	0	229
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	234	-	-	229
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.7	22.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	234	-	-	-	-	229
HCM Lane V/C Ratio	0.181	-	-	-	-	0.117
HCM Control Delay (s)	23.7	-	-	-	-	22.8
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.6	-	-	-	-	0.4



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	736	109	205	728	12	177	53	37	53	12	15
Future Volume (veh/h)	21	736	109	205	728	12	177	53	37	53	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	866	127	241	856	14	208	62	29	62	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	334	1481	217	293	1711	28	442	124	48	442	97	55
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	602	3096	454	537	3576	58	984	383	147	978	298	168
Grp Volume(v), veh/h	25	497	496	241	425	445	299	0	0	86	0	0
Grp Sat Flow(s),veh/h/ln	602	1777	1773	537	1777	1858	1514	0	0	1445	0	0
Q Serve(g_s), s	1.5	10.1	10.1	13.7	8.2	8.2	6.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.6	10.1	10.1	23.8	8.2	8.2	8.0	0.0	0.0	1.9	0.0	0.0
Prop In Lane	1.00		0.26	1.00		0.03	0.70		0.10	0.72		0.12
Lane Grp Cap(c), veh/h	334	850	848	293	850	889	614	0	0	594	0	0
V/C Ratio(X)	0.07	0.58	0.58	0.82	0.50	0.50	0.49	0.00	0.00	0.14	0.00	0.00
Avail Cap(c_a), veh/h	334	850	848	293	850	889	918	0	0	875	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.2	9.4	9.4	20.7	8.9	8.9	13.9	0.0	0.0	11.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.0	1.0	17.1	0.5	0.4	0.6	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	6.1	6.1	7.1	4.3	4.5	4.6	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.3	10.4	10.4	37.8	9.4	9.3	14.5	0.0	0.0	12.1	0.0	0.0
LnGrp LOS	B	B	B	D	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1018			1111			299			86	
Approach Delay, s/veh		10.5			15.5			14.5			12.1	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		20.8		29.0		20.8				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		12.1		3.9		25.8		10.0				
Green Ext Time (p_c), s		5.4		0.4		0.0		1.7				

Intersection Summary												
HCM 6th Ctrl Delay			13.2									
HCM 6th LOS			B									

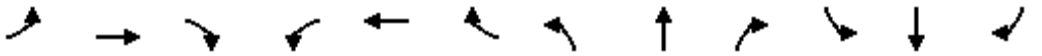
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1989	3	0	2050	0	5
Future Vol, veh/h	0	1989	3	0	2050	0	5
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2139	3	0	2204	0	5

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1609	0	0	-	-	-	1073
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	200	-	-	0	-	0	185
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	200	-	-	-	-	-	185
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	25
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	185	200	-	-	-
HCM Lane V/C Ratio	0.029	-	-	-	-
HCM Control Delay (s)	25	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	341	1445	384	335	1552	180	452	672	261	315	635	342
Future Volume (veh/h)	341	1445	384	335	1552	180	452	672	261	315	635	342
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	367	1554	271	360	1669	137	486	723	178	339	683	309
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.26	0.26
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1565
Grp Volume(v), veh/h	367	1554	271	360	1669	137	486	723	178	339	683	309
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1565
Q Serve(g_s), s	8.4	30.9	14.9	10.2	33.4	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Cycle Q Clear(g_c), s	8.4	30.9	14.9	10.2	33.4	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
V/C Ratio(X)	1.42	0.96	0.55	1.15	0.97	0.26	1.13	0.51	0.41	0.94	0.75	0.77
Avail Cap(c_a), veh/h	258	1627	494	313	1716	528	430	1740	529	360	1132	499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.6	34.6	29.1	46.7	33.9	25.0	44.8	31.4	30.4	45.6	35.4	35.7
Incr Delay (d2), s/veh	210.9	13.2	1.3	97.3	15.7	0.3	83.7	0.3	0.6	32.6	2.2	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	18.0	20.3	9.5	13.7	22.7	4.4	16.5	8.6	6.5	9.9	12.6	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	258.5	47.8	30.4	144.0	49.6	25.3	128.5	31.7	31.1	78.2	37.6	41.4
LnGrp LOS	F	D	C	F	D	C	F	C	C	E	D	D
Approach Vol, veh/h		2192			2166			1387			1331	
Approach Delay, s/veh		80.9			63.8			65.5			48.8	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.8	13.0	40.2	16.3	34.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	32.9	16.0	20.9	10.4	35.4	13.0	14.3
Green Ext Time (p_c), s	0.0	0.1	0.0	4.5	0.0	0.0	0.0	5.5

Intersection Summary	
HCM 6th Ctrl Delay	66.6
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1081	42	27	1210	23	16	1	78	0	0	24
Future Vol, veh/h	0	1081	42	27	1210	23	16	1	78	0	0	24
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1228	48	31	1375	26	18	1	89	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1285	0	0	1987	2703	623	-	-	704
Stage 1	-	-	-	-	-	-	1237	1237	-	-	-	-
Stage 2	-	-	-	-	-	-	750	1466	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	536	-	-	36	21	429	0	0	379
Stage 1	0	-	-	-	-	-	186	246	-	0	0	-
Stage 2	0	-	-	-	-	-	369	191	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	531	-	-	32	20	425	-	-	378
Mov Cap-2 Maneuver	-	-	-	-	-	-	121	103	-	-	-	-
Stage 1	-	-	-	-	-	-	186	244	-	-	-	-
Stage 2	-	-	-	-	-	-	322	179	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.4	15.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	292	-	-	531	-	-	378
HCM Lane V/C Ratio	0.37	-	-	0.058	-	-	0.072
HCM Control Delay (s)	24.4	-	-	12.2	-	-	15.3
HCM Lane LOS	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.6	-	-	0.2	-	-	0.2

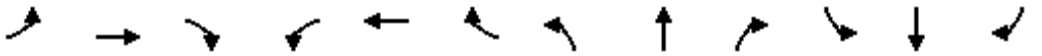
Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2048	24	0	2182	39	0	0	27	0	0	65
Future Vol, veh/h	0	2048	24	0	2182	39	0	0	27	0	0	65
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2381	28	0	2537	45	0	0	31	0	0	76

