<table>
<tr><td colspan="2">CITY OF FRESNO

MITIGATED NEGATIVE DECLARATION</td><td rowspan="2">Notice of Intent was filed with:

FRESNO COUNTY CLERK
2220 Tulare Street
Fresno, California 93721

on

August 9, 2019</td></tr>
<tr><td>The full Initial Study and the Fresno General Plan Master Environmental Impact Report are on file in the Planning and Development Department,
Fresno City Hall, 3rd Floor
2600 Fresno Street
Fresno, California 93721
(559) 621-8070</td><td>ENVIRONMENTAL ASSESSMENT NUMBER:

<u>P18-03724</u></td></tr>
<tr><td>APPLICANT:

Lennar Homes of California, Inc.
8080 N. Palm Avenue, Suite 110
Fresno, CA, 93711</td><td colspan="2">PROJECT LOCATION:

2840 North Temperance Avenue; located on the east side of North Temperance Avenue, between East Shields and East Clinton Avenues; ±69.15 acres

Site Latitude: 36°4’36.02” N
Site Longitude: -119°39’42.44” W

Mount Diablo Base & Meridian, Township 13S, Range 21E Section 26 – California

Assessor’s Parcel Numbers: 310-260-01 through -08 & -56</td></tr>
</table>

PROJECT DESCRIPTION:

Prezone Application No. P18-03443 proposes to prezone the Official Zoning Map of the City of Fresno to rezone the subject property from the Fresno County AE-20 (*Exclusive Agriculture*) (±69.15 acres) to the RS-3/ANX/UGM (*Residential Single Family, Low Density)(±11.85 acres),* RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management)(±23 acres)* and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)*(±34.3 acres) zone districts in accordance with the Fresno General Planned Land Use Map.

Planned Development Permit Application No. P18-03739 proposes to modify the RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management*) and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)* zone districts development standards to allow for reduced front and rear yard setbacks, reduced lot size and increased lot coverage for the proposed single family residences.

Vesting Tentative Tract Map No. 6224 (P18-03724) proposes to subdivide ±57.3 acres of the subject property for the purpose of creating a 349-lot single-family residential development subject to the findings and compliance with the Conditions of Approval included within the Staff Report to the Planning Commission.

Annexation Application No. P18-03263 proposes to initiate annexation proceedings for the Shields-Temperance No. 2 Reorganization proposing incorporation of the subject property within the City of

Fresno; and, detachment from the Kings River Conservation District and Fresno County Fire Protection District.

The City of Fresno has conducted an initial study and proposes to adopt a Mitigated Negative Declaration for the above-described project. The environmental analysis contained in the Initial Study and this Mitigated Negative Declaration is tiered from the Master Environmental Impact Report (SCH # 2012111015) prepared for the Fresno General Plan ("MEIR"). A copy of the MEIR may be reviewed in the City of Fresno Development and Resource Management Department as noted above. The proposed project has been determined to be a subsequent project that is not fully within the scope of the MEIR prepared for the Fresno General Plan. Pursuant to Public Resources Code § 21157.1 and California Environmental Quality Act (CEQA) Guidelines § 15177, this project has been evaluated with respect to each item on the attached environmental checklist to determine whether this project may cause any additional significant effect on the environment which was not previously examined in the MEIR. After conducting a review of the adequacy of the MEIR pursuant to Public Resources Code, Section 21157.6(b)(1), the Development and Resource Management Department, as lead agency, finds that no substantial changes have occurred with respect to the circumstances under which the MEIR was certified and that no new information, which was not known and could not have been known at the time that the MEIR was certified as complete, has become available.

This completed environmental impact checklist form, its associated narrative, technical studies and proposed mitigation measures reflect applicable comments of responsible and trustee agencies and research and analyses conducted to examine the interrelationship between the proposed project and the physical environment. The information contained in the project application and its related environmental assessment application, responses to requests for comment, checklist, initial study narrative, and any attachments thereto, combine to form a record indicating that an initial study has been completed in compliance with the State CEQA Guidelines and the CEQA.

All new development activity and many non-physical projects contribute directly or indirectly toward cumulative impacts on the physical environment. It has been determined that the incremental effect contributed by this project toward cumulative impacts is not considered substantial or significant in itself, and/or that cumulative impacts accruing from this project may be mitigated to less than significant with application of feasible mitigation measures.

Based upon the evaluation guided by the environmental checklist form, it was determined that there are foreseeable impacts from the project that are additional to those identified in the MEIR, and/or impacts which require mitigation measures not included in the MEIR Mitigation Measure Checklist.

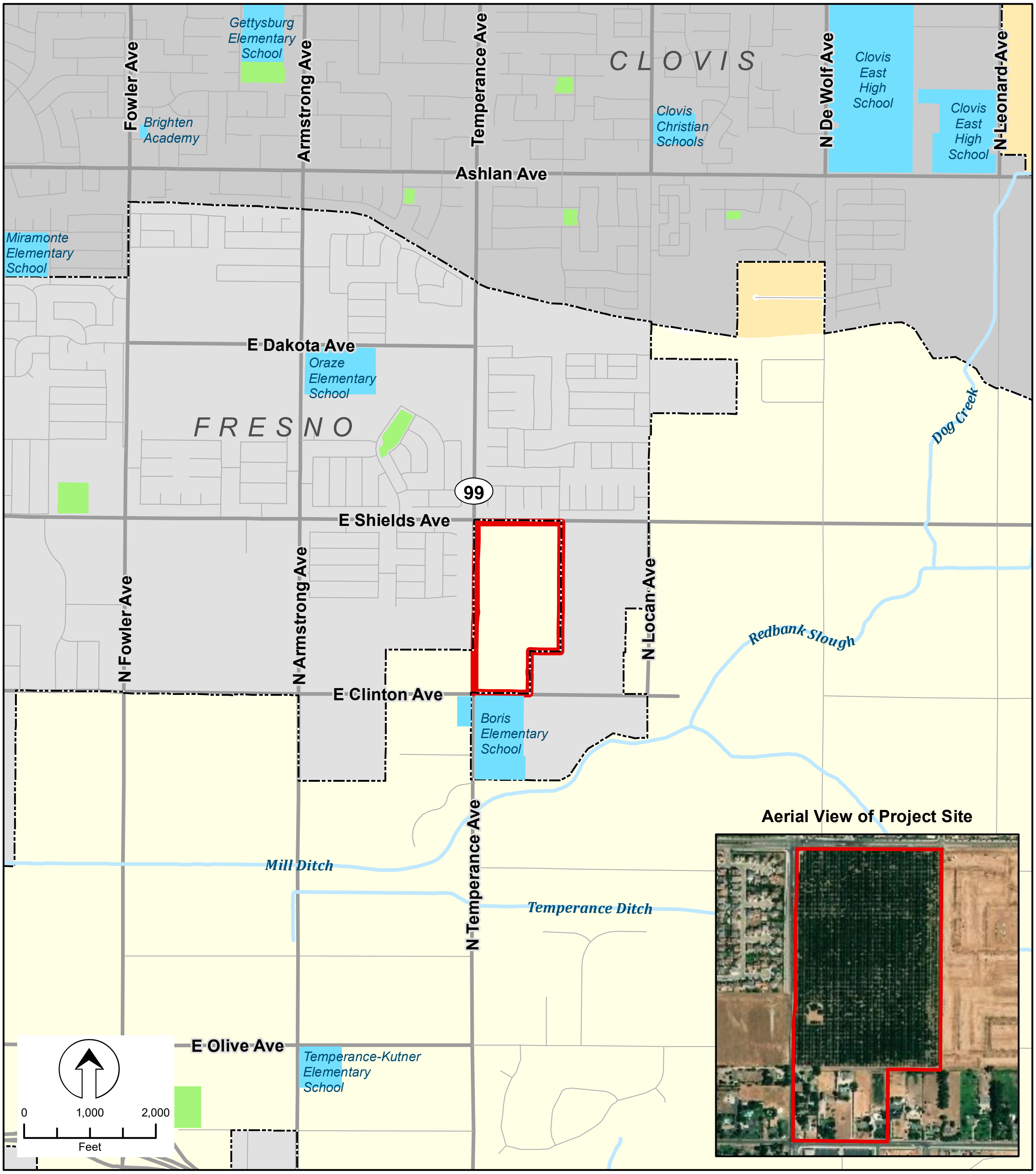
The completed environmental checklist form indicates whether an impact is potentially significant, less than significant with mitigation, or less than significant.

For some categories of potential impacts, the checklist may indicate that a specific adverse environmental effect has been identified which is of sufficient magnitude to be of concern. Such an effect may be inherent in the nature and magnitude of the project, or may be related to the design and characteristics of the individual project. Effects so rated are not sufficient in themselves to require the preparation of an Environmental Impact Report, and have been mitigated to the extent feasible. With the project specific mitigation imposed, there is no substantial evidence in the record that this project may have additional significant, direct, indirect or cumulative effects on the environment that are significant and that were not identified and analyzed in the MEIR. Both the MEIR Mitigation Measure Checklist and the Project Specific Mitigation Measure Checklist will be imposed on this project.

The initial study has concluded that the proposed project will not result in any adverse effects which fall within the "Mandatory Findings of Significance" contained in Section 15065 of the State CEQA Guidelines.

The finding is, therefore, made that the proposed project will not have a significant adverse effect on the environment.

PREPARED BY: Jose Valenzuela Planner	SUBMITTED BY: Bonique Emerson, Planning Manager PLANNING AND DEVELOPMENT DEPARTMENT
DATE: August 9, 2019	
Attachments:	- Vicinity Map - Notice of Intent - Initial Study Impact Checklist and Initial Study (Appendix G) - City of Fresno General Plan MEIR Mitigation Measure Monitoring Checklist dated August 2019 - Project Specific Mitigation Monitoring Checklist dated August 2019 - Appendix A: Air Quality, Greenhouse Gas, and Energy Calculations - Appendix B: Acoustical Analysis - Appendix C: Traffic Impact Study



Legend

- ProjectBoundary
- City Boundary
- Clovis
- Fresno
- Clovis Sphere of Influence
- Fresno Sphere of Influence
- School
- Park

CITY OF FRESNO - TRACT 6224

Vicinity Map

De Novo Planning Group
A Land Use Planning, Design, and Environmental Firm

Sources: Fresno County GIS; City of Fresno GIS; City of Clovis GIS; ArcGIS Online World Imagery Map Service. Map date: August 22, 2019.

CITY OF FRESNO **NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION**	Filed with: E201910000296 FILED AUG 16 2019 TIME 3:41pm FRESNO COUNTY CLERK By ______ DEPUTY FRESNO COUNTY CLERK 2220 Tulare Street, Fresno, CA 93721
EA No. P18-03724 for Prezone Application No. P18-03443, Planned Development Permit Application No. P18-03739, Annexation Application No. P18-03263 and Vesting Tentative Tract Map No. 6224 (P18-03724)	
PROJECT SPONSOR: Lennar Homes of California, Inc.	
PROJECT LOCATION: 2840 North Temperance Avenue; located on the east side of North Temperance Avenue, between East Shields and East Clinton Avenues. ±69.15 acres Site Latitude: 36°4'36.02" N Site Longitude: -119°39'42.44" W Mount Diablo Base & Meridian, Township 13S, Range 21E Section 26 – California Assessor's Parcel Numbers: 310-260-01 and 310-260-02	

PROJECT DESCRIPTION:

Prezone Application No. P18-03443 proposes to prezone the Official Zoning Map of the City of Fresno to rezone the subject property from the Fresno County AE-20 (*Exclusive Agriculture*)(±69.15 acres) to the RS-3/ANX/UGM (*Residential Single Family, Low Density)(±11.85 acres)*, RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management)(±23 acres)* and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)*(±34.3 acres) zone districts in accordance with the Fresno General Planned Land Use Map.

Planned Development Permit Application No. P18-03739 proposes to modify the RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management*) and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)* zone districts development standards to allow for reduced front and rear yard setbacks, reduced lot sizes and increased lot coverage for the proposed single family residences.

Annexation Application No. P18-03263 proposes to initiate annexation proceedings for the Shields-Temperance No. 2 Reorganization proposing incorporation of the subject property within the City of Fresno; and, detachment from the Kings River Conservation District and Fresno County Fire Protection District.

Vesting Tentative Tract Map No. 6224 (P18-03724) proposes to subdivide ±57.3 acres of the subject property for the purpose of creating a 349-lot single-family residential development.

The City of Fresno has conducted an initial study of the above-described project and it has been determined to be a subsequent project that is not fully within the scope of the Master Environmental Impact Report SCH No. 2012111015 (MEIR) prepared for the Fresno General Plan. Therefore, the Planning and Development Department proposes to adopt a Mitigated Negative Declaration for this project.

With the project specific mitigation imposed, there is no substantial evidence in the record that this project may have additional significant, direct, indirect or cumulative effects on the environment that are significant and that were not identified and analyzed in the MEIR. After conducting a review of the adequacy of the MEIR pursuant to Public Resources Code, Section 21157.6(b)(1), the Planning and Development Department, as lead agency, finds that no substantial changes have occurred with respect to the circumstances under which the MEIR was certified and that no new information, which was not known and could not have been known at the time that the MEIR was certified as complete has become available. The project is not located on a site which is included on any of the lists enumerated under Section 65962.5 of the Government Code including, but not limited to, lists of hazardous waste facilities, land designated as hazardous waste property, hazardous waste disposal sites and others, and the information in the Hazardous Waste and Substances Statement required under subdivision (f) of that Section.

Additional information on the proposed project, including the MEIR proposed environmental finding of a mitigated negative declaration and the initial study may be obtained from the Planning and Development Department, Fresno City Hall, 2600 Fresno Street, 3rd Floor Fresno, Room 3043, California 93721-3604. Please contact Bonique Emerson at (559) 621-8277 for more information.

ANY INTERESTED PERSON may comment on the proposed environmental finding. Comments must be in writing and must state (1) the commentor's name and address; (2) the commentor's interest in, or relationship to, the project; (3) the environmental determination being commented upon; and (4) the specific reason(s) why the proposed environmental determination should or should not be made. Any comments may be submitted at any time between the publication date of this notice and close of business on **September 9, 2019**. Please direct comments to Jose Valenzuela, Planner, City of Fresno Planning and Development Department, City Hall, 2600 Fresno Street, Room 3043, Fresno, California, 93721-3604; or by email to Jose.Valenzuela@fresno.gov; or comments can be sent by facsimile to (559) 498-1026.

INITIAL STUDY PREPARED BY: Elise Carrol, Senior Planner, De Novo Planning Group Jose Valenzuela, Planner, City of Fresno	SUBMITTED BY: McKencie Perez, Supervising Planner CITY OF FRESNO PLANNING AND DEVELOPMENT DEPARTMENT
DATE: August 16, 2019	

APPENDIX G/INITIAL STUDY FOR A NEGATIVE DECLARATION

Environmental Checklist Form for:
EA No. P18-03724

1.	**Project title:** Environmental Assessment Application No. P18-03724
2.	**Lead agency name and address:** City of Fresno Planning and Development Department 2600 Fresno Street Fresno, CA 93721
3.	**Contact person and phone number:** Jose Valenzuela, Planner City of Fresno Planning and Development Department (559) 621-8070
4.	**Project location:** 2840 North Temperance Avenue; located on the east side of North Temperance Avenue, between East Shields and East Clinton Avenues; ±69.15 acres Site Latitude: 36°4’36.02” N Site Longitude: -119°39’42.44” W Mount Diablo Base & Meridian, Township 13S, Range 21E Section 26 – California Assessor’s Parcel Numbers: 310-260-01 through -08 & -56
5.	**Project sponsor's name and address:** Lennar Homes of California, Inc. 8080 N. Palm Avenue, Suite 110 Fresno, CA, 93711
6.	**General & Community plan land use designation:** Neighborhood Park/Medium Density Residential (±9.34 acres) (See Figure LU-2: Dual Designation, of the Fresno General Plan), Medium Density Residential (±24.96 acres) Medium Low Density Residential (±23 acres) and Low Density Residential (±11.85 acres) (City of Fresno)
7.	**Zoning:** Fresno County Exclusive Agricultural, 20 Acres (*AE-20*) (±69.15 acres)

8.	**Description of project:** Prezone Application No. P18-03443 proposes to prezone the Official Zoning Map of the City of Fresno to rezone the subject property from the Fresno County AE-20 (*Exclusive Agriculture*) (±69.15 acres) to the RS-3/ANX/UGM (*Residential Single Family, Low Density)(±11.85 acres),* RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management)(±23 acres)* and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)*(±34.3 acres) zone districts in accordance with the Fresno General Planned Land Use Map. Planned Development Permit Application No. P18-03739 proposes to modify the RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management*) and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)* zone districts development standards to allow for reduced front and rear yard setbacks, reduced lot size and increased lot coverage for the proposed single family residences. Vesting Tentative Tract Map No. 6224 (P18-03724) proposes to subdivide ±57.3 acres of the subject property for the purpose of creating a 349-lot single-family residential development subject to the findings and compliance with the Conditions of Approval included within the Staff Report to the Planning Commission. Annexation Application No. P18-03263 proposes to initiate annexation proceedings for the Shields-Temperance No. 2 Reorganization proposing incorporation of the subject property within the City of Fresno; and, detachment from the Kings River Conservation District and Fresno County Fire Protection District.
9.	**Surrounding land uses and setting:**

	Planned Land Use	Existing Zoning	Existing Land Use
North	Medium Low Density Residential	**RS-4/UGM (City)** *(Residential Single-Family, Medium Low Density/ Urban Growth Management)*	Single-Family Residential
East	Medium Low Density Residential	**RS-4/UGM (City)** *(Residential Single-Family, Medium Low Density/ Urban Growth Management)*	Single-Family Residential (Under Construction)
South	Low Density Residential	**AE-20 (County)** *(Exclusive Agricultural, 20 Acres)* and **RS-3 (City)** *(Residential Single-Family, Low Density)*	Rural Residential
West	Medium Low Density Residential	**RS-4/UGM** *(Residential Single-Family, Medium Low Density/ Urban Growth Management)*	Single-Family Residential and Vacant Land

10.	**Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement):** Planning and Development Department, Building & Safety Services Division; Department of Public Works; Department of Public Utilities; County of Fresno, Department of Community Health; County of Fresno, Department of Public Works and Planning; City of Fresno Fire Department; Fresno Metropolitan Flood Control District; and San Joaquin Valley Air Pollution Control District.
11.	**Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code (PRC) Section 21080.3.1? If so, has consultation begun?** The State requires lead agencies to consider the potential effects of proposed projects and consult with California Native American tribes during the local planning process for the purpose of protecting Traditional Tribal Cultural Resources through the California Environmental Quality Act (CEQA) Guidelines. Pursuant to PRC Section 21080.3.1, the lead agency shall begin consultation with the California Native American tribe that is traditionally and culturally affiliated with the geographical area of the proposed project. Such significant cultural resources are either sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a tribe which is either on or eligible for inclusion in the California Historic Register or local historic register, or, the lead agency, at its discretion, and support by substantial evidence, choose to treat the resources as a Tribal Cultural Resources (PRC Section 21074(a)(1-2)). According to the most recent census data, California is home to 109 currently recognized Indian tribes. Tribes in California currently have nearly 100 separate reservations or Rancherias. Fresno County has a number of Rancherias such as Table Mountain Rancheria, Millerton Rancheria, Big Sandy Rancheria, Cold Springs Rancheria, and Squaw Valley Rancheria. These Rancherias are not located within the city limits. Note: Conducting consultation early in the CEQA process allows tribal governments, lead agencies, and project proponents to discuss the level of environmental review, identify and address potential adverse impacts to tribal cultural resources, and reduce the potential for delay and conflict in the environmental review process. (See PRC Section 21083.3.2.) Information may also be available from the California Native American Heritage Commission's Sacred Lands File per PRC Section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that PRC Section 21082.3(c) contains provisions specific to confidentiality. Pursuant to Assembly Bill 52 (AB 52), the Table Mountain Rancheria of California and Dumna Wo Wah Tribal Government were invited to consult under AB 52. The City of Fresno mailed notices of the proposed project to each of these tribes on December 31, 2018 which included the required 30-day time period for tribes to request consultation.

	Under invitations to consult under AB 52, the Table Mountain Rancheria of California responded on February 5, 2019. The response letter notes that the Table Mountain Rancheria declines participation at this time, but would appreciate being notified in the unlikely event that cultural resources are identified.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

	Aesthetics		Agriculture and Forestry Resources		Air Quality
	Biological Resources		Cultural Resources		Energy
	Geology/Soils		Greenhouse Gas Emissions		Hazards/Hazardous Materials
	Hydrology/Water Quality		Land Use/Planning		Mineral Resources
	Noise		Population/Housing		Public Services
	Recreation		Transportation		Tribal Cultural Resources
	Utilities/Service Systems		Wildfire		Mandatory Findings of Significance

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

___	I find that the proposed project could not have a significant effect on the environment. A NEGATIVE DECLARATION will be prepared.
_X_	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
___	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
___	I find that the proposed project MAY have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
___	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Bonique Emerson, Planning Manager Date

EVALUATION OF ADDITIONAL ENVIRONMENTAL IMPACTS NOT ASSESSED IN THE MASTER ENVIRONMENTAL IMPACT REPORT (MEIR):

1. For purposes of this Initial Study, the following answers have the corresponding meanings:

   a. “No Impact” means the subsequent project will not cause any additional significant effect related to the threshold under consideration which was not previously examined in the MEIR.

   b. “Less Than Significant Impact” means there is an impact related to the threshold under consideration that was not previously examined in the MEIR, but that impact is less than significant;

   c. “Less Than Significant with Mitigation Incorporation” means there is a potentially significant impact related to the threshold under consideration that was not previously examined in the MEIR, however, with the mitigation incorporated into the project, the impact is less than significant.

   d. “Potentially Significant Impact” means there is an additional potentially significant effect related to the threshold under consideration that was not previously examined in the MEIR.

2. A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

3. All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

4. Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

5. "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from

"Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

6. Earlier analyses may be used where, pursuant to the tiering, program EIR or MEIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:

   a. Earlier Analysis Used. Identify and state where they are available for review.

   b. Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in the MEIR or another earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.

   c. Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.

7. Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.

8. Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

9. This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.

10. The explanation of each issue should identify:

    a. The significance criteria or threshold, if any, used to evaluate each question; and

    b. The mitigation measure identified, if any, to reduce the impact to less than significance.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. AESTHETICS – Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?			X	
b) Substantially damage scenic resources, including, but not limited to, trees, rock out-croppings, and historic buildings within a state scenic highway?			X	
c) In nonurbanized areas, substantially degrade the existing visual character or quality of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?			X	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?		X		

The site is located within an area undergoing continued growth in development. Areas to the north and west have been developed and continue to be developed with residential uses, while the subject property is vacant. The subject property contains agricultural uses (orchards) with one 10,302-sqare-foot agricultural building. The Property to the north and west includes existing single-family residential subdivisions. Property to the south contains approximately nine single-family ranchette homes. Property to the east is currently under construction for single-family residential uses. The existing topography of the subject property is nearly flat, with elevations ranging from 354 to 361 feet above mean sea level.

A scenic vista is a viewpoint that provides a distant view of highly valued natural or man-made landscape features for the benefit of the general public. Typical scenic vistas are locations where views of rivers, hillsides, and open space areas can be obtained as well as locations where valued urban landscape features can be viewed in the distance.

The Fresno General Plan MEIR provides and recognizes that the City has not identified or designated scenic vistas within its General Plan. Although no scenic vista has been designated, it is acknowledged that scenic vistas within the Planning Area could provide distant views of natural landscape features such as the San Joaquin River along the northern boundary of the Planning Area and the foothills of the Sierra Nevada Mountain Range. The River bluffs provide distant views of the San Joaquin River as well as areas north of the River. However, the majority of these views are from private property. There are limited views of the San Joaquin River from Weber Avenue, Milburn Avenue, McCampbell Drive, Valentine Avenue, Palm Avenue, State Route 41, Friant Road, and Woodward Park. There are various locations throughout the eastern portion of the Planning Area that provide views of the Sierra Nevada foothills that are located northeast and east of the Planning Area. These distant views of the Sierra Nevada foothills are impeded many days during the year by the poor air quality in the Fresno region. Distant views of man-made landscape features include the Downtown Fresno buildings that provide a unique skyline.

Scenic resources include landscapes and features that are visually or aesthetically pleasing. They contribute positively to a distinct community or region. These resources produce a visual benefit upon communities. The scenic resources within the Planning Area include landscaped open spaces such as parks and golf courses. Additional scenic resources within the Planning Area include areas along the San Joaquin River due to the topographic variation in the relatively flat San Joaquin Valley. The River bluffs provide a unique geological feature in the San Joaquin Valley. Historic structures in Downtown Fresno buildings also represent scenic resources because they provide a unique skyline.

Although superseded by the Fresno General Plan (§15-104-B-4.b of the FMC) the Bullard Community Plan previously depicted six vista points along the bluffs overlooking the San Joaquin River bottom and environs. Two of the vista points within Riverview Estates were recognized as having either been developed or committed to development through tentative map approval, prior to the establishment of the Bullard Community Plan standards. As a result, the two committed sites were considered minimal facilities with potential access and other problems. To avoid such future problems, standards were prepared within the Bullard Community Plan to guide development of the four remaining vista points.

The purpose of the vista points was to provide limited bluff access to non-area residents and to offer panoramic views of the river bluffs and river bottom. Such views were considered best enjoyed as part of a passive recreational experience where one can stop, relax and absorb the natural beauty of the river environment. As such, the vista points were recommended to be designed to accommodate local residents who walk, non-area residents who bike, and the driving public.

None of the six vista point locations shown on the Bullard Community Plan Map are located in the nearby vicinity of the subject property. Each vista point is located over 10 miles to the northwest of the project site. As such, impacts related to these vista points would not occur.

Given the site's distance from the San Joaquin River (i.e., approximately 10 miles northwest of the site), the proposed project will not interfere with public views of the San Joaquin River environs. Furthermore, as there are no designated public or scenic vistas on or adjacent to the subject property, there is no potential for adverse effect on a scenic vista.

Furthermore, the Fresno General Plan MEIR recognizes and acknowledges that poor air quality reduces existing views within the City of Fresno sphere of influence as a whole, and therefore finds that a less than significant impact will result to views of highly valued features such as the Sierra Nevada foothills from future development on and in the vicinity of the subject property.

Finally, the project site is not within the vicinity of a State designated scenic highway.

The project will not damage nor will it degrade the visual character or quality of the subject site and its surroundings, given that the project site is in an area within close proximity to existing industrial development; and, in an area generally planned for and developed with industrial uses at comparable intensities.

Future development of the site will create a new source of substantial light or glare within the area. However, given that the project site is within an area which has been previously developed or is currently being developed with urban and residential uses, which already affect day and night time views in the project area to a degree equal or greater than the proposed project, no significant impact will occur. The project would be subject to the applicable mitigation measures pertaining to light and glare included in in MEIR SCH No. 2012111015.

Furthermore, through the entitlement process, staff will ensure that lights are located in areas that will minimize light sources to the neighboring properties in accordance with the mitigation measures of the MEIR.