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1205	-	-	1291
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	280	0	0	256
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	280	-	-	256
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.5	24.8
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	280	-	-	-	-	256
HCM Lane V/C Ratio	0.112	-	-	-	-	0.295
HCM Control Delay (s)	19.5	-	-	-	-	24.8
HCM Lane LOS	C	-	-	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1078	75	162	1123	22	118	41	73	38	3	23
Future Volume (veh/h)	29	1078	75	162	1123	22	118	41	73	38	3	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1211	83	182	1262	23	133	46	55	43	3	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	1621	111	219	1716	31	362	127	116	456	41	80
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	407	3372	231	403	3570	65	770	391	357	1015	126	248
Grp Volume(v), veh/h	33	637	657	182	628	657	234	0	0	56	0	0
Grp Sat Flow(s),veh/h/ln	407	1777	1826	403	1777	1858	1517	0	0	1389	0	0
Q Serve(g_s), s	3.6	14.6	14.7	9.5	14.3	14.3	4.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.9	14.6	14.7	24.2	14.3	14.3	6.0	0.0	0.0	1.2	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.04	0.57		0.24	0.77		0.18
Lane Grp Cap(c), veh/h	223	854	878	219	854	893	605	0	0	577	0	0
V/C Ratio(X)	0.15	0.75	0.75	0.83	0.74	0.74	0.39	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	223	854	878	219	854	893	891	0	0	828	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.7	10.6	10.6	23.2	10.5	10.5	13.4	0.0	0.0	11.9	0.0	0.0
Incr Delay (d2), s/veh	0.3	3.6	3.6	22.6	3.3	3.2	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	9.2	9.5	6.0	8.4	8.7	3.5	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.0	14.2	14.2	45.8	13.8	13.7	13.8	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	D	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1327			1467			234			56	
Approach Delay, s/veh		14.3			17.7			13.8			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		20.9		29.4		20.9				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.9		3.2		26.2		8.0				
Green Ext Time (p_c), s		3.2		0.2		0.0		1.3				

Intersection Summary												
HCM 6th Ctrl Delay			15.8									
HCM 6th LOS			B									

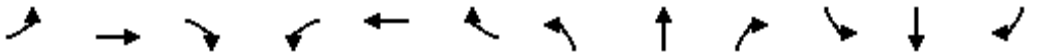
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2037	15	0	2222	0	3
Future Vol, veh/h	0	2037	15	0	2222	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2263	17	0	2469	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1802	0	0	-	-	-	1140
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	156	-	-	0	-	0	167
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	156	-	-	-	-	-	167
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	27
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	167	156	-	-	-
HCM Lane V/C Ratio	0.02	-	-	-	-
HCM Control Delay (s)	27	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	265	1565	475	275	1552	174	545	839	252	310	787	256
Future Volume (veh/h)	265	1565	475	275	1552	174	545	839	252	310	787	256
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	270	1597	315	281	1584	118	556	856	153	316	803	220
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	270	1597	315	281	1584	118	556	856	153	316	803	220
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	32.9	18.3	8.4	32.3	5.8	15.4	14.9	8.0	10.3	22.5	12.7
Cycle Q Clear(g_c), s	8.0	32.9	18.3	8.4	32.3	5.8	15.4	14.9	8.0	10.3	22.5	12.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
V/C Ratio(X)	1.12	0.99	0.64	1.11	0.97	0.23	1.20	0.56	0.33	0.84	0.83	0.52
Avail Cap(c_a), veh/h	241	1614	492	253	1633	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.0	31.0	48.6	35.4	26.4	45.1	31.2	28.8	45.7	36.2	32.7
Incr Delay (d2), s/veh	94.2	19.8	2.8	89.5	15.7	0.2	108.6	0.4	0.4	10.6	5.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.7	22.5	11.4	11.0	22.1	3.9	20.4	10.1	5.4	8.0	15.4	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	143.0	55.8	33.8	138.1	51.1	26.7	153.7	31.6	29.2	56.3	41.2	33.7
LnGrp LOS	F	E	C	F	D	C	F	C	C	E	D	C
Approach Vol, veh/h		2182			1983			1565			1339	
Approach Delay, s/veh		63.4			62.0			74.7			43.5	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.9	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	34.9	17.4	24.5	10.0	34.3	12.3	16.9
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	61.7
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1214	37	35	1349	22	6	7	48	0	0	30
Future Vol, veh/h	0	1214	37	35	1349	22	6	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1320	40	38	1466	24	7	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1362	0	0	2131	2894	662	-	-	751
Stage 1	-	-	-	-	-	-	1322	1322	-	-	-	-
Stage 2	-	-	-	-	-	-	809	1572	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	501	-	-	28	16	404	0	0	353
Stage 1	0	-	-	-	-	-	165	224	-	0	0	-
Stage 2	0	-	-	-	-	-	340	169	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	500	-	-	24	15	403	-	-	351
Mov Cap-2 Maneuver	-	-	-	-	-	-	105	90	-	-	-	-
Stage 1	-	-	-	-	-	-	165	224	-	-	-	-
Stage 2	-	-	-	-	-	-	285	155	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	25.6	16.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	240	-	-	500	-	-	351
HCM Lane V/C Ratio	0.276	-	-	0.076	-	-	0.093
HCM Control Delay (s)	25.6	-	-	12.8	-	-	16.3
HCM Lane LOS	D	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.1	-	-	0.2	-	-	0.3

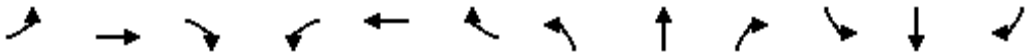
Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2200	21	0	2274	42	0	0	30	0	0	48
Future Vol, veh/h	0	2200	21	0	2274	42	0	0	30	0	0	48
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2292	22	0	2369	44	0	0	31	0	0	50

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1157	-	-	1207
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6	-	-	6
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	235	0	0	221
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	235	-	-	221
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.7	26
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	235	-	-	-	-	221
HCM Lane V/C Ratio	0.133	-	-	-	-	0.226
HCM Control Delay (s)	22.7	-	-	-	-	26
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.5	-	-	-	-	0.8



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1216	57	176	1258	9	82	12	79	30	2	17
Future Volume (veh/h)	28	1216	57	176	1258	9	82	12	79	30	2	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1228	57	178	1271	9	83	12	50	30	2	13
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	305	1963	91	303	2053	15	276	60	107	324	42	92
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	409	3457	160	407	3616	26	707	296	528	907	206	452
Grp Volume(v), veh/h	28	631	654	178	624	656	145	0	0	45	0	0
Grp Sat Flow(s),veh/h/ln	409	1777	1841	407	1777	1865	1531	0	0	1565	0	0
Q Serve(g_s), s	2.1	10.1	10.2	14.0	10.0	10.0	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.1	10.1	10.2	24.2	10.0	10.0	3.4	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.57		0.34	0.67		0.29
Lane Grp Cap(c), veh/h	305	1009	1045	303	1009	1059	443	0	0	458	0	0
V/C Ratio(X)	0.09	0.63	0.63	0.59	0.62	0.62	0.33	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	305	1009	1045	303	1009	1059	1048	0	0	1035	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.2	6.2	6.2	16.0	6.1	6.1	14.8	0.0	0.0	13.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.2	1.2	2.9	1.2	1.1	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	4.9	5.1	3.2	4.1	4.3	2.0	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.3	7.4	7.4	19.0	7.3	7.3	15.3	0.0	0.0	14.0	0.0	0.0
LnGrp LOS	B	A	A	B	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1313			1458			145			45	
Approach Delay, s/veh		7.4			8.7			15.3			14.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		13.2		29.4		13.2				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		14.1		2.9		26.2		5.4				
Green Ext Time (p_c), s		6.3		0.2		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			8.5									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0.1