In conclusion, with MEIR mitigation measures incorporated, the project will not result in any aesthetic resource impacts beyond those analyzed in MEIR SCH No. 2012111015. Therefore, the project will have a less-than-significant impact on aesthetics.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the aesthetics related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
II. AGRICULTURE AND FORESTRY RESOURCES – In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?		X		
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				X

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?				X
d) Result in the loss of forest land or conversion of forest land to non-forest use?				X
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				X

Based upon the upon the State of California Department of Conservation California Important Farmland Finder, the project site is designated “Prime Farmland” with a small area designated as “Farmland of Statewide Importance”. An area to the west of the site is designated as “Farmland of Local Importance”, while the majority of the area west of the site is designated as “Urban and Built-Up Land”. The area to the east of the site is designated as “Farmland of Local Importance”. The area to the north of the site is also designated “Urban and Built-Up Land”. The area to the south is designated as “Rural Residential Land”.

The subject property is currently utilized for agricultural purposes.

The Fresno General Plan MEIR analyzed “project specific” impacts associated with future development within the Planning Area (Sphere of Influence) as well as the cumulative impacts factored from future development in areas outside of the Planning Area. The MEIR identifies locations within the Planning Area that have been designated as Prime Farmland, Unique Farmland, and Farmland of Statewide Importance through the Farmland Mapping and Monitoring Program (FMMP) of the California Department of Conservation. The analysis of impacts contained within the MEIR acknowledges that Fresno General Plan implementation anticipates all of the FMMP-designated farmland within the Planning Area being converted to uses other than agriculture. Furthermore, the MEIR acknowledges that the anticipated conversion is a significant impact on agricultural resources.

To reduce potential project-specific and cumulative impacts on agricultural uses, the General Plan incorporates objectives and policies, which include but are not limited to the following:

G-5 Objective: While recognizing that the County of Fresno retains the primary responsibility for agricultural land use policies and the protection and advancement of farming operations, the City of Fresno will support efforts to preserve agricultural land outside of the area planned for urbanization and outside of the City's public service delivery capacity by being responsible in its land use plans, public service delivery plans, and development policies.

G-5-b. Policy: Plan for the location and intensity of urban development in a manner that efficiently utilizes land area located within the planned urban boundary, including the North and Southeast Growth Areas, while promoting compatibility with agricultural uses located outside of the planned urban area.

G-5-f. Policy: Oppose lot splits and development proposals in unincorporated areas within and outside the City General Plan boundary when these proposals would do any of the following:

- Make it difficult or infeasible to implement the general plan; or,

- Contribute to the premature conversion of agricultural, open space, or grazing lands; or constitute a detriment to the management of resources and/or facilities important to the metropolitan area (such as air quality, water quantity and quality, traffic circulation, and riparian habitat).

RC-9-c. Policy: In coordination with regional partners or independently, establish a Farmland Preservation Program. When Prime Farmland, Unique Farmland, or Farmland of Statewide Importance is converted to urban uses outside City limits, this program would require that the developer of such a project mitigate the loss of such farmland consistent with the requirements of CEQA. The Farmland Preservation Program shall provide several mitigation options that may include, but are not limited to the following: Restrictive Covenants or Deeds, In Lieu Fees, Mitigation Banks, Fee Title Acquisition, Conservation Easements, Land Use Regulation, or any other mitigation method that is in compliance with the requirements of CEQA. The Farmland Preservation Program may be modeled after some or all of the programs described by the California Council of Land Trusts.

However, the MEIR recognizes that despite implementation of the objectives and policies of the Fresno General Plan, project and cumulative impacts on agricultural resources will remain significant; and, that no feasible measures in addition to the objectives and policies of the Fresno General Plan are available.

In 2014, through passage of Council Resolution No. 2014-225, the City of Fresno adopted Findings of Fact related to Significant and Unavoidable Effects as well as Statements of Overriding Considerations in order to certify MEIR SCH No. 2012111015 for purposes of adoption of the Fresno General Plan. Section 15093 of the California Environmental Quality Act requires the lead agency to balance the benefits of a proposed project against its unavoidable environmental risks in determining whether to approve the project.

The adopted Statements of Overriding Considerations for the MEIR addressed Findings of Significant Unavoidable Impacts within the categories/areas of Agricultural Resources; citing specific economic, legal, social, technological, or other considerations, including provision of employment opportunities for highly trained workers as project goals, each and all of which were deemed and considered by the Fresno City Council to be benefits, which outweighed the unavoidable adverse environmental effects attributed to development occurring within the City of Fresno Sphere of Influence (SOI), consistent with the land uses, densities, and intensities set forth in the Fresno General Plan.

The project site is and continues to be further encompassed with urban development. The project site is a logical expansion for purposes of orderly development. Given these circumstances, the proposed project is consistent with the goals, objective and policies of the Fresno General Plan as referenced herein above; and, will not result in the premature conversion of agricultural lands or constitute a detriment to the management of agricultural resources and/or facilities important to the metropolitan area.

The subject property is not subject to a Williamson Act agricultural land conservation contract. Therefore, the proposed project on the subject site will not affect existing agriculturally zoned or Williamson Act contract parcels.

The proposed project will not conflict with any forest land or Timberland Production or result in any loss of forest land.

As discussed in Impact AG-1 of the MEIR, future development in accordance with the Fresno General Plan would result in the conversion of farmland to a non-agricultural use. Except for direct conversion, the implementation of project development would not result in other changes in the existing environment that would impact agricultural land outside of the project boundary or Planning Area. In addition, development in accordance with the General Plan would not impact forest land as discussed in Section 7.2.1 of the Master EIR. Therefore, the project would result in no impact on farmland or forest land involving other changes in the existing environment which fall outside of the scope of the analyses contained within the MEIR.

Therefore, the proposed project will not have an impact on Williamson Act contracts or forestland. The project will result in conversion of Important Farmland. Project Specific Mitigation Measure AG-1 requires the project proponent to mitigate the loss of Prime Farmland on the project site at a 1:1 ratio.

With the Project Specific Mitigation Measure incorporated, the proposed project will not result in any agricultural and forestry resources impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate the agriculture and forestry resources related mitigation measure as identified in the attached Project Specific Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan (*e.g.*, by having potential emissions of regulated criterion pollutants which exceed the San Joaquin Valley Air Pollution Control Districts (SJVAPCD) adopted thresholds for these pollutants)?			X	
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Expose sensitive receptors to substantial pollutant concentrations?			X	
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?				X

Setting

The subject site is located in the City of Fresno and within the San Joaquin Valley Air Basin (SJVAB). This region has had chronic non-attainment of federal and state clean air standards for ozone/oxidants and particulate matter due to a combination of topography and climate. The San Joaquin Valley (Valley) is hemmed in on three sides by mountain ranges, with prevailing winds carrying pollutants and pollutant precursors from urbanized areas to the north (and in turn contributing pollutants and precursors to downwind air basins). The Mediterranean climate of this region, with a high number of sunny days and little or no measurable precipitation for several months of the year, fosters photochemical reactions in the atmosphere, creating ozone and particulate matter. Regional factors affect the accumulation and dispersion of air pollutants within the SJVAB.

Air pollutant emissions overall are fairly constant throughout the year, yet the concentrations of pollutants in the air vary from day to day and even hour to hour. This variability is due to complex interactions of weather, climate, and topography. These factors affect the ability of the atmosphere to disperse pollutants. Conditions that move and mix the atmosphere help disperse pollutants, while conditions that cause the atmosphere to stagnate allow pollutants to concentrate. Local climatological effects, including topography, wind speed and direction, temperature, inversion layers, precipitation, and fog can exacerbate the air quality problem in the SJVAB.

The SJVAB is approximately 250 miles long and averages 35 miles wide, and is the second largest air basin in the state. The SJVAB is defined by the Sierra Nevada in the east (8,000 to 14,000 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi mountains in the south (6,000 to 8,000 feet in elevation). The Valley is basically flat with a slight downward gradient to the northwest. The Valley opens to the sea at the Carquinez Straits where the San Joaquin-Sacramento Delta empties into San Francisco Bay. The Valley, thus, could be considered a “bowl” open only to the north.

During the summer, wind speed and direction data indicate that summer wind usually originates at the north end of the Valley and flows in a south-southeasterly direction through the Valley, through Tehachapi pass, into the Southeast Desert Air Basin. In addition, the Altamont Pass also serves as a funnel for pollutant transport from the San Francisco Bay Area Air Basin into the region.

During the winter, wind speed and direction data indicate that wind occasionally originates from the south end of the Valley and flows in a north-northwesterly direction. Also during the winter months, the Valley generally experiences light, variable winds (less than 10 mph). Low wind speeds, combined with low inversion layers in the winter, create a climate conducive to high carbon monoxide (CO) and particulate matter (PM10 and PM2.5) concentrations. The SJVAB has an “Inland Mediterranean” climate averaging over 260 sunny days per year. The Valley floor is characterized by warm, dry summers and cooler winters. For the entire Valley, high daily temperature readings in summer average 95ºF. Temperatures below freezing are unusual. Average high temperatures in the winter are in the 50s, but highs in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low temperature is 45ºF.

The vertical dispersion of air pollutants in the Valley is limited by the presence of persistent temperature inversions. Solar energy heats up the Earth’s surface, which in turn radiates heat and warms the lower atmosphere. Therefore, as altitude increases, the air temperature usually decreases due to increasing distance from the source of heat. A reversal of this atmospheric state, where the air temperature increases with height, is termed an inversion. Inversions can exist at the surface or at any height above the ground, and tend to act as a lid on the Valley, holding in the pollutants that are generated here.

Regulations

The San Joaquin Valley Air Pollution Control District (SJVAPCD) is the local regional jurisdictional entity charged with attainment planning, rulemaking, rule enforcement, and monitoring under Federal and State Clean Air Acts and Clean Air Act Amendments.

To aid in evaluating potentially significant construction and/or operational impacts of a project, SJVAPCD has prepared an advisory document, the Guide for Assessing and Mitigating Air Quality Impacts (GAMAQI), which contains standard procedures for addressing air quality in CEQA documents. GAMAQI presents a three-tiered approach to air quality analysis. The Small Project Analysis Level (SPAL) is first used to screen the project for potentially significant impacts. A project that meets the screening criteria at this level requires no further analysis and air quality impacts of the project may be deemed less than significant. If a project does not meet all the criteria at this screening level, additional screening is recommended at the Cursory Analysis Level and, if warranted, the Full Analysis Level. For heavy industrial uses, the threshold is 920,000 sf. Given that the project related applications have been filed to facilitate the creation and development of 310,874 sf of industrial uses, the proposed project is considered to have less than significant impacts pertaining to air emissions and is excluded from quantifying criteria pollutant emissions for CEQA purposes.

SJVAPCD Regulation VIII mandates requirements for any type of ground moving activity and would be adhered to during construction; however, during construction, air quality impacts would be less than SJVAPCD thresholds for non-attainment pollutants and operation of the project would not result in impacts to air quality standards for criteria pollutants.

The SJVAPCD accounts for cumulative impacts to air quality in its GAMAQI. The SJVAPCD considered basin-wide cumulative impacts to air quality when developing its significance thresholds. The SJVAPCD's air quality significance thresholds represent the maximum emissions from a project that are not expected to conflict with the SJVAPCD's air quality plans, and is not expected to cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard. These are developed based on the ambient concentrations of the pollutant for each source. Because the project would not exceed the air quality significance thresholds on the project-level, and would not otherwise conflict with the SJVAPCD's air quality plans, the cumulative emissions would not be a significant contribution to a cumulative impact.

The proposed project would comply with the SJVAPCD's Regulation VIII dust control requirements during any proposed construction (including Rules 8011, 8031, 8041, and 8071). Compliance with this regulation would reduce the potential for significant localized PM10 impacts to less than significant levels.

Project Criteria Pollutants

As noted above, the SJVAPCD SPAL is first used to screen the project for potentially significant impacts. A project that meets the screening criteria at this level requires no further analysis and air quality impacts of the project may be deemed less than significant. If a project does not meet all the criteria at this screening level, additional screening is recommended at the Cursory Analysis Level and, if warranted, the Full Analysis Level. For single family uses, the threshold is 152 units. Given that the project related applications have been filed to facilitate the creation and development of 349 single family units, the proposed project is required to quantify criteria pollutant emissions for CEQA purposes.

Construction Emissions

Construction-generated emissions are temporary and short term but have the potential to represent a significant air quality impact. The construction and development of the proposed project would result in the temporary generation of emissions. Emissions of airborne particulate matter are largely dependent on the amount of ground disturbance associated with site preparation activities.

The SJVAPCD has adopted guidelines for determining potential adverse impacts to air quality in the region. The SJVAPCD guidelines state that construction activities are considered a potentially significant adverse impact if: the feasible control measures for construction in compliance with Regulation VIII as listed in the SJVAPCD guidelines are not incorporated or implemented; if the project generates emissions of reactive organic gases (ROG) or oxides of nitrogen (NO_X) that exceeds 10 tons per year; or if the project generates emissions of respirable particulate matter (PM_{10}) or fine particulate matter ($PM_{2.5}$) that exceeds 15 tons per year.

Construction Activities/Schedule: CalEEMod default values were used for the construction schedule and off-road equipment. Construction activities will consist of multiple phases over approximately 5.5 years. These construction activities can be described as site improvements (demolition, grading, underground infrastructure, and topside improvements) and vertical construction (building construction and architectural coatings). For purposes of this analysis, it is assumed that the entire project is built-out from 2019 through 2025. This construction schedule is considered a worst-case scenario.

Site Improvements: The exact construction schedule of the entire project is largely dependent on market demands. For purposes of this analysis it is assumed that site improvements are installed in one phase. This approach will present a more conservative and worst-case scenario.

The site improvement phase of construction will begin with demolition and site preparation. The demolition step will include the use of excavators, dozers, and concrete/industrial saws to demolish the existing agricultural structure on the site. This step would take approximately 5 days. The site preparation step will include the use of dozers, backhoes, and loaders to strip (clear and grub) all organic materials and the upper half-inch to inch of soil from the project site. This task will include vehicle trips from construction workers. This step would take approximately 40 days.

After the site is striped of organic materials grading will begin. This activity will involve the use of excavators, graders, dozers, scrappers, loaders, and backhoes to move soil around the project site to create specific engineered grade elevations and soil compaction levels. Grading the project site would take approximately 110 days and will include vehicle trips from construction workers. *(Note: It would be possible to grade the site under a more compacted schedule with extra equipment operating or under a longer timeframe with less equipment.).*

The last task is to install the topside improvements, which includes pouring concrete curbs, gutters, sidewalks, and access aprons and then paving of all streets and parking lots. This task will involve the use of pavers, paving equipment, and rollers and will take approximately 75 days and will include vehicle trips from construction workers. *(Note: It would be possible to install the topside improvements under a more compacted schedule with extra equipment operating or under a longer timeframe with less equipment).*

Building Construction/Architectural Coatings: Building construction involves the vertical construction of structures and landscaping around the structures. This task will involve the use of cranes, forklifts, generator sets, welders, and tractors/loaders/backhoes. The exact construction schedule of the entire project is largely dependent on market demands. For purposes of this analysis it is assumed that the buildings constructed over an approximately 4.25-year period. The actual building construction phase may be much shorter or much longer. Architectural coatings involve the interior and exterior painting associated with the structures. This task will generally begin after construction begins on the structure and will generally be completed with the completion of the individual buildings.

Construction Emissions: The proposed project is larger in scope and size then the SJVAPCD's Small Project Analysis Level (SPAL); therefore, a quantification of the emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ that will be emitted by project construction has been performed. CalEEMod™ (v. 2016.3.2) was used to estimate construction emissions for the proposed project. Below is a list of model assumptions used in the construction screens of CalEEMod. The CalEEMod assumptions and outputs are included in Appendix A.

Table 1 presents the estimated construction phase schedule, which shows the duration of each construction phase.

Table 1: Construction Phase

Phase Number	*Phase Name*	*Start Date*	*End Date*	*# Days/Week*	*# Days*
1	Demolition	11/4/2019	11/8/2019	5	5
2	Site Preparation	2/8/2020	4/3/2020	5	40
3	Grading	4/4/2020	9/4/2020	5	110
4	Paving	12/7/2024	3/21/2025	5	75
5	Building Construction	9/5/2020	12/6/2024	5	1,110
6	Architectural Coating	3/22/2025	7/4/2025	5	75

SOURCE: CALEEMOD (V. 2016.3.2)

Table 2 shows the off-road construction equipment used during construction for each phase. Table 3 shows the construction emissions for the construction years 2019 through 2025. Following these tables are a list of default factors that were used in the model.

Table 2: Off-Road Equipment

Equipment Type	***Unit Amount***	***Hours/Day***	***Horsepower***	***Load Factor***
Demolition				
Concrete/Industrial Saws	1	8.00	81	0.73
Rubber Tired Dozers	2	8.00	247	0.40
Excavators	3	8.00	158	0.38
Site Preparation				
Rubber Tired Dozers	3	8.00	247	0.40
Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading				
Excavators	2	8.00	158	0.38
Graders	1	8.00	187	0.41
Rubber Tired Dozers	1	8.00	247	0.40
Scrapers	2	8.00	367	0.48
Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction				
Cranes	1	7.00	231	0.29
Forklifts	3	8.00	89	0.20
Generator Sets	1	8.00	84	0.74
Tractors/Loaders/Backhoes	3	7.00	97	0.37
Welders	1	8.00	46	0.45
Paving				
Pavers	2	8.00	130	0.42
Paving Equipment	2	8.00	131	0.36
Rollers	2	8.00	80	0.38
Architectural Coatings				
Air Compressors	1	6.00	78	0.48

SOURCE: CALEEMOD (V. 2016.3.2).

Table 3: Construction Emissions (Unmitigated)

Thresholds	***ROG***	***NO_X***	***PM_{10}***	***$PM_{2.5}$***
	≤ 10 tons/year	***≤ 10 tons/year***	***≤ 15 tons/year***	***≤ 15 tons/year***
2019	9.1600e-003	0.0966	0.0104	5.1700e-003
2020	0.4500	4.6236	0.9989	0.5972
2021	0.3277	2.8492	0.2910	0.1641
2022	0.2953	2.5698	0.2702	0.1450
2023	0.2693	2.2914	0.2550	0.1308
2024	0.2465	2.1190	0.2347	0.1172
2025	5.9332	0.2941	0.0251	0.0161
Maximum	**5.9332**	**4.6236**	**0.9989**	**0.5972**
Threshold Exceeded in Any Year?	**No**	**No**	**No**	**No**

NOTES: THE AIR DISTRICT IS ATTAINMENT FOR CO AND SO_2.
SOURCE: CALEEMOD (V. 2016.3.2).

The SJVAPCD has established construction related emissions thresholds of significance as follows: 10 tons per year of ROG, 10 tons per year of NO_X, or 15 tons per year of PM_{10} or $P_{2.5}$. If the proposed project's emissions will exceed the SJVAPCD's threshold of significance for construction-generated emissions, the proposed project will have a significant impact on air quality and all feasible mitigation are required to be implemented to reduce emissions. As shown in Table 3, annual emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ will not exceed the SJVAPCD thresholds of significance in any given year during project construction. Because the emissions are well below the SJVAPCD thresholds of significance, no mitigation measures are required.

Operational Emissions

The SJVAPCD is tasked with implementing programs and regulations required by the Federal Clean Air Act and the California Clean Air Act. In that capacity, the SJVAPCD has prepared plans to attain Federal and State ambient air quality standards. To achieve attainment with the standards, the SJVAPCD has established thresholds of significance for criteria pollutant emissions in their *SJVAPCD Guidance for Assessing and Mitigating Air Quality Impacts* (2015). Projects with emissions below the thresholds of significance for criteria pollutants would be determined to "Not conflict or obstruct implementation of the District's air quality plan".

The proposed project would be a direct and indirect source of air pollution, in that it would generate and attract vehicle trips in the region (mobile source emissions) and it would increase area source emissions and energy consumption. The mobile source emissions would be entirely from vehicles, while the area source emissions would be primarily from the use of natural gas fuel combustion, landscape fuel combustion, consumer products, and architectural coatings.

CalEEMod^{TM} (v.2016.3.2) was used to estimate emissions for buildout of the proposed project. Table 4 shows the emissions, which include mobile, area source, and energy emissions of criteria pollutants that would result from operations of the proposed project. The CalEEMod assumptions and outputs are included in Appendix A.

Table 4: Operational Buildout Generated Emissions

	ROG (tons/year)		***NOx (tons/year)***		***PM_{10} (tons/year)***		***$PM_{2.5}$ (tons/year)***	
Thresholds	***≤ 10 tons/year***		***≤ 10 tons/year***		***≤ 15 tons/year***		***≤ 15 tons/year***	
Category	***UM***	***M***	***UM***	***M***	***UM***	***M***	***UM***	***M***
Area	3.1370	3.1370	0.1605	0.1605	0.0249	0.0249	0.0249	0.0249
Energy	0.0492	0.0492	0.4205	0.4205	0.0340	0.0340	0.0340	0.0340
Mobile	1.2419	1.2068	13.4088	12.9810	3.6969	3.4423	1.0322	0.9614
Total	**4.4281**	**4.3930**	**13.9898**	**13.5620**	**3.7558**	**3.5012**	**1.0910**	**1.0202**
Threshold Exceeded?	**No**	**No**	**Yes**	**Yes**	**No**	**No**	**No**	**No**
Percent Reduction	**0.79**		**3.06**		**6.78**		**6.49**	

NOTES: UM = UNMITIGATED, M = MITIGATED; THE AIR DISTRICT IS IN ATTAINMENT FOR CO, AND SO_2.
SOURCE: CALEEMOD (V.2016.3.2).

The long-term operational emissions estimate for buildout of the proposed project, incorporates the potential area source and vehicle emissions, and emissions associated with utility and water usage, and wastewater and solid waste generation. The modeling included the following inputs for the year 2021:

<u>Traffic</u>

- Project Setting: Low Density Suburban
- Increase Density: 349 du/57.3 ac = 6.10 du/ac
- Increase Destination Accessibility: Distance to Downtown/Job Center is 7.1 miles (from project site to downtown Fresno)
- Increase Transit Accessibility: Distance to Transit is 1.26 miles (Fresno Area Express Route 45 has a stop at Shields / Business Park)
- Improve Pedestrian Network: Project Site and Connecting Off-Site (project includes connections from the site to the adjacent shopping center)

<u>Area</u>

- Only Natural Gas Hearth (Per SJVAPCD Rule 4901: Wood-Burning Fireplaces and Wood-Burning Heaters, open-hearth fireplaces are not allowed in new construction projects which would result in more than two homes per acre. The proposed project includes more than two homes per acre.)

The traffic-related inputs listed above are characteristics of the proposed project development and project location. For example, the proposed project is located in a low density suburban setting approximately 7.1 miles from a job center (downtown Fresno). The project site is also approximately 1.26 miles from a Fresno Area Express Route 45 but stop (located at Shields Avenue / Business Park Avenue). Further, the proposed project would include development of sidewalks throughout the internal roadway system and connecting to the off-site adjacent (existing and future) developments. Lastly, per SJVAPCD Rule 4901, the proposed residences would not include wood burning fireplaces or wood burning heaters.

The SJVAPCD has established their thresholds of significance by which the project emissions are compared against to determine the level of significance. The SJVAPCD has established operations related emissions thresholds of significance as follows: 10 tons per year of NO_x, 10 tons per year of ROG, 15 tons per year of PM_{10}, and 15 tons per year of $PM_{2.5}$. If the proposed project's emissions will exceed the SJVAPCD's threshold of significance for operational-generated emissions, the proposed project will have a significant impact on air quality and all feasible mitigation are required to be implemented to reduce emissions to the extent feasible. As shown in Table 4 above, annual emissions of ROG, $PM_{2.5}$, and PM_{10} would not exceed the SJVAPCD thresholds of significance. Annual emissions of NO_X would exceed the SJVAPCD thresholds of significance.

CalEEMod^{TM} (v.2016.3.2) mitigation assumptions described above were incorporated into the model. With mitigation inputs, annual emissions of NOx can be reduced; however, the emissions would not be reduced to below the thresholds of significance. The NOx emissions would exceed the SJVAPCD thresholds of significance for operations even with mitigation. The proposed project is subject to the SJVAPCD Rule 9510 (Indirect Source Rule), which could result in substantial mitigation of emissions beyond what is reflected in the modeling outputs. The reductions are accomplished by the incorporation of mitigation measures into projects and/or by the payment of an Indirect Source Rule fee for any required reductions that have not been accomplished through project mitigation commitments. The current fees are $9,350 per ton of NOx, although these are subject to adjustments by the SJVAPCD. The actual calculations will be accomplished by the SJVAPCD and project applicants as the project (i.e., or portions of the project) are brought forward for approval under Rule 9510. However, even with the application of the ISR and the mitigation measures described above, direct emissions levels remain above the defined thresholds of significance for the project as a whole. It is anticipated that with the payment of fees through the ISR, that the SJVAPCD will offset the emissions by implementing projects/programs that reduce emissions.

As noted above, design elements and compliance with District rules and regulations may not be sufficient to reduce project related impacts on air quality to a less than significant level. In such situations, the *SJVAPCD Guidance for Assessing and Mitigating Air Quality Impacts* (March 2015) indicates that the project proponents may enter into a Voluntary Emission Reduction Agreement (VERA) with the SJVAPCD. A VERA is a method by which the project proponent provides pound-for-pound mitigation of air emissions increases through a process that develops, funds, and implements emission reduction projects, with the District serving a role of administrator of the emissions reduction projects and verifier of the successful mitigation effort. To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate project specific emissions by providing funds for the District's Emission Reduction Incentive Program (ERIP). The funds are disbursed by ERIP in the form of grants for projects that achieve emission reductions. Thus, project specific impacts on air quality are offset. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of old farm tractors.

In implementing a VERA, the SJVAPCD verifies the actual emission reductions that have been achieved as a result of completed grant contracts, monitors the emission reduction projects, and ensures the enforceability of achieved reductions. The initial agreement is generally based on the projected maximum emissions increases as calculated by a SJVAPCD approved air quality impact assessment, and contains the corresponding maximum fiscal obligation. However, because the goal is to mitigate actual emissions, the SJVAPCD has designed flexibility into the VERA such that the final mitigation is based on actual emissions related to the project as determined by actual equipment used, hours of operation, etc. After the project is mitigated, the SJVAPCD certifies to the lead agency that the mitigation is completed, providing the lead agency with an enforceable mitigation measure demonstrating that project specific emissions have been mitigated.

By its definition, the VERA is a voluntary program initiated by the SJVAPCD to help reduce project-related emissions. The mitigation measure also requires consideration of the benefits of improved air quality with the costs of implementation in the decision-making process. Because a VERA is a voluntary program that requires the applicant and the SJVAPCD to agree on a negotiated contractual agreement, a VERA is not considered an enforceable mitigation measures as it provides no specific details or measures that can be mandated at this time. The project applicant retains the option to implement a VERA as a way of reducing emissions in addition to Rule 9510.