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2255	6	0	2316	0	8
Future Vol, veh/h	0	2255	6	0	2316	0	8
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2325	6	0	2388	0	8

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1743	0	0	-	-	-	1169
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	168	-	-	0	-	0	160
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	168	-	-	-	-	-	160
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

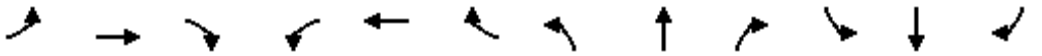
Approach	EB	WB	NB
HCM Control Delay, s	0	0	28.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	160	168	-	-	-
HCM Lane V/C Ratio	0.052	-	-	-	-
HCM Control Delay (s)	28.7	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.2	0	-	-	-

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APPENDIX 6.12: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS QUEUING ANALYSIS WORKSHEETS – WITHOUT FLOWER CONNECTION

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	1472	399	170	1306	112	466	588	179	200	720	241
Future Volume (veh/h)	245	1472	399	170	1306	112	466	588	179	200	720	241
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		1.00	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	258	1549	412	179	1375	110	491	619	180	211	758	237
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	1818	554	174	1818	562	292	1464	447	275	1000	441
Arrive On Green	0.05	0.36	0.36	0.05	0.36	0.36	0.09	0.29	0.29	0.09	0.28	0.28
Sat Flow, veh/h	3183	5106	1557	3183	5106	1580	3183	5106	1558	3183	3554	1568
Grp Volume(v), veh/h	258	1549	412	179	1375	110	491	619	180	211	758	237
Grp Sat Flow(s),veh/h/ln	1591	1702	1557	1591	1702	1580	1591	1702	1558	1591	1777	1568
Q Serve(g_s), s	5.0	25.7	21.2	5.0	21.7	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Cycle Q Clear(g_c), s	5.0	25.7	21.2	5.0	21.7	4.4	8.4	9.0	8.5	5.9	17.8	11.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	174	1818	554	174	1818	562	292	1464	447	275	1000	441
V/C Ratio(X)	1.48	0.85	0.74	1.03	0.76	0.20	1.68	0.42	0.40	0.77	0.76	0.54
Avail Cap(c_a), veh/h	174	1885	575	174	1885	583	292	1857	567	282	1281	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	27.2	25.8	43.3	26.0	20.4	41.6	26.5	26.3	40.9	30.1	27.9
Incr Delay (d2), s/veh	246.0	3.9	5.0	76.3	1.7	0.2	321.1	0.2	0.6	10.6	2.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	13.7	15.6	12.9	6.9	13.8	2.9	26.6	6.4	5.6	4.8	12.1	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	289.2	31.1	30.8	119.5	27.7	20.6	362.6	26.7	26.9	51.5	32.0	28.9
LnGrp LOS	F	C	C	F	C	C	F	C	C	D	C	C
Approach Vol, veh/h		2219			1664			1290			1206	
Approach Delay, s/veh		61.1			37.1			154.6			34.8	
Approach LOS		E			D			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.6	38.0	13.0	31.0	9.6	38.0	12.5	31.4
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	5.0	33.8	8.4	33.0	5.0	33.8	8.1	33.3
Max Q Clear Time (g_c+I1), s	7.0	27.7	10.4	19.8	7.0	23.7	7.9	11.0
Green Ext Time (p_c), s	0.0	4.9	0.0	4.9	0.0	6.8	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	68.8
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	813	29	17	915	6	13	1	19	0	0	17
Future Vol, veh/h	0	813	29	17	915	6	13	1	19	0	0	17
Conflicting Peds, #/hr	0	0	1	0	0	4	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	924	33	19	1040	7	15	1	22	0	0	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	958	0	0	1483	2014	463	-	-	528
Stage 1	-	-	-	-	-	-	925	925	-	-	-	-
Stage 2	-	-	-	-	-	-	558	1089	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	714	-	-	87	58	546	0	0	495
Stage 1	0	-	-	-	-	-	290	346	-	0	0	-
Stage 2	0	-	-	-	-	-	482	290	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	713	-	-	82	56	545	-	-	493
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	167	-	-	-	-
Stage 1	-	-	-	-	-	-	290	346	-	-	-	-
Stage 2	-	-	-	-	-	-	451	281	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.2	18.3	12.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	308	-	-	713	-	-	493
HCM Lane V/C Ratio	0.122	-	-	0.027	-	-	0.039
HCM Control Delay (s)	18.3	-	-	10.2	-	-	12.6
HCM Lane LOS	C	-	-	B	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-	-	0.1

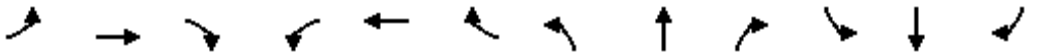
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1999	15	0	1986	74	0	0	41	0	0	87
Future Vol, veh/h	0	1999	15	0	1986	74	0	0	41	0	0	87
Conflicting Peds, #/hr	0	0	3	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2061	15	0	2047	76	0	0	42	0	0	90