Although the operational NO_X emissions would be above the SJVAPCD threshold, the project site was analyzed for Neighborhood Park/Medium Density Residential, Medium Density Residential, Medium Low Density Residential, and Low Density Residential development as part of the City's General Plan MEIR process. The rules for tiering are set forth in CEQA Guidelines Section 15152. "'[T]iering is a process by which agencies can adopt programs, plans, policies, or ordinances with EIRs focusing on 'the big picture,' and can then use streamlined CEQA review for individual projects that are consistent with such…[first tier decisions] and are…consistent with local agencies' governing general plans and zoning.'" (*Koster v. County of San Joaquin* (1996) 47 Cal.App.4th 29, 36.) Section 15152 provides that, where a first-tier EIR has "adequately addressed" the subject of cumulative impacts, such impacts need not be revisited in second- and third-tier documents. Furthermore, second- and third-tier documents may limit the examination of impacts to those that "were not examined as significant effects" in the prior EIR or "[a]re susceptible to substantial reduction or avoidance by the choice of specific revisions in the project, by the imposition of conditions, or other means." In general, significant environmental effects have been "adequately addressed" if the lead agency determines that:

a) they have been mitigated or avoided as a result of the prior environmental impact report and findings adopted in connection with that prior environmental impact report; or
b) they have been examined at a sufficient level of detail in the prior environmental impact report to enable those effects to be mitigated or avoided by site specific revisions, the imposition of conditions, or by other means in connection with the approval of the later project.

Because the City's General Plan MEIR addressed the effects of developing the project site with Neighborhood Park/Medium Density Residential, Medium Density Residential, Medium Low Density Residential, and Low Density Residential uses, environmental review can also be streamlined pursuant to Public Resources Code Section 21083.3 and CEQA Guidelines Section 15183.

The proposed project is generally consistent with the General Plan designations for the project site. The City's General Plan designates the project area as Neighborhood Park/Medium Density Residential (approximately 9.34 acres), Medium Density Residential (approximately 24.96 acres), Medium Low Density Residential (approximately 23.0 acres) and Low Density Residential (11.85 acres). The Medium Density Residential designation allows for residential densities of 5 to 12 dwelling units per acre. The Medium Low Density Residential designation allows for residential densities of 3.5 to 6 dwelling units per acre. The Low Density Residential designation allows for residential densities of 1.0 to 3.5 dwelling units per acre. Therefore, the City's General Plan anticipated up to 9.34 acres of park or up to 112 Medium Density Residential units (on the land designated Neighborhood Park/Medium Density Residential), up to 299 Medium Density Residential units (on the land designated Medium Density Residential), up to 138 units (on the land designated Medium Low Density Residential), and up to 41 units (on the land designated Low Density Residential). This would result in a total of up to 9.34 acres of park and up to 478 units, or 0.0 acres of park and up to 590 units. This would result in an associated population of 1,529 to 1,888 persons within the project area. The analysis included in the City's General Plan MEIR assumed that the site would be developed with Neighborhood Park/Medium Density Residential, Medium Density Residential, and Medium Low Density Residential uses. The project would not increase development beyond the level assumed for the site in the City's General Plan MEIR.

The General Plan MEIR concludes that although the existing policies, ordinances, and regulations and the objectives and policies in the General Plan will reduce criteria pollutant emissions, implementation of the General Plan would exceed the SJVAPCD project level thresholds of significance for ROG, NO_X, PM_{10}, and $PM_{2.5}$. Implementation of the General Plan would result in a significant and unavoidable impact related to violation of air quality standards. NO_X is an ozone precursor, meaning that NO_X emissions result in the formation of ground-level ozone. The City of Fresno certified the General Plan Draft EIR, adopted a statement of overriding considerations relative to this significant and unavoidable impact, and approved the General Plan. As such, the operational NO_X emission resulting from operation of the proposed project were previously considered by the City as part of the General Plan and General Plan EIR planning efforts.

Project Carbon Monoxide Hotspots

Project traffic would increase concentrations of carbon monoxide along streets providing access to the project site. Carbon monoxide is a local pollutant (i.e., high concentrations are normally only found very near sources). The major source of carbon monoxide, a colorless, odorless, poisonous gas, is automobile traffic. Elevated concentrations (i.e. hotspots), therefore, are usually only found near areas of high traffic volume and congestion.

The proposed use, if approved, will be allowed on the subject site and will not expose sensitive receptors to substantial pollutant concentrations, including carbon monoxide hotspots. The growth projections used for the Fresno General Plan assume that growth in population, vehicle use and other source categories will occur at historically robust rates that are consistent with the rates used to develop the SJVAPCD's attainment plans. Future development on the subject property is required to comply with the SJVAPCD rules and regulations.

<u>Project Toxic Air Contaminants</u>

A toxic air contaminant (TAC) is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air. However, their high toxicity or health risk may pose a threat to public health even at very low concentrations. In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. This contrasts with the criteria pollutants for which acceptable levels of exposure can be determined and for which the state and federal governments have set ambient air quality standards.

The California Air Resources Board (CARB) published the *Air Quality and Land Use Handbook: A Community Health Perspective* (2007) to provide information to local planners and decision-makers about land use compatibility issues associated with emissions from industrial, commercial and mobile sources of air pollution. The CARB Handbook indicates that mobile sources continue to be the largest overall contributors to the State's air pollution problems, representing the greatest air pollution health risk to most Californians. The most serious pollutants on a statewide basis include diesel exhaust particulate matter (diesel PM), benzene, and 1,3-butadiene, all of which are emitted by motor vehicles. These mobile source air toxics are largely associated with freeways and high traffic roads. Non-mobile source air toxics are largely associated with industrial and commercial uses. Table 5 shows the CARB minimum separation recommendations on siting sensitive land uses.

The project site is not within 500 feet of any highway or interstate (State Route 180 is located more than 9,150 feet [1.7 miles] southwest of the project site). Therefore, the site lies beyond the CARB-recommended buffer area, and future receptors would not be negatively affected by toxic air contaminants generated on a highway or interstate. In addition, there are no distribution centers, rail yards, ports, refineries, chrome platers, dry cleaners, or gasoline dispensing facilities located in the vicinity of the project site. There are no major stationary sources of toxic air contaminants identified in the vicinity of the development site that could potentially affect future on-site sensitive receptors. Therefore, development of the proposed project would not cause a substantial increase in exposure of sensitive receptors to localized concentrations of TACs.

Table 5: CARB Minimum Separation Recommendations on Siting Sensitive Land Uses

Source Category	***Advisory Recommendations***
Freeways/High-Traffic Roads	• Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Distribution Centers	• Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week). • Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points.
Rail Yards	• Avoid siting new sensitive land uses within 1,000 feet of a major service and maintenance rail yard. • Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	• Avoid siting of new sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult local air districts or the CARB on the status of pending analyses of health risks.
Refineries	• Avoid siting new sensitive land uses immediately downwind of petroleum refineries. Consult with local air districts and other local agencies to determine an appropriate separation.
Chrome Platers	• Avoid siting new sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloro-ethylene	• Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district. • Do not site new sensitive land uses in the same building with perc dry cleaning operations.
Gasoline Dispensing Facilities	• Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas dispensing facilities.

SOURCE: AIR QUALITY AND LAND USE HANDBOOK: A COMMUNITY HEALTH PERSPECTIVE (CARB 2005).

Odors

The project is not proposing a use which will create objectionable odors more obnoxious than the current surrounding non-residential uses. Examples of facilities that are known producers of odors include: Wastewater Treatment Facilities, Chemical Manufacturing, Sanitary Landfill, Fiberglass Manufacturing, Transfer Station, Painting/Coating Operations (e.g. auto body shops), Food Processing Facility, Petroleum Refinery, Asphalt Batch Plant, and Rendering Plant. The proposed project would develop 349 residential units and is not expected to produce nuisance odors. There are no facilities proximate to the project site that pose an odor nuisance concern.

Conclusion

At full build-out the proposed project would result in development which exceeds 50 residential units, which is an adopted threshold for conducting an Air Impact Assessment (AIA) in accordance with District Rule 9510 (Indirect Source Review).

Therefore, an AIA application will be submitted to the SJVAPCD for their review and approval.

District Rule 9510 was adopted to reduce the impact of NOx and provide emission reductions needed by the SJVAPCD to demonstrate attainment of the federal PM10 standard and contributed reductions that assist in attaining federal ozone standards. Rule 9510 also contributes toward attainment of state standards for these pollutants. The rule places application and emission reduction requirements on development projects meeting applicability criteria in order to reduce emissions through onsite mitigation, offsite SJVAPCD-administered projects, or a combination of the two. Compliance with SJVAPCD Rule 9510 reduces the emissions impacts through incorporation of onsite measures as well as payment of an offsite fee that funds emission reduction projects in the Air Basin. The emissions analysis for Rule 9510 is detailed and is dependent on the exact project design that is expected to be constructed or installed. Compliance with Rule 9510 is separate from the CEQA process, though the control measures used to comply with Rule 9510 may be used to mitigate significant air quality impacts.

The proposed use, if approved, will be allowed on the subject site and will not expose sensitive receptors to substantial pollutant concentrations. The project is not proposing a use which will create objectionable odors more obnoxious than the current surrounding residential uses. Therefore, there will be no impact related to odors.

The growth projections used for the Fresno General Plan assume that growth in population, vehicle use and other source categories will occur at historically robust rates that are consistent with the rates used to develop the SJVAPCD's attainment plans. In other words, the amount of growth predicted for the General Plan is accommodated by the SJVAPCD's attainment plan and would allow the air basin to attain the 8-hour ozone standard by the 2023 attainment date. Future development on the subject property is required to comply with these rules and regulations providing additional support for the conclusion that it will not interfere or obstruct with the application of the attainment plans.

Therefore, compliance with all of the above SJVAPCD Rules, Fresno General Plan policies and MEIR mitigation measures results in a less than significant impact on air quality with respect to air quality plans and standards and cumulative increases in criteria pollutants.

The proposed project will comply with the Resource Conservation Element of the Fresno General Plan and the Goals, Policies and Objectives of the Regional Transportation Plan adopted by the Fresno Council of Fresno County Governments; therefore, the project will not conflict with or obstruct an applicable air quality plan.

In conclusion, the proposed project would not result in any air quality environmental impacts beyond those analyzed in the MEIR SCH No. 2012111015.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES – Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		X		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?			X	
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?			X	
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			X	
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?			X	

The proposed project will not directly affect any sensitive, special status, or candidate species, nor would it modify any habitat that supports them.

Riparian habitat or any other sensitive natural community identified by the California Department of Fish and Game or the US Fish and Wildlife Service are not located on the subject property. In addition, no federally protected wetlands are located on the subject site. Therefore, there would be no impacts to riparian species or habitat or other sensitive wetland communities.

The project site contains orchard crops which are used for agricultural purposes, which based on its location, do not provide suitable habitat for any special-status plant species and limited habitat for special-status wildlife species.

Wildlife species that often occur within vacant fields include gophers, California ground squirrels, mourning dove, mockingbird, white-crowned sparrows, and ravens. Other wildlife that would be expected to occur within orchards would be similar to those occurring in adjacent ruderal habitats or agricultural fields.

Mammal species may also occur within intermittent fallow agricultural lands and on lands with broken topography similar to the subject property. These mammals could include: deer mice, house mice, pocket gopher and California ground squirrels. These species would occur in fluctuating numbers depending on the available cover in the individual fields. California ground squirrels are sometimes known to burrow complexes at the margins or within areas of some fields where annual disking may not reach. Other small mammals likely to occur from time to time may include black-tailed hares and cottontail rabbits.

The presence of birds and small mammals is an attractant to both foraging raptors, such as hawks and owls, and mammalian predators. Mammalian predators occurring on the site could include raccoons, coyotes, and red foxes, as these species are tolerant of human and other disturbance. Various species of bat may also forage over portions of the subject site for flying insects.

A number of special status species, such as San Joaquin kit fox, Swainson hawk, tricolored blackbird, California horned lark, pallid bat, hoary bat, and western mastiff bat have some potential as resident seasonal or transient inhabitant of habitats such as those which may be found on the site.

The federally endangered and California threatened San Joaquin kit fox once occurred throughout much of the San Joaquin Valley, but this species favored areas of alkali sink scrub and alkali grassland throughout the San Joaquin Valley and Tulare Basin, as well as areas further west. The low foothills of the Sierra Nevada at the eastern edge of the San Joaquin Valley is considered at the margin of their natural range.

The project site would not provide habitat for American badgers. This species is known to occur within areas with friable soils which support California ground squirrels and it prefers open habitats (herbaceous growth, shrubs or forest). Typically, loss of linkages to large tracks of open grassland minimizes the potential presence of this species. Large tracks of open grassland are not located in the project vicinity. Although some sparsely developed areas are currently located to the east and south of the site, the area to the east is currently being developed with residential uses. Additionally, there are only two documented occurrences of American badger within 15 miles of the project site, and the closest occurrence to the project site is located 1.8 miles to the northwest. It is highly unlikely that the project site is used by American badger.

The burrowing owl is a small, terrestrial owl of open prairie and grassland habitats. It inhabits relatively flat dry open grasslands where tree and shrub canopies provide minimal cover. This species is found in close association with California ground squirrels, using the abandoned burrows of these squirrels for shelter, roosting, and nesting. Burrowing owls are colonially nesting raptors, and colony size is indicative of habitat quality. It is not uncommon to find burrowing owls in developed and cultivated areas. The project site does not provide habitat for this species because the orchards provide cover for squirrels.

The Swainson hawk requires a supply of small mammals such as young ground squirrels as prey for nestlings and elevated perches for hunting. Therefore, it favors open and semi-open country over agricultural fields which may offer its prey too much cover. The Swainson hawk is considered to be generally tolerant of people and attracted to certain agricultural operations which disturb soils and displace prey which burrow or nest in those soils or from farm equipment which turn up insects. Such soil disturbances do regularly occur on the subject property. The project site is located in the vicinity of some existing sparsely developed lands to the south and east of the site, which may provide suitable foraging habitat for Swainson hawk. However, because the on-site orchards provide cover for prey, the project site provides low quality foraging habitat for this species, and this species is not likely to forage on-site.

Tricolored blackbirds nest in cattails, bulrushes, Himalaya berry, and agricultural silage, in areas that are flooded or otherwise defended against easy access by predators. Tricolored blackbirds forage away from nesting sites, and large colonies require large foraging areas; the birds eat insects, small fruits, seeds, and small aquatic life. Suitable habitat for foraging includes irrigated pasture, dry rangeland, and dairy operations providing successive harvest and flooding conditions. Orchards, row crops, and vineyards may occasionally and briefly be used as foraging habitat; however, these areas are not known to sustain breeding colonies. Tricolored blackbirds could occasionally forage over the project site; however, habitat suitable for nesting tricolored blackbirds is generally not found on the project site.

Horned larks, which feed on seeds and insects, are ground nesters. The frequent soil disturbance on the project site precludes the presence of this species.

Pallid bat, hoary bat, and western mastiff bat are relatively reclusive and are not expected to breed on the project site, but they may forage on or near the site from time to time. Hoary bats and western mastiff bats eat insects, while pallid bats eat insects, other invertebrates, and small vertebrates that they find on the ground or on vegetation. The project site would not constitute uniquely important habitat for these species.

Use of ruderal/nonnative grassland habitat by native terrestrial vertebrates is generally considered common in agricultural fields. This includes birds and small mammals which serve as an attractant to both foraging raptors, such as hawks and owls, and mammalian predators; as well as, those terrestrial and/or ground-nesting special status species preferring open prairie and/or grassland habitats.

Mitigation Measure MM BIO-1 of MEIR SCH No. 2012111015 for the Fresno General Plan requires construction of a proposed project to avoid, where possible, vegetation communities that provide suitable habitat for a special-status species known to occur within the Planning Area. If construction within potentially suitable habitat must occur, the presence/absence of any special-status plant or wildlife species must be determined prior to construction, to determine if the habitat supports any special-status species. If special-status species are determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible.

Furthermore, Mitigation Measure MM BIO-2 of MEIR SCH No. 2012111015 for the Fresno General Plan requires that any direct or incidental take of any state or federally listed species should be avoided to the greatest extent feasible. If construction of a proposed project will result in the direct or incidental take of a listed species, consultation with the resources agencies and/or additional permitting may be required. Agency consultation through the California Department of Fish and Wildlife (CDFW) 2081 and U.S. Fish and Wildlife Service (USFWS) Section 7 or Section 10 permitting processes must take place prior to any action that may result in the direct or incidental take of a listed species. Specific mitigation measures for direct or incidental impacts to a listed species will be determined through agency consultation.

Mitigation Measure MM BIO-4 of MEIR SCH No. 2012111015 for the Fresno General Plan requires projects within the Planning Area to avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA), if it is determined that suitable nesting habitat occurs on a project site. If construction cannot avoid the nesting season, a pre-construction clearance survey must be conducted to determine if any nesting birds or nesting activity is observed on or within 500-feet of a project site. If an active nest is observed during the survey, a biological monitor must be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer will be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities may continue in the vicinity of the nest only at the discretion of the biological monitor.

Natural communities of special concern are those that are of limited distribution, distinguished by significant biological diversity, home to special status plant and animal species, of importance in maintaining water quality or sustaining flows, etc. Examples of natural communities of special concern in the San Joaquin Valley could include: open, ruderal/nonnative grassland habitat, which is infrequently disturbed, vernal pools and various types of riparian forest. No natural communities of special concern were identified on the project site.

Wildlife movement corridors are areas where wildlife species regularly and predictably move during foraging, or during dispersal or migration. Movement corridors in California are typically associated with valleys, rivers and creeks supporting riparian vegetation, and ridgelines. Such geographic and topographic features are absent from the project site. Additionally, due to the presence of developed lands and urban uses surrounding the subject property, there is limited potential for project related activities to have an impact on the movement of wildlife species or established wildlife corridors. Compliance with the biological Mitigation Measures of MEIR SCH No. 2012111015 for the Fresno General Plan through preparation of a pre-construction biological survey prior to construction, to determine if the project site supports any special-status species. If a special-status species is determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible.

No habitat conservation plans or natural community conservation plans in the region pertain to natural resources that exist on the subject site or in its immediate vicinity.

Implementation of all Biological Resource related mitigation measures of MEIR SCH No. 2012111015 for the Fresno General Plan have been applied to the proposed project. Therefore, no actions or activities resulting from the implementation of the proposed project would have the potential to affect floral, or faunal species; or, their habitat. Therefore, there will be no impacts to Biological Resources.

In conclusion, with the MEIR and Project Specific Mitigation Measures incorporated the proposed project will not result in any biological resource impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the biological resources related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

2. The proposed project shall implement and incorporate the biological resources related mitigation measure as identified in the attached Project Specific Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
V. CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5?		X		
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?		X		
c) Disturb any human remains, including those interred outside of formal cemeteries?		X		

There are no structures which exist within the project area that are listed in the National or Local Register of Historic Places, and the subject site is not within a designated historic district. There are no known archaeological or paleontological resources that exist within the project area.

There is no evidence that cultural resources of any type (including historical, archaeological, paleontological, or unique geologic features) exist on the subject property. Nevertheless, there is some possibility that a buried site may exist in the area and be obscured by vegetation, fill, or other historic activities, leaving no surface evidence. Furthermore, previously unknown paleontological resources or undiscovered human remains could be disturbed during project construction.

Therefore, due to the ground disturbing activities that will occur as a result of the project, the measures within the MEIR SCH No. 2012111015 for the Fresno General Plan, Mitigation Monitoring Checklist to address archaeological resources, paleontological resources, and human remains will be employed to guarantee that should archaeological and/or animal fossil material be encountered during project excavations, then work shall stop immediately; and, that qualified professionals in the respective field are contacted and consulted in order to ensure that the activities of the proposed project will not involve physical demolition, destruction, relocation, or alteration of historic, archaeological, or paleontological resources.

Furthermore, as indicated within Section XVII, Tribal Cultural Resources, of this initial study, tribal consultation has occurred for the proposed project in compliance with AB 52 requirements. the Table Mountain Rancheria of California and Dumna Wo Wah Tribal Government were invited to consult under AB 52. The City of Fresno mailed notices of the proposed project to each of these tribes on December 31, 2018 which included the required 30-day time period for tribes to request consultation.

Under invitations to consult under AB 52, the Table Mountain Rancheria of California responded on February 5, 2019. The response letter notes that the Table Mountain Rancheria declines participation at this time, but would appreciate being notified in the unlikely event that cultural resources are identified.

In conclusion, with implementation of the MEIR Cultural Resource Mitigation measures and project specific mitigation measures related to Tribal Cultural Resources incorporated herein below, the project will not result in any cultural resource impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the cultural resource related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. ENERGY – Would the project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?			X	
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?			X	

Appendix F of the State CEQA Guidelines requires consideration of the potentially significant energy implications of a project. CEQA requires mitigation measures to reduce “wasteful, inefficient and unnecessary” energy usage (Public Resources Code Section 21100, subdivision [b][3]). According to Appendix F of the CEQA Guidelines, the means to achieve the goal of conserving energy include decreasing overall energy consumption, decreasing reliance on natural gas and oil, and increasing reliance on renewable energy sources. In particular, the proposed project would be considered “wasteful, inefficient, and unnecessary” if it were to violate state and federal energy standards and/or result in significant adverse impacts related to project energy requirements, energy inefficiencies, energy intensiveness of materials, cause significant impacts on local and regional energy supplies or generate requirements for additional capacity, fail to comply with existing energy standards, otherwise result in significant adverse impacts on energy resources, or conflict or create an inconsistency with applicable plan, policy, or regulation.

The proposed project includes the construction of 349 residential units on the 57.3-acre project site. The project includes a range of home types, home sizes, and yard sizes. The project would include seven storm drain outlet/open space areas throughout the project site, for a total of approximately 1.52 acres. Development of the project would also require demolition of one existing on-site building. The project also includes on-site parking, landscaping, and infrastructure improvements.

The amount of energy used at the project site would directly correlate to the size of the proposed buildings, the energy consumption of associated appliances and technology, and outdoor lighting. Other major sources of proposed project energy consumption include fuel used by vehicle trips generated during project construction and operation, and fuel used by off-road construction vehicles during construction.

The following discussion provides calculated levels of energy use expected for the proposed project, based on commonly used modelling software (i.e. CalEEMod v.2016.3.2 and the California Air Resource Board's EMFAC2014). It should be noted that many of the assumptions provided by CalEEMod are conservative relative to the proposed project. Therefore, this discussion provides a conservative estimate of proposed project emissions.

Electricity and Natural Gas

Electricity and natural gas used by the proposed project would be used primarily to power on-site buildings. Total annual electricity (kWh) and natural gas (kBTU) usage associated with the operation of the proposed project are shown in Table 6, below (as provided by CalEEMod).

Table 6: Project Operational Natural Gas and Electricity Usage

Emissions[(a)]	***Natural Gas (kBTU/year)***	***Electricity (kWh/year)***
Residential – Single Family Housing	7,950,880	2,856,850

SOURCE: CALEEMOD (V.2016.3.2).

According to Calico's *Appendix A: Calculation Details for CalEEMod*, CalEEMod uses the California Commercial End Use Survey (CEUS) database to develop energy intensity value for non-residential buildings. The energy use from residential land uses is calculated based on the Residential Appliance Saturation Survey (RASS). Similar to CEUS, this is a comprehensive energy use assessment that includes the end use for various climate zones in California.

As shown in Table 6, the project would use approximately 7,950,880 kBTU of natural gas per year and approximately 2,856,850 kWh of electricity per year.

On-Road Vehicles (Operation)

The proposed project would generate vehicle trips during its operational phase. The Residential – Single Family Housing CalEEMod land use and subtype were used for the proposed project. See Appendix A for the CalEEMod assumptions and detailed energy calculations. The Institute of Transportation Engineers (ITE) Trip Generation Manual land use description/code which corresponds to the Residential – Single Family Housing CalEEMod land use and subtype is "Single Family Detached Housing/210". The Traffic Impact Study prepared for the project (ND Engineering, PC, 2019) utilizes the Single Family Detached Housing ITE trip generation rates to determine how many vehicle trips would result from operation of the proposed residential uses. Using this ITE code and corresponding trip generation rate used in the Traffic Impact Study, the project would generate approximately 3,295 new daily vehicles trips. In order to calculate operational on-road vehicle energy usage and emissions, default trip lengths generated by CalEEMod were used, which are based on the project location and urbanization level parameters selected within CalEEMod (i.e. "SJVAPCD" project location and "Urban" setting, respectively). These values are provided by the individual districts or use a default average for the state, depending on the location of the proposed project (CAPCOA, 2017).

Based on default factors provided by CalEEMod, the average distance per trip was conservatively calculated to be approximately 9.45 miles. Therefore, the proposed project would generate at total of approximately 336,181 average daily vehicle miles travelled (Average Daily VMT). Using fleet mix data provide by CalEEMod (v2016.3.2), and Year 2021 gasoline and diesel MPG (miles per gallon) factors for individual vehicle classes as provided by EMFAC2014, De Novo derived weighted MPG factors for operational on-road vehicles of approximately 26.5 MPG for gasoline and 7.8 MPG for diesel vehicles. With this information, De Novo calculated as a conservative estimate that the unmitigated proposed project would generate vehicle trips that would use a total of approximately 10,619 gallons of gasoline and 7,047 gallons of diesel fuel per day, on average, or 3,876,115 gallons of gasoline and 2,572,025 annual gallons of diesel fuel per year.

On-Road Vehicles (Construction)

The proposed project would also generate on-road vehicle trips during project construction (from construction workers and vendors). Estimates of vehicle fuel consumed were derived based on the assumed construction schedule, vehicle trip lengths and number of workers per construction phase as provided by CalEEMod, and Year 2021 gasoline MPG factors provided by EMFAC2014. For the purposes of simplicity, it was assumed that all vehicles used gasoline as a fuel source (as opposed to diesel fuel or alternative sources). Table 7 describes gasoline and diesel fuel used by on-road mobile sources during each phase of the construction schedule.

Table 7: On-Road Mobile Fuel Generated by Project Construction Activities – By Phase

Construction Phase	***# of Days***	***Total Daily Worker Trips[a]***	***Total Daily Vendor Trips[a]***	***Total Daily Hauler Trips[a]***	***Gallons of Gasoline Fuel[b]***	***Gallons of Diesel Fuel[b]***
Demolition	5	15	-	47	31	690
Site Preparation	40	18	-	-	298	-
Grading	110	20	-	-	911	-
Building Construction	1,110	126	37	-	57,940	44,025
Paving	75	15	-	-	466	-
Architectural Coating	75	25	-	-	777	-
Total	**N/A**	**N/A**	**N/A**	**N/A**	**60,423**	**44,715**

NOTE: [A] PROVIDED BY CALEEMOD. [B]SEE APPENDIX A FOR FURTHER DETAIL.
SOURCE: CALEEMOD (V.2016.3.2); EMFAC2014.

As shown, the vast majority of on-road mobile vehicle fuel used during the construction of the proposed project would occur during the building construction phase. See Appendix A for a detailed calculation.