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1041	-	-	1062
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	6.5	-	-	6.4
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	234	0	0	235
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	233	-	-	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	23.8	29.5
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	233	-	-	-	-	235
HCM Lane V/C Ratio	0.181	-	-	-	-	0.382
HCM Control Delay (s)	23.8	-	-	-	-	29.5
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.6	-	-	-	-	1.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	736	109	217	728	12	177	53	54	53	12	15
Future Volume (veh/h)	21	736	109	217	728	12	177	53	54	53	12	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.98	1.00		0.95	0.97		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	25	866	127	255	856	14	208	62	49	62	14	10
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	1462	214	286	1689	28	422	123	78	441	97	55
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.33	0.33	0.33	0.33	0.33	0.33
Sat Flow, veh/h	602	3096	454	537	3576	58	913	369	233	955	290	164
Grp Volume(v), veh/h	25	497	496	255	425	445	319	0	0	86	0	0
Grp Sat Flow(s),veh/h/ln	602	1777	1773	537	1777	1858	1514	0	0	1409	0	0
Q Serve(g_s), s	1.5	10.3	10.3	13.5	8.4	8.4	6.8	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.9	10.3	10.3	23.8	8.4	8.4	8.7	0.0	0.0	1.9	0.0	0.0
Prop In Lane	1.00		0.26	1.00		0.03	0.65		0.15	0.72		0.12
Lane Grp Cap(c), veh/h	327	839	837	286	839	878	623	0	0	592	0	0
V/C Ratio(X)	0.08	0.59	0.59	0.89	0.51	0.51	0.51	0.00	0.00	0.15	0.00	0.00
Avail Cap(c_a), veh/h	327	839	837	286	839	878	904	0	0	850	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	12.7	9.7	9.7	21.4	9.2	9.2	14.0	0.0	0.0	11.8	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.1	1.1	27.3	0.5	0.5	0.7	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	6.3	6.3	8.6	4.5	4.7	5.0	0.0	0.0	1.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.8	10.9	10.9	48.7	9.7	9.7	14.6	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	D	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1018			1125			319			86	
Approach Delay, s/veh		10.9			18.6			14.6			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.0		21.4		29.0		21.4				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		23.8		26.4		23.8		26.4				
Max Q Clear Time (g_c+I1), s		12.3		3.9		25.8		10.7				
Green Ext Time (p_c), s		5.4		0.4		0.0		1.8				

Intersection Summary												
HCM 6th Ctrl Delay			14.8									
HCM 6th LOS			B									

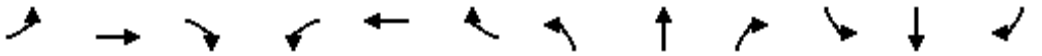
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	1992	3	0	2060	0	5
Future Vol, veh/h	0	1992	3	0	2060	0	5
Conflicting Peds, #/hr	0	0	2	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2142	3	0	2215	0	5

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1617	0	0	-	-	-	1075
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	198	-	-	0	-	0	185
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	198	-	-	-	-	-	185
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	25
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	185	198	-	-	-
HCM Lane V/C Ratio	0.029	-	-	-	-
HCM Control Delay (s)	25	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	342	1446	384	336	1555	180	452	673	261	315	635	342
Future Volume (veh/h)	342	1446	384	336	1555	180	452	673	261	315	635	342
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	368	1555	271	361	1672	137	486	724	178	339	683	309
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
Arrive On Green	0.08	0.32	0.32	0.10	0.34	0.34	0.14	0.28	0.28	0.11	0.26	0.26
Sat Flow, veh/h	3183	5106	1552	3183	5106	1571	3183	5106	1552	3183	3554	1565
Grp Volume(v), veh/h	368	1555	271	361	1672	137	486	724	178	339	683	309
Grp Sat Flow(s),veh/h/ln	1591	1702	1552	1591	1702	1571	1591	1702	1552	1591	1777	1565
Q Serve(g_s), s	8.4	30.9	14.9	10.2	33.5	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Cycle Q Clear(g_c), s	8.4	30.9	14.9	10.2	33.5	6.6	14.0	12.3	9.7	11.0	18.3	18.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	258	1627	494	313	1716	528	430	1423	433	360	912	401
V/C Ratio(X)	1.43	0.96	0.55	1.15	0.97	0.26	1.13	0.51	0.41	0.94	0.75	0.77
Avail Cap(c_a), veh/h	258	1627	494	313	1716	528	430	1740	529	360	1132	499
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.6	34.6	29.1	46.7	33.9	25.0	44.8	31.4	30.4	45.6	35.4	35.7
Incr Delay (d2), s/veh	212.5	13.3	1.3	98.5	16.1	0.3	83.7	0.3	0.6	32.6	2.2	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	18.1	20.3	9.5	13.8	22.8	4.4	16.5	8.7	6.5	9.9	12.6	12.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	260.1	47.9	30.4	145.1	50.0	25.3	128.5	31.7	31.1	78.2	37.6	41.4
LnGrp LOS	F	D	C	F	D	C	F	C	C	E	D	D
Approach Vol, veh/h		2194			2170			1388			1331	
Approach Delay, s/veh		81.3			64.3			65.5			48.8	
Approach LOS		F			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	38.4	18.6	31.8	13.0	40.2	16.3	34.1
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	10.2	33.0	14.0	33.0	8.4	34.8	11.7	35.3
Max Q Clear Time (g_c+I1), s	12.2	32.9	16.0	20.9	10.4	35.5	13.0	14.3
Green Ext Time (p_c), s	0.0	0.1	0.0	4.5	0.0	0.0	0.0	5.5

Intersection Summary	
HCM 6th Ctrl Delay	66.9
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1081	46	27	1210	23	17	1	78	0	0	24
Future Vol, veh/h	0	1081	46	27	1210	23	17	1	78	0	0	24
Conflicting Peds, #/hr	0	0	9	0	0	3	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1228	52	31	1375	26	19	1	89	0	0	27

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1289	0	0	1987	2703	623	-	-	704
Stage 1	-	-	-	-	-	-	1237	1237	-	-	-	-
Stage 2	-	-	-	-	-	-	750	1466	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	534	-	-	36	21	429	0	0	379
Stage 1	0	-	-	-	-	-	186	246	-	0	0	-
Stage 2	0	-	-	-	-	-	369	191	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	529	-	-	32	20	425	-	-	378
Mov Cap-2 Maneuver	-	-	-	-	-	-	121	103	-	-	-	-
Stage 1	-	-	-	-	-	-	186	244	-	-	-	-
Stage 2	-	-	-	-	-	-	322	179	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	24.9	15.3
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	288	-	-	529	-	-	378
HCM Lane V/C Ratio	0.379	-	-	0.058	-	-	0.072
HCM Control Delay (s)	24.9	-	-	12.2	-	-	15.3
HCM Lane LOS	C	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.7	-	-	0.2	-	-	0.2

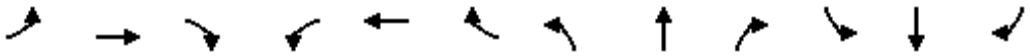
Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2049	24	0	2163	62	0	0	27	0	0	88
Future Vol, veh/h	0	2049	24	0	2163	62	0	0	27	0	0	88
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2383	28	0	2515	72	0	0	31	0	0	102

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1206	-	-	1294
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.3	-	-	5.3
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	279	0	0	255
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	279	-	-	255
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	19.5	28.3
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	279	-	-	-	-	255
HCM Lane V/C Ratio	0.113	-	-	-	-	0.401
HCM Control Delay (s)	19.5	-	-	-	-	28.3
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.8



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1078	75	166	1123	22	118	41	77	38	3	23
Future Volume (veh/h)	29	1078	75	166	1123	22	118	41	77	38	3	23
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.93	0.95		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	33	1211	83	187	1262	23	133	46	60	43	3	10
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	1621	111	219	1716	31	355	126	124	454	41	80
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	407	3372	231	403	3570	65	750	387	381	1008	125	246
Grp Volume(v), veh/h	33	637	657	187	628	657	239	0	0	56	0	0
Grp Sat Flow(s),veh/h/ln	407	1777	1826	403	1777	1858	1518	0	0	1380	0	0
Q Serve(g_s), s	3.6	14.6	14.7	9.5	14.3	14.3	4.6	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.9	14.6	14.7	24.2	14.3	14.3	6.2	0.0	0.0	1.2	0.0	0.0
Prop In Lane	1.00		0.13	1.00		0.04	0.56		0.25	0.77		0.18
Lane Grp Cap(c), veh/h	223	854	878	219	854	893	604	0	0	575	0	0
V/C Ratio(X)	0.15	0.75	0.75	0.85	0.74	0.74	0.40	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	223	854	878	219	854	893	890	0	0	824	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.7	10.6	10.6	23.2	10.5	10.5	13.5	0.0	0.0	11.9	0.0	0.0
Incr Delay (d2), s/veh	0.3	3.6	3.6	26.3	3.3	3.2	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.6	9.2	9.5	6.5	8.4	8.7	3.6	0.0	0.0	0.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.0	14.2	14.2	49.5	13.8	13.7	13.9	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	B	B	B	D	B	B	B	A	A	B	A	A
Approach Vol, veh/h		1327			1472			239			56	
Approach Delay, s/veh		14.3			18.3			13.9			11.9	
Approach LOS		B			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		21.0		29.4		21.0				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		19.9		3.2		26.2		8.2				
Green Ext Time (p_c), s		3.2		0.2		0.0		1.4				

Intersection Summary												
HCM 6th Ctrl Delay			16.1									
HCM 6th LOS			B									

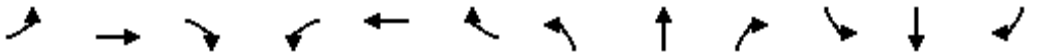
Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2038	15	0	2225	0	3
Future Vol, veh/h	0	2038	15	0	2225	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2264	17	0	2472	0	3

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1805	0	0	-	-	-	1141
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	155	-	-	0	-	0	167
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	155	-	-	-	-	-	167
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	27
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	167	155	-	-	-
HCM Lane V/C Ratio	0.02	-	-	-	-
HCM Control Delay (s)	27	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.1	0	-	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	268	1568	475	277	1556	174	545	842	252	310	787	256
Future Volume (veh/h)	268	1568	475	277	1556	174	545	842	252	310	787	256
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.99	1.00		0.99	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1723	1870	1870	1723	1870	1870	1723	1870	1870	1723	1870	1870
Adj Flow Rate, veh/h	273	1600	315	283	1588	118	556	859	153	316	803	220
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
Arrive On Green	0.08	0.32	0.32	0.08	0.32	0.32	0.15	0.30	0.30	0.12	0.27	0.27
Sat Flow, veh/h	3183	5106	1558	3183	5106	1575	3183	5106	1562	3183	3554	1557
Grp Volume(v), veh/h	273	1600	315	283	1588	118	556	859	153	316	803	220
Grp Sat Flow(s),veh/h/ln	1591	1702	1558	1591	1702	1575	1591	1702	1562	1591	1777	1557
Q Serve(g_s), s	8.0	33.0	18.3	8.4	32.4	5.8	15.4	15.0	8.0	10.3	22.5	12.7
Cycle Q Clear(g_c), s	8.0	33.0	18.3	8.4	32.4	5.8	15.4	15.0	8.0	10.3	22.5	12.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	241	1614	492	253	1633	504	464	1528	467	375	964	422
V/C Ratio(X)	1.13	0.99	0.64	1.12	0.97	0.23	1.20	0.56	0.33	0.84	0.83	0.52
Avail Cap(c_a), veh/h	241	1614	492	253	1633	504	464	1629	498	443	1110	486
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.8	36.0	31.0	48.6	35.5	26.4	45.1	31.2	28.8	45.7	36.2	32.7
Incr Delay (d2), s/veh	98.4	20.3	2.8	92.1	16.1	0.2	108.6	0.4	0.4	10.6	5.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.0	22.6	11.4	11.2	22.2	3.9	20.4	10.1	5.4	8.0	15.4	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	147.3	56.3	33.8	140.8	51.6	26.7	153.7	31.6	29.2	56.3	41.2	33.7
LnGrp LOS	F	E	C	F	D	C	F	C	C	E	D	C
Approach Vol, veh/h		2188			1989			1568			1339	
Approach Delay, s/veh		64.4			62.8			74.7			43.5	
Approach LOS		E			E			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.0	38.8	20.0	33.9	12.6	39.2	17.0	36.8
Change Period (Y+Rc), s	4.6	5.4	4.6	5.2	4.6	5.4	4.6	5.2
Max Green Setting (Gmax), s	8.4	33.4	15.4	33.0	8.0	33.8	14.7	33.7
Max Q Clear Time (g_c+I1), s	10.4	35.0	17.4	24.5	10.0	34.4	12.3	17.0
Green Ext Time (p_c), s	0.0	0.0	0.0	3.9	0.0	0.0	0.2	5.9

Intersection Summary	
HCM 6th Ctrl Delay	62.3
HCM 6th LOS	E

Notes

User approved ignoring U-Turning movement.