Off-Road Vehicles (Construction)

Off-road construction vehicles would use diesel fuel during the construction phase of the proposed project. A non-exhaustive list of off-road constructive vehicles expected to be used during the construction phase of the proposed project includes: cranes, forklifts, generator sets, tractors, excavators, and dozers. Based on the total amount of CO_2 emissions expected to be generated by the proposed project (as provided by the CalEEMod output), and a CO_2 to diesel fuel conversion factor (provided by the U.S. Energy Information Administration), the proposed project would use a total of approximately 37,256 gallons of diesel fuel for off-road construction vehicles (during the site preparation and grading phases of the proposed project). Detailed calculations are provided in Appendix A.

Other

Proposed project landscape maintenance activities would generally require the use fossil fuel (i.e. gasoline) energy. For example, lawn mowers require the use of fuel for power. As an approximation, it is estimated that landscape care maintenance would require approximately two individuals one full day (8 hours) per week, or 832 hours per year. Assuming an average of approximately 0.5 gallons of gasoline used per person-hour, the proposed project would require the use of approximately 416 gallons of gasoline per year to power landscape maintenance equipment. The energy used to power landscape maintenance equipment would not differ substantially from the energy required for landscape maintenance for similar project.

Conclusion

The proposed project would use energy resources for the operation of project buildings (electricity and natural gas), for on-road vehicle trips (e.g. gasoline and diesel fuel) generated by the proposed project, and from off-road construction activities associated with the proposed project (e.g. diesel fuel). Each of these activities would require the use of energy resources. The proposed project would be responsible for conserving energy, to the extent feasible, and relies heavily on reducing per capita energy consumption to achieve this goal, including through State-wide and local measures.

The proposed project would be in compliance with all applicable Federal, State, and local regulations regulating energy usage. For example, PG&E is responsible for the mix of energy resources used to provide electricity for its customers, and it is in the process of implementing the State-wide Renewable Portfolio Standard (RPS) to increase the proportion of renewable energy (e.g. solar and wind) within its energy portfolio. PG&E is expected to achieve at least a 33% mix of renewable energy resources by 2020, and 50% by 2030. Additionally, energy-saving regulations, including the latest State Title 24 building energy efficiency standards (“part 6”), would be applicable to the proposed project. Other State-wide measures, including those intended to improve the energy efficiency of the State-wide passenger and heavy-duty truck vehicle fleet (e.g. the Pavley Bill and the Low Carbon Fuel Standard), would improve vehicle fuel economies, thereby conserving gasoline and diesel fuel. These energy savings would continue to accrue over time.

As a result, the proposed project would not result in any significant adverse impacts related to project energy requirements, energy use inefficiencies, and/or the energy intensiveness of materials by amount and fuel type for each stage of the project including construction, operations, maintenance, and/or removal. PG&E, the electricity and natural gas provider to the site, maintains sufficient capacity to serve the proposed project. The proposed project would comply with all existing energy standards, and would not result in significant adverse impacts on energy resources. For these reasons, the proposed project would not be expected to cause an inefficient, wasteful, or unnecessary use of energy resources nor cause a significant impact on any of the threshold as described by Appendix F of the *CEQA Guidelines*.

In conclusion, energy impacts would be considered less than significant.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
VII. GEOLOGY AND SOILS – Would the project:				
a) Directly or Indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:			X	
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			X	
ii) Strong seismic ground shaking?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
iii) Seismic-related ground failure, including liquefaction?			X	
iv) Landslides?			X	
b) Result in substantial soil erosion or the loss of topsoil?			X	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			X	
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?			X	
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?			X	
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			X	

There are no geologic hazards or unstable soil conditions known to exist on the site. The existing topography is relatively flat with no apparent unique or significant land forms such as vernal pools. Development of the property requires compliance with grading and drainage standards of the City of Fresno. A civil engineer or soils engineer registered in this state shall complete a Soils Investigation and Evaluation Report. The investigation will address the detail of the configuration, location, type of loading of the proposed structures and drainage plan. The report shall provide detailed recommendation for foundations, drainage, and other items. The preparation of the Soils Investigation and Evaluation Report is an existing standard.

Fresno has no known active earthquake faults and is not in any Alquist-Priolo Special Studies Zones. The immediate Fresno area has extremely low seismic activity levels, although shaking may be felt from earthquakes whose epicenters lie to the east, west, and south. Known major faults are over 50 miles distant and include the San Andreas Fault, Coalinga area blind thrust fault(s), and the Long Valley, Owens Valley, and White Wolf/Tehachapi fault systems. The most serious threat to Fresno from a major earthquake in the Eastern Sierra would be flooding that could be caused by damage to dams on the upper reaches of the San Joaquin River.

Fresno is classified by the State as being in a moderate seismic risk zone, Category “C” or “D,” depending on the soils underlying the specific location being categorized and that location’s proximity to the nearest known fault lines. All new structures are required to conform to current seismic protection standards in the California Building Code. Seismic upgrade/retrofit requirements are imposed on older structures by the City’s Planning and Development Department as may be applicable to building modification and rehabilitation projects.

Landslides include rockfalls, deep slope failure, and shallow slope failure. Factors such as the geological conditions, drainage, slope, vegetation, and others directly affect the potential for landslides. One of the most common causes of landslides is construction activity that is associated with road building (i.e. cut and fill). The project site is relatively flat; therefore, the potential for a landslide in the project site is essentially non-existent.

No adverse environmental effects related to topography, soils or geology are expected as a result of this project.

As noted previously, there are no known paleontological resources that exist within the project area. Nevertheless, previously unknown paleontological resources could be disturbed during project construction. Therefore, due to the ground disturbing activities that will occur as a result of the project, the measures within the MEIR SCH No. 2012111015 for the Fresno General Plan, Mitigation Monitoring Checklist to address archaeological resources, paleontological resources, and human remains will be employed to guarantee that should archaeological and/or animal fossil material be encountered during project excavations, then work shall stop immediately; and, that qualified professionals in the respective field are contacted and consulted in order to ensure that the activities of the proposed project will not involve physical demolition, destruction, relocation, or alteration of historic, archaeological, or paleontological resources.

In conclusion, the proposed project would not result in any geology or soil environmental impacts beyond those analyzed in MEIR SCH No. 2012111015.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS – Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			X	
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			X	

Background

Various gases in the Earth's atmosphere, classified as atmospheric greenhouse gases (GHGs), play a critical role in determining the Earth's surface temperature. Solar radiation enters Earth's atmosphere from space, and a portion of the radiation is absorbed by the Earth's surface. The Earth emits this radiation back toward space, but the properties of the radiation change from high-frequency solar radiation to lower-frequency infrared radiation.

Naturally occurring greenhouse gases include water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and ozone (O_3). Several classes of halogenated substances that contain fluorine, chlorine, or bromine are also greenhouse gases, but they are, for the most part, solely a product of industrial activities. Although the direct greenhouse gases CO_2, CH_4, and N_2O occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. From the pre-industrial era (i.e., ending about 1750) to 2011, concentrations of these three greenhouse gases have increased globally by 40, 150, and 20 percent, respectively (Intergovernmental Panel on Climate Change [IPCC], 2013).

Greenhouse gases, which are transparent to solar radiation, are effective in absorbing infrared radiation. As a result, this radiation that otherwise would have escaped back into space is now retained, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect. Among the prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), ozone (O_3), water vapor, nitrous oxide (N_2O), and chlorofluorocarbons (CFCs).

The emissions from a single project will not cause global climate change, however, GHG emissions from multiple projects throughout the world could result in a cumulative impact with respect to global climate change. Therefore, the analysis of GHGs and climate change presented in this section is presented in terms of the proposed project's contribution to cumulative impacts and potential to result in cumulatively considerable impacts related to GHGs and climate change.

Cumulative impacts are the collective impacts of one or more past, present, and future projects that, when combined, result in adverse changes to the environment. In determining the significance of a proposed project's contribution to anticipated adverse future conditions, a lead agency should generally undertake a two-step analysis. The first question is whether the *combined* effects from *both* the proposed project *and* other projects would be cumulatively significant. If the agency answers this inquiry in the affirmative, the second question is whether "the proposed project's *incremental* effects are cumulatively considerable" and thus significant in and of themselves. The cumulative project list for this issue (climate change) comprises anthropogenic (i.e., human-made) GHG emissions sources across the globe and no project alone would reasonably be expected to contribute to a noticeable incremental change to the global climate. However, legislation and executive orders on the subject of climate change in California have established a statewide context and process for developing an enforceable statewide cap on GHG emissions. Given the nature of environmental consequences from GHGs and global climate change, CEQA requires that lead agencies consider evaluating the cumulative impacts of GHGs. Small contributions to this cumulative impact (from which significant effects are occurring and are expected to worsen over time) may be potentially considerable and, therefore, significant.

Significance Thresholds

Governor's Office of Planning and Research's (OPR's) Guidance does not include a quantitative threshold of significance to use for assessing a project's GHG emissions under CEQA. Moreover, the California Air Resources Board (CARB) has not established such a threshold or recommended a method for setting a threshold for project-level analysis. In the absence of a consistent statewide threshold, a threshold of significance for analyzing the project's GHG emissions was developed. The issue of setting a GHG threshold is complex and dynamic, especially in light of the California Supreme Court decision in *Center for Biological Diversity v. California Department of Fish and Wildlife* (referred to as the Newhall Ranch decision hereafter). The California Supreme Court ruling also highlighted the need for the threshold to be tailored to the specific project type, its location, and the surrounding setting. Therefore, the threshold used to analyze the project is specific to the analysis herein and the City retains the ability to develop and/or use different thresholds of significance for other projects in its capacity as lead agency and recognizing the need for the individual threshold to be tailored and specific to individual projects.

The SJVAPCD provides guidance for addressing GHG emissions under CEQA. The SJVAPCD guidance regarding evaluating GHG significance notes that if a project complies with an adopted statewide, regional, or local plan for reduction or mitigation of GHG emissions, then impacts related to GHGs would be less than significant. The applicable plan for reduction or mitigation of GHG emissions for the proposed project is the Manteca Climate Action Plan. Additionally, the SJVAPCD requires quantification of GHG emissions for all projects which the lead agency has determined that an EIR is required. Although an EIR is not required for the proposed project, the GHG emissions are quantified below, followed by a consistency analysis with the Fresno Council of Governments Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) and the Fresno Greenhouse Gas Reduction Plan.

Responses to Checklist Questions

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the industrial/manufacturing, utility, transportation, residential, and agricultural sectors. Therefore, the cumulative global emissions of GHGs contributing to global climate change can be attributed to every nation, region, and city, and virtually every individual on Earth. A project's GHG emissions are at a micro-scale relative to global emissions, but could result in a cumulatively considerable incremental contribution to a significant cumulative macro-scale impact. Implementation of the proposed project would contribute to increases of GHG emissions that are associated with global climate change. Estimated GHG emissions attributable to future development would be primarily associated with increases of CO_2 and other GHG pollutants, such as CH_4 and N_2O, from mobile sources and utility usage.

The proposed project's short-term construction-related and long-term operational GHG emissions for Buildout of the proposed Project, were estimated using CalEEMod™ (v.2016.3.2). CalEEMod is a statewide model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify GHG emissions from land use projects. The model quantifies direct GHG emissions from construction and operation (including vehicle use), as well as indirect GHG emissions, such as GHG emissions from energy use, solid waste disposal, vegetation planting and/or removal, and water use. Emissions are expressed in annual metric tons of CO_2 equivalent units of measure (i.e., $MTCO_2e$), based on the global warming potential of the individual pollutants.

Short-Term Construction GHG Emissions

Estimated increases in GHG emissions associated with construction of the proposed project are summarized in Table 8.

Table 8: Construction GHG Emissions (Unmitigated Metric Tons Per Year)

Year	Bio-CO_2	NBio-CO_2	Total CO_2	CH_4	N_2O	CO_2e
2019	0.0000	10.7407	10.7407	2.5200e-003	0.0000	10.8037
2020	0.0000	554.2369	554.2369	0.1470	0.0000	557.9113
2021	0.0000	545.4001	545.4001	0.0858	0.0000	547.5451
2022	0.0000	538.1735	538.1735	0.0843	0.0000	540.2814
2023	0.0000	531.0958	531.0958	0.0806	0.0000	533.1102
2024	0.0000	513.6608	513.6608	0.0809	0.0000	515.6838
2025	0.0000	75.7885	75.7885	0.0195	0.0000	76.2750
Maximum	**0.0000**	**554.2369**	**554.2369**	**0.1470**	**0.0000**	**557.9113**

SOURCE: CALEEMOD (V.2016.3.2).

As presented in the table, maximum short-term annual construction emissions of GHG associated with development of the project are estimated to be 557.9113 $MTCO_2e$ (2020) with a low of 10.8037 $MTCO_2e$ (2019) emitted. These construction GHG emissions are a one-time release and are comparatively much lower than emissions associated with operational phases of a project. Cumulatively, these construction emissions would not generate a significant contribution to global climate change.

Long-Term Operational GHG Emissions

The long-term operational emissions estimate for buildout of the proposed project, incorporates the potential area source and vehicle emissions, and emissions associated with utility and water usage, and wastewater and solid waste generation. The modeling included the following inputs for the year 2021 (it should be noted that the following listed inputs are considered 'mitigation' in CalEEMod, even though they reflect project characteristics):

Traffic

- Project Setting: Low Density Suburban
- Increase Density: 349 du/57.3 ac = 6.10 du/ac
- Increase Destination Accessibility: Distance to Downtown/Job Center is 7.1 miles (from project site to downtown Fresno)
- Increase Transit Accessibility: Distance to Transit is 1.26 miles (Fresno Area Express Route 45 has a stop at Shields / Business Park)
- Improve Pedestrian Network: Project Site and Connecting Off-Site (project includes connections from the site to the adjacent shopping center)

Area

- Only Natural Gas Hearth (Per SJVAPCD Rule 4901: Wood-Burning Fireplaces and Wood-Burning Heaters, open-hearth fireplaces are not allowed in new construction projects which would result in more than two homes per acre. The proposed project includes more than two homes per acre.)