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱	↰	↑↑			↔				↱
Traffic Vol, veh/h	0	1214	48	35	1349	22	8	7	48	0	0	30
Future Vol, veh/h	0	1214	48	35	1349	22	8	7	48	0	0	30
Conflicting Peds, #/hr	0	0	2	0	0	6	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	75	140	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1320	52	38	1466	24	9	8	52	0	0	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	1374	0	0	2131	2894	662	-	-	751
Stage 1	-	-	-	-	-	-	1322	1322	-	-	-	-
Stage 2	-	-	-	-	-	-	809	1572	-	-	-	-
Critical Hdwy	-	-	-	4.14	-	-	7.54	6.54	6.94	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.54	5.54	-	-	-	-
Follow-up Hdwy	-	-	-	2.22	-	-	3.52	4.02	3.32	-	-	3.32
Pot Cap-1 Maneuver	0	-	-	495	-	-	28	16	404	0	0	353
Stage 1	0	-	-	-	-	-	165	224	-	0	0	-
Stage 2	0	-	-	-	-	-	340	169	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	494	-	-	24	15	403	-	-	351
Mov Cap-2 Maneuver	-	-	-	-	-	-	105	90	-	-	-	-
Stage 1	-	-	-	-	-	-	165	224	-	-	-	-
Stage 2	-	-	-	-	-	-	285	155	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0.3	27	16.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	231	-	-	494	-	-	351
HCM Lane V/C Ratio	0.296	-	-	0.077	-	-	0.093
HCM Control Delay (s)	27	-	-	12.9	-	-	16.3
HCM Lane LOS	D	-	-	B	-	-	C
HCM 95th %tile Q(veh)	1.2	-	-	0.2	-	-	0.3

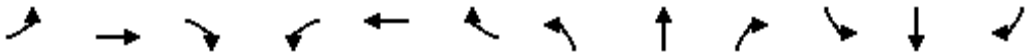
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2203	21	0	2249	77	0	0	30	0	0	79
Future Vol, veh/h	0	2203	21	0	2249	77	0	0	30	0	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2295	22	0	2343	80	0	0	31	0	0	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1159	-	-	1212
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	5.9	-	-	5.8
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	242	0	0	235
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	242	-	-	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	22.1	28.4
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	242	-	-	-	-	235
HCM Lane V/C Ratio	0.129	-	-	-	-	0.35
HCM Control Delay (s)	22.1	-	-	-	-	28.4
HCM Lane LOS	C	-	-	-	-	D
HCM 95th %tile Q(veh)	0.4	-	-	-	-	1.5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	28	1216	57	187	1258	9	82	12	85	30	2	17
Future Volume (veh/h)	28	1216	57	187	1258	9	82	12	85	30	2	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1772	1870	1870	1772	1870	1870	1772	1870	1870	1772	1870	1870
Adj Flow Rate, veh/h	28	1228	57	189	1271	9	83	12	56	30	2	13
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	304	1957	91	301	2047	14	268	61	117	327	42	93
Arrive On Green	0.57	0.57	0.57	0.57	0.57	0.57	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	409	3457	160	407	3616	26	670	296	570	910	204	453
Grp Volume(v), veh/h	28	631	654	189	624	656	151	0	0	45	0	0
Grp Sat Flow(s),veh/h/ln	409	1777	1841	407	1777	1865	1536	0	0	1566	0	0
Q Serve(g_s), s	2.1	10.2	10.2	14.0	10.1	10.1	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	12.2	10.2	10.2	24.2	10.1	10.1	3.5	0.0	0.0	0.9	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.55		0.37	0.67		0.29
Lane Grp Cap(c), veh/h	304	1006	1042	301	1006	1055	445	0	0	461	0	0
V/C Ratio(X)	0.09	0.63	0.63	0.63	0.62	0.62	0.34	0.00	0.00	0.10	0.00	0.00
Avail Cap(c_a), veh/h	304	1006	1042	301	1006	1055	1045	0	0	1030	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.3	6.2	6.2	16.5	6.2	6.2	14.9	0.0	0.0	13.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	1.2	1.2	4.1	1.2	1.1	0.4	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	0.3	5.0	5.2	3.6	4.2	4.3	2.1	0.0	0.0	0.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.4	7.5	7.5	20.5	7.4	7.3	15.3	0.0	0.0	14.0	0.0	0.0
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	A
Approach Vol, veh/h		1313			1469			151			45	
Approach Delay, s/veh		7.5			9.1			15.3			14.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		13.4		29.4		13.4				
Change Period (Y+Rc), s		5.2		4.6		5.2		4.6				
Max Green Setting (Gmax), s		24.2		26.0		24.2		26.0				
Max Q Clear Time (g_c+I1), s		14.2		2.9		26.2		5.5				
Green Ext Time (p_c), s		6.3		0.2		0.0		0.8				

Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	0

Movement	EBU	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Vol, veh/h	0	2258	6	0	2325	0	8
Future Vol, veh/h	0	2258	6	0	2325	0	8
Conflicting Peds, #/hr	0	0	3	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	125	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	0	-
Grade, %	-	0	-	-	0	0	-
Peak Hour Factor	92	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2
Mvmt Flow	0	2328	6	0	2397	0	8

Major/Minor	Major1			Major2		Minor1	
Conflicting Flow All	1750	0	0	-	-	-	1170
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	5.64	-	-	-	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.32	-	-	-	-	-	3.92
Pot Cap-1 Maneuver	167	-	-	0	-	0	160
Stage 1	-	-	-	0	-	0	-
Stage 2	-	-	-	0	-	0	-
Platoon blocked, %		-	-		-		
Mov Cap-1 Maneuver	167	-	-	-	-	-	160
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	28.7
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBU	EBT	EBR	WBT
Capacity (veh/h)	160	167	-	-	-
HCM Lane V/C Ratio	0.052	-	-	-	-
HCM Control Delay (s)	28.7	0	-	-	-
HCM Lane LOS	D	A	-	-	-
HCM 95th %tile Q(veh)	0.2	0	-	-	-

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APPENDIX 6.13: GENERAL PLAN BUILDOUT WITH PROJECT CONDITIONS INTERSECTION OPERATIONS ANALYSIS WORKSHEETS WITH IMPROVEMENTS