The traffic-related impacts listed above are characteristics of the proposed project development and project location. For example, the proposed project is located in a low density suburban setting approximately 7.1 miles from a job center (downtown Fresno). The project site is also approximately 1.26 miles from a Fresno Area Express Route 45 but stop (located at Shields Avenue / Business Park Avenue). Further, the proposed project would include development of sidewalks throughout the internal roadway system and connecting to the off-site adjacent (existing and future) developments. Lastly, per SJVAPCD Rule 4901, the proposed residences would not include wood burning fireplaces or wood burning heaters.

Estimated GHG emissions associated with the buildout of the proposed project is summarized in Table 9. As shown in the following table, the annual GHG emissions associated with buildout of the proposed project would be 6,630.8662 $MTCO_2e$.

Table 9: Operational GHG Emissions 2021 (Metric Tons Per Year)

Category	***Bio-CO_2***	***NBio-CO_2***	***Total CO_2***	***CH_4***	***N_2O***	***CO_2e***
Area	0.0000	155.4223	155.4223	7.0000e-003	2.7700e-003	156.4233
Energy	0.0000	881.3993	881.3993	0.0488	0.0171	887.7111
Mobile	0.0000	5,312.4896	5,312.4896	0.3658	0.0000	5,321.6351
Waste	85.2339	0.0000	85.2339	5.0372	0.0000	211.1633
Water	7.2140	22.7847	29.9987	0.7432	0.0180	53.9333
Total	**92.4478**	**6,372.0960**	**6,464.5438**	**6.2020**	**0.0378**	**6,630.8662**

SOURCE: CALEEMOD (V.2016.3.2).

Fresno Council of Governments RTP/SCS

The Fresno Council of Governments adopted the RTP/SCS in July 2018. The RTP/SCS comprehensively assesses all forms of transportation available in Fresno County as well as travel and goods movement needs through 2042. The RTP/SCS is required by Senate Bill 375. The 2018 RTP reflects the federal directives embodied in both the Fixing America's Surface Transportation Act (FAST Act) and the Clean Air Act Amendments of 1991. These acts require that projects in RTPs be "constrained" to only those that can actually be delivered with reasonably expected funds, and that those projects help attain and maintain air quality standards. The RTP contains four main required elements that are discussed below. However, the Fresno Council of Governments RTP includes additional elements or chapters regarding the regional context of the RTP, public participation, environmental justice analysis and transportation performance management.

Chapter 2 of the RTP/SCS contains goals, objectives, and policies in order to address the transportation needs of the Fresno region and quantify regional needs in the 25-year planning horizon. One of the policies in Table 2-1A of the RTP/SCS aims to provide for efficient, multi-destination trips through the coordination of urban and rural public transportation. Another policy aims to provide a transit system that meets the public transportation needs of the service area. The project site is approximately 1.26 miles from a Fresno Area Express Route 45 but stop (located at Shields Avenue / Business Park Avenue). Route 45 has stops in eastern, central, and western Fresno. This route stops at or near the following points of interest: Army Navy Reserve, Manchester Transit Center, Fresno City College, Fresno High School, Gillis Library, and Bullard High School. Therefore, the proposed project would be located in an area that is currently served by Fresno Area Express. Another goal in Table 2-1H of the RTP/SCS aims to achieve a safe transportation system for all motorized and non-motorized users on all public roads in Fresno County. The project would include sidewalks on the internal streets to facilitate non-motorized travel.

As demonstrated above, the proposed project would be generally consistent with the goals and strategies of the RTP/SCS.

Fresno Greenhouse Gas Reduction Plan

The City's General Plan includes a Greenhouse Gas Reduction Plan. The Greenhouse Gas Reduction Plan provides a comprehensive assessment of the benefits of these General Plan and Development Code Update policies along with existing plans, programs, and initiatives that reduce greenhouse gas emissions. In addition, the Greenhouse Gas Reduction Plan includes an emission reduction target for demonstrating consistency with State GHG reduction targets.

The General Plan and MEIR rely upon a Greenhouse Gas Reduction Plan that provides a comprehensive assessment of the benefits of city policies and proposed code changes, existing plans, programs, and initiatives that reduce greenhouse gas emissions. The plan demonstrates that even though there is increased growth, the City would still be reducing greenhouse gas emissions through 2020 and per capita emission rates drop substantially. The benefits of adopted regulations become flat in later years and growth starts to exceed the reductions from all regulations and measures. Although it is highly likely that regulations will be updated to provide additional reductions, none are reflected in the analysis since only the effect of adopted regulations is included.

The City's General Plan designates the project area as Neighborhood Park/Medium Density Residential (approximately 9.34 acres), Medium Density Residential (approximately 24.96 acres), Medium Low Density Residential (approximately 23.0 acres) and Low Density Residential (11.85 acres). The Medium Density Residential designation allows for residential densities of 5 to 12 dwelling units per acre. The Medium Low Density Residential designation allows for residential densities of 3.5 to 6 dwelling units per acre. The Low Density Residential designation allows for residential densities of 1.0 to 3.5 dwelling units per acre. Therefore, the City's General Plan anticipated up to 9.34 acres of park or up to 112 Medium Density Residential units (on the land designated Neighborhood Park/Medium Density Residential), up to 299 Medium Density Residential units (on the land designated Medium Density Residential), up to 138 units (on the land designated Medium Low Density Residential), and up to 41 units (on the land designated Low Density Residential). This would result in a total of up to 9.34 acres of park and up to 478 units, or 0.0 acres of park and up to 590 units. This would result in an associated population of 1,529 to 1,888 persons within the project area. The analysis included in the City's General Plan MEIR assumed that the site would be developed with Neighborhood Park/Medium Density Residential, Medium Density Residential, and Medium Low Density Residential uses. The project would not increase development beyond the level assumed for the site in the City's General Plan MEIR and the associated Greenhouse Gas Reduction Plan. Because the Greenhouse Gas Reduction Plan analyzed the Fresno General Plan land use capacity, the GHG emissions resulting from the proposed project (i.e., 6,630.8662 $MTCO_2e$ during operation and a maximum of 557.9113 $MTCO_2e$ during construction [2020]) would be less than anticipated in the Greenhouse Gas Reduction Plan.

Conclusion

The maximum short-term annual construction emissions of GHG associated with development of the project are estimated to be 557.9113 $MTCO_2e$ (2020) with a low of 10.8037 $MTCO_2e$ (2019) emitted. As stated previously, short-term construction GHG emissions are a one-time release of GHGs and are not expected to significantly contribute to global climate change over the lifetime of the proposed project. The annual operational GHG emissions associated with buildout of the proposed project would be 6,630.8662 $MTCO_2e$. Additionally, the project would be generally consistent with the goals and policies of the Fresno Council of Governments RTP/SCS and the Fresno Greenhouse Gas Reduction Plan.

The proposed project will not occur at a scale or scope with potential to contribute substantially or cumulatively to the generation of greenhouse gas emissions, either directly or indirectly, or conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
IX. HAZARDS AND HAZARDOUS MATERIAL – Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?		X		
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?			X	
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?			X	
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?			X	
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?			X	

There are no known existing hazardous material conditions on the property and the property is not included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. The project itself will not generate or use hazardous materials in a manner outside health department requirements.

The subject property is not located within any wildland fire hazard zones.

The proposed project incorporates six access points, which will be utilized for purposes of emergency vehicle access.

As shown in historical aerial photographs available on Google Earth, the project site has been planted with orchard type agricultural uses since at least 1998. A single-family home and associated structure were previously located south of the existing agricultural building. The single-family home and associated structure were demolished by April 2014.

The agricultural structure on the site will be removed prior to any construction. Demolition of the structure will require evaluation for asbestos and lead containing materials. If such materials are present in the demolition of the structures, special demolition and disposal practices are required in accordance with state regulations to ensure their safe handling.

According to GeoTracker, one site is located in the project vicinity. The Private Residence Site (Site # T0601900332) is a Leaking Underground Storage Tank (LUST) Cleanup Site with a cleanup status of Open – Site Assessment as of November 15, 2011. This site is located approximately 0.4 miles northeast of the project site. The case was opened following an unauthorized release from an underground storage tank system at the subject site. The Fresno County Department of Health referred the case to the Central Valley Regional Water Quality Control Board in October 2008. The Central Valley Regional Water Quality Control Board has directed a site investigation for this case. No other hazardous sites are documented in the immediate project vicinity.

The proposed project is within Fresno Yosemite Airport Safety Zone 6 – Traffic Pattern Zone as identified in the Fresno County Airport Land Use Compatibility Plan Exhibit D8.

The proposed project will be considered by the Airport Land Use Commission August 12, 2019. Consideration by the Commission will ensure that the proposed project would not result in a safety hazard for people residing or working in the project area.

The project area is not located in an FAA-designated Runway Protection Zone, Inner Safety Zone and Sideline Safety Zone according to review of the Downtown Fresno Chandler Airport Maps. Based upon the goals of the proposed project, no potential interference with an adopted emergency response or evacuation plan has been identified.

In conclusion, with the MEIR and Project Specific Mitigation Measures incorporated the proposed project will not result in any hazards and hazardous material impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

2. The proposed project shall implement and incorporate, as applicable, the hazards and hazardous material related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

3. The proposed project shall implement and incorporate the hazards and hazardous material related mitigation measure as identified in the attached Project Specific Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. HYDROLOGY AND WATER QUALITY – Would the project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?		X		

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			X	
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:			X	
i) Result in a substantial erosion or siltation on- or off-site;		X		
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site:		X		
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or		X		
iv) impede or redirect flood flows?			X	
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?			X	

On January 17, 2014, the Governor of California, proclaimed a State of Emergency in the State of California due to severe drought conditions. On April 25, 2014 and April 1, 2015, the Governor signed Executive Orders directing the State Water Resources Control Board ("State Water Board") to adopt emergency regulations to ensure urban water suppliers implement drought response plans to limit outdoor irrigation and other wasteful water practices. California Water Code Section 1058.5 grants the State Water Board the authority to adopt emergency regulations during a period when the Governor has issued a proclamation of emergency based upon drought conditions or in response to drought conditions that exist, or are threatened, in a critically dry year immediately preceded by two or more consecutive below normal, dry, or critically dry years.

On July 15, 2014, the State Water Board adopted an emergency regulation for urban water conservation requiring each urban water supplier to implement the stage of its water shortage contingency plan that imposes restrictions on outdoor irrigation, which resulted in the City of Fresno implementing Stage 2 of its Water Shortage Contingency Plan.

On May 5, 2015, the State Water Board adopted additional emergency regulations for urban water conservation, requiring the City of Fresno to reduce its water usage by 28% compared to 2013 and impose additional prohibitions on water use beginning June 1, 2015, through February 28, 2016. In 2015, the City of Fresno implemented additional water conservation measures resulting in 23% reduction in the City's water usage in 2015 and 2016.

On August 29, 2016, the Governor signed into law SB 814, which required the City of Fresno to define "excessive use" regarding water usage, and to establish a method to identify and discourage excessive water use.

California received record precipitation in the winter of 2017, resulting in mountain snowpack at 164% of the season average and on April 7, 2017, the Governor declared an end to California's drought emergency for all but Fresno, Kings, Tulare, and Tuolumne Counties in the state of California by Executive Order B-40-17. Executive Order B-40-17 directed the State Water Board to make permanent prohibitions on certain practices which do not conserve water.

On April 26, 2017, the State Water Board rescinded mandatory water conservation standards statewide, but left in effect prohibitions on certain water uses and required certain water conservation activities at all times in the City of Fresno comports with the Governor's Executive Order. In October, 2017, the City of Fresno amended the FMC to update specific prohibitions against wasteful water use practices to comport with state regulations, established a new definition for excessive water use, updated outdoor watering restrictions based on drought stage declarations, and changed the enforcement fine schedule for violations of prohibited water use practices. The City of Fresno adopted further water conservation revisions to the FMC in April, 2019, defining Excessive Water Use for customers in single-family residences or multi-unit housing in which each unit is individually metered or sub-metered, as using potable water in excess of the maximum gallons per hour, depending on the City's current Water Shortage Contingency Plan stage, during days or hours when outdoor irrigation is prohibited, more than one day during the monthly billing period, as recorded by the City. The maximum gallons per hour are: Stage 1 - 400 gallons per hour recommended. Stage 2 - 400 gallons per hour. Stage 3 - 350 gallons per hour. Stage 4 - 300 gallons per hour.

Fresno is one of the largest cities in the United States that still maintains a significant reliance on groundwater as part of its public water supply portfolio. Surface water treatment and distribution has been implemented in the northeastern part of the City since 2004 and in the southeastern part of the City in 2018, but the City is still subject to an EPA Sole Source Aquifer designation. While the aquifer underlying Fresno typically exceeds a depth of 300-feet and is capacious enough to provide adequate quantities of safe drinking water to the metropolitan area well into the twenty-first century, groundwater degradation, increasingly stringent water quality regulations, and an historic trend of high consumptive use of water on a per capita basis (currently 205 gallons per day per capita), have resulted in a general decline in aquifer levels, increased cost to provide potable water, and localized water supply limitations.

The City's groundwater aquifer has been documented by the State Department of Water Resources (Bulletin 118 - Interim Update 2016) to be critically over-drafted, and has been designated a high-priority basin for corrective action through the Sustainable Groundwater Management Act (SGMA).

Adverse groundwater conditions of limited supply and compromised quality have been well documented by planning, environmental impact report and technical