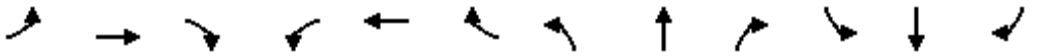
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Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	104	2005	2051	0	14	0
Future Volume (vph)	104	2005	2051	0	14	0
Turn Type	Prot	NA	NA	NA	Perm	NA
Protected Phases	5	2	6	8		4
Permitted Phases					4	
Detector Phase	5	2	6	8	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.6	27.4	27.4	14.6	37.6	37.6
Total Split (s)	13.1	72.4	59.3	37.6	37.6	37.6
Total Split (%)	11.9%	65.8%	53.9%	34.2%	34.2%	34.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	4.6	4.6
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	8.3	67.4	54.4	13.9	13.9	13.9
Actuated g/C Ratio	0.09	0.74	0.60	0.15	0.15	0.15
v/c Ratio	0.70	0.58	0.80	0.02	0.07	0.32
Control Delay	65.5	7.5	18.3	0.0	31.9	4.6
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	65.5	7.6	18.3	0.0	31.9	4.6
LOS	E	A	B	A	C	A
Approach Delay		10.4	18.3			7.7
Approach LOS		B	B			A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 91.4	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 14.3	Intersection LOS: B
Intersection Capacity Utilization 69.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Flower Av. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	2005	4	0	2051	168	0	0	5	14	0	108
Future Volume (veh/h)	104	2005	4	0	2051	168	0	0	5	14	0	108
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	0	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	112	2156	4	0	2205	181	0	0	5	15	0	116
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	2	2
Cap, veh/h	142	3977	7	0	2968	241	0	0	188	254	0	188
Arrive On Green	0.08	0.76	0.76	0.00	0.62	0.62	0.00	0.00	0.12	0.12	0.00	0.12
Sat Flow, veh/h	1781	5263	10	0	4972	389	0	0	1585	1411	0	1585
Grp Volume(v), veh/h	112	1394	766	0	1555	831	0	0	5	15	0	116
Grp Sat Flow(s),veh/h/ln	1781	1702	1869	0	1702	1789	0	0	1585	1411	0	1585
Q Serve(g_s), s	4.9	13.5	13.5	0.0	25.5	26.4	0.0	0.0	0.2	0.8	0.0	5.5
Cycle Q Clear(g_c), s	4.9	13.5	13.5	0.0	25.5	26.4	0.0	0.0	0.2	1.0	0.0	5.5
Prop In Lane	1.00		0.01	0.00		0.22	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	142	2572	1412	0	2104	1105	0	0	188	254	0	188
V/C Ratio(X)	0.79	0.54	0.54	0.00	0.74	0.75	0.00	0.00	0.03	0.06	0.00	0.62
Avail Cap(c_a), veh/h	190	2866	1573	0	2306	1212	0	0	657	672	0	657
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	4.0	4.0	0.0	10.7	10.8	0.0	0.0	31.0	31.4	0.0	33.3
Incr Delay (d2), s/veh	10.3	0.2	0.3	0.0	1.2	2.5	0.0	0.0	0.1	0.1	0.0	3.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.5	5.9	6.6	0.0	13.4	14.8	0.0	0.0	0.2	0.5	0.0	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.3	4.2	4.4	0.0	11.9	13.3	0.0	0.0	31.1	31.5	0.0	36.6
LnGrp LOS	D	A	A	A	B	B	A	A	C	C	A	D
Approach Vol, veh/h		2272			2386			5			131	
Approach Delay, s/veh		6.3			12.4			31.1			36.0	
Approach LOS		A			B			C			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		65.5		14.0	10.9	54.6		14.0				
Change Period (Y+Rc), s		5.4		4.6	4.6	5.4		4.6				
Max Green Setting (Gmax), s		67.0		33.0	8.5	53.9		33.0				
Max Q Clear Time (g_c+I1), s		15.5		7.5	6.9	28.4		2.2				
Green Ext Time (p_c), s		30.6		0.6	0.0	20.8		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			10.2									
HCM 6th LOS			B									

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2005	4	0	2051	168	0	0	5	0	0	108
Future Vol, veh/h	0	2005	4	0	2051	168	0	0	5	0	0	108
Conflicting Peds, #/hr	0	0	2	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2156	4	0	2205	181	0	0	5	0	0	116

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1082	-	-	1198
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	183	0	0	153
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	183	-	-	152
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	25.3	80.3
HCM LOS			D	F

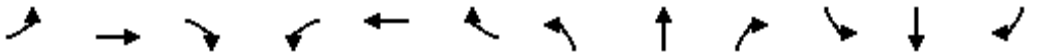
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	183	-	-	-	-	152
HCM Lane V/C Ratio	0.029	-	-	-	-	0.764
HCM Control Delay (s)	25.3	-	-	-	-	80.3
HCM Lane LOS	D	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	-	4.7

Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	58	2053	2232	0	15	0
Future Volume (vph)	58	2053	2232	0	15	0
Turn Type	Prot	NA	NA	NA	Perm	NA
Protected Phases	5	2	6	8		4
Permitted Phases					4	
Detector Phase	5	2	6	8	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.6	27.4	27.4	14.6	37.6	37.6
Total Split (s)	10.0	72.4	62.4	37.6	37.6	37.6
Total Split (%)	9.1%	65.8%	56.7%	34.2%	34.2%	34.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	4.6	4.6
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	5.6	68.0	60.4	14.0	14.0	14.0
Actuated g/C Ratio	0.06	0.78	0.70	0.16	0.16	0.16
v/c Ratio	0.57	0.58	0.73	0.01	0.08	0.26
Control Delay	64.5	7.3	14.7	0.0	32.1	7.9
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	64.5	7.3	14.7	0.0	32.1	7.9
LOS	E	A	B	A	C	A
Approach Delay		8.9	14.7			11.9
Approach LOS		A	B			B

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 86.7	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 64.9%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Flower Av. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	2053	15	0	2232	87	0	0	4	15	0	79
Future Volume (veh/h)	58	2053	15	0	2232	87	0	0	4	15	0	79
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	0	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	64	2281	17	0	2480	97	0	0	4	17	0	88
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	2	2
Cap, veh/h	84	3987	30	0	3317	129	0	0	179	246	0	179
Arrive On Green	0.05	0.76	0.76	0.00	0.66	0.66	0.00	0.00	0.11	0.11	0.00	0.11
Sat Flow, veh/h	1781	5228	39	0	5212	196	0	0	1585	1412	0	1585
Grp Volume(v), veh/h	64	1484	814	0	1668	909	0	0	4	17	0	88
Grp Sat Flow(s),veh/h/ln	1781	1702	1863	0	1702	1835	0	0	1585	1412	0	1585
Q Serve(g_s), s	2.8	14.7	14.8	0.0	26.4	26.9	0.0	0.0	0.2	0.9	0.0	4.2
Cycle Q Clear(g_c), s	2.8	14.7	14.8	0.0	26.4	26.9	0.0	0.0	0.2	1.0	0.0	4.2
Prop In Lane	1.00		0.02	0.00		0.11	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	84	2596	1421	0	2239	1207	0	0	179	246	0	179
V/C Ratio(X)	0.76	0.57	0.57	0.00	0.74	0.75	0.00	0.00	0.02	0.07	0.00	0.49
Avail Cap(c_a), veh/h	120	2845	1557	0	2421	1305	0	0	653	668	0	653
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.7	4.0	4.0	0.0	9.2	9.3	0.0	0.0	31.6	32.1	0.0	33.4
Incr Delay (d2), s/veh	8.8	0.2	0.4	0.0	1.2	2.3	0.0	0.0	0.0	0.1	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.6	6.4	7.1	0.0	13.3	14.8	0.0	0.0	0.1	0.5	0.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.5	4.2	4.4	0.0	10.4	11.6	0.0	0.0	31.7	32.2	0.0	35.5
LnGrp LOS	D	A	A	A	B	B	A	A	C	C	A	D
Approach Vol, veh/h		2362			2577			4			105	
Approach Delay, s/veh		5.5			10.8			31.7			35.0	
Approach LOS		A			B			C			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		66.5		13.6	8.4	58.1		13.6				
Change Period (Y+Rc), s		5.4		4.6	4.6	5.4		4.6				
Max Green Setting (Gmax), s		67.0		33.0	5.4	57.0		33.0				
Max Q Clear Time (g_c+I1), s		16.8		6.2	4.8	28.9		2.2				
Green Ext Time (p_c), s		33.0		0.5	0.0	23.8		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			8.8									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2053	15	0	2232	87	0	0	4	0	0	79
Future Vol, veh/h	0	2053	15	0	2232	87	0	0	4	0	0	79
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2281	17	0	2480	97	0	0	4	0	0	88

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1149	-	-	1289
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	165	0	0	133
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	165	-	-	133
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	27.4	73.4
HCM LOS			D	F

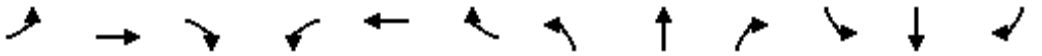
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	165	-	-	-	-	133
HCM Lane V/C Ratio	0.027	-	-	-	-	0.66
HCM Control Delay (s)	27.4	-	-	-	-	73.4
HCM Lane LOS	D	-	-	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	-	3.6

Lane Group	EBL	EBT	WBT	NBT	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	59	2273	2328	0	18	0
Future Volume (vph)	59	2273	2328	0	18	0
Turn Type	Prot	NA	NA	NA	Perm	NA
Protected Phases	5	2	6	8		4
Permitted Phases					4	
Detector Phase	5	2	6	8	4	4
Switch Phase						
Minimum Initial (s)	5.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	9.6	27.4	27.4	14.6	37.6	37.6
Total Split (s)	12.2	72.4	60.2	37.6	37.6	37.6
Total Split (%)	11.1%	65.8%	54.7%	34.2%	34.2%	34.2%
Yellow Time (s)	3.6	4.4	4.4	3.6	3.6	3.6
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.6	5.4	5.4	4.6	4.6	4.6
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	6.8	67.6	58.7	14.0	14.0	14.0
Actuated g/C Ratio	0.08	0.78	0.68	0.16	0.16	0.16
v/c Ratio	0.44	0.59	0.73	0.03	0.08	0.22
Control Delay	52.6	7.4	15.6	0.1	32.3	2.4
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0
Total Delay	52.6	7.5	15.6	0.1	32.3	2.4
LOS	D	A	B	A	C	A
Approach Delay		8.6	15.6	0.1		8.0
Approach LOS		A	B	A		A

Intersection Summary	
Cycle Length: 110	
Actuated Cycle Length: 86.2	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 65.7%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 7: Flower Av. & Imperial Hwy. (SR-90)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	2273	6	0	2328	94	0	0	8	18	0	80
Future Volume (veh/h)	59	2273	6	0	2328	94	0	0	8	18	0	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	0	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	61	2343	6	0	2400	97	0	0	8	19	0	82
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	2	2
Cap, veh/h	84	3974	10	0	3265	131	0	0	182	248	0	182
Arrive On Green	0.05	0.76	0.76	0.00	0.65	0.65	0.00	0.00	0.11	0.11	0.00	0.11
Sat Flow, veh/h	1781	5258	13	0	5199	202	0	0	1585	1407	0	1585
Grp Volume(v), veh/h	61	1517	832	0	1618	879	0	0	8	19	0	82
Grp Sat Flow(s),veh/h/ln	1781	1702	1868	0	1702	1828	0	0	1585	1407	0	1585
Q Serve(g_s), s	2.6	15.1	15.2	0.0	24.6	25.1	0.0	0.0	0.3	0.9	0.0	3.7
Cycle Q Clear(g_c), s	2.6	15.1	15.2	0.0	24.6	25.1	0.0	0.0	0.3	1.3	0.0	3.7
Prop In Lane	1.00		0.01	0.00		0.11	0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	84	2573	1412	0	2209	1186	0	0	182	248	0	182
V/C Ratio(X)	0.72	0.59	0.59	0.00	0.73	0.74	0.00	0.00	0.04	0.08	0.00	0.45
Avail Cap(c_a), veh/h	175	2954	1621	0	2416	1298	0	0	678	688	0	678
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.3	4.2	4.2	0.0	9.1	9.2	0.0	0.0	30.4	31.0	0.0	31.9
Incr Delay (d2), s/veh	4.4	0.2	0.4	0.0	1.1	2.1	0.0	0.0	0.1	0.1	0.0	1.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.2	6.5	7.3	0.0	12.5	13.9	0.0	0.0	0.2	0.6	0.0	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.6	4.4	4.6	0.0	10.1	11.3	0.0	0.0	30.5	31.1	0.0	33.7
LnGrp LOS	D	A	A	A	B	B	A	A	C	C	A	C
Approach Vol, veh/h		2410			2497			8			101	
Approach Delay, s/veh		5.4			10.5			30.5			33.2	
Approach LOS		A			B			C			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		63.8		13.5	8.2	55.5		13.5				
Change Period (Y+Rc), s		5.4		4.6	4.6	5.4		4.6				
Max Green Setting (Gmax), s		67.0		33.0	7.6	54.8		33.0				
Max Q Clear Time (g_c+I1), s		17.2		5.7	4.6	27.1		2.3				
Green Ext Time (p_c), s		33.8		0.5	0.0	23.0		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			8.5									
HCM 6th LOS			A									

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2273	6	0	2328	94	0	0	8	0	0	80
Future Vol, veh/h	0	2273	6	0	2328	94	0	0	8	0	0	80
Conflicting Peds, #/hr	0	0	3	0	0	5	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	2343	6	0	2400	97	0	0	8	0	0	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	-	0	0	-	-	0	-	-	1178	-	-	1254
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	-	-	-	7.14	-	-	7.14
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-	-	-	3.92	-	-	3.92
Pot Cap-1 Maneuver	0	-	-	0	-	-	0	0	158	0	0	140
Stage 1	0	-	-	0	-	-	0	0	-	0	0	-
Stage 2	0	-	-	0	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	-	-	-	-	-	-	-	-	158	-	-	139
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	0	29	63
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT	WBR	SBLn1
Capacity (veh/h)	158	-	-	-	-	139
HCM Lane V/C Ratio	0.052	-	-	-	-	0.593
HCM Control Delay (s)	29	-	-	-	-	63
HCM Lane LOS	D	-	-	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	-	3.1

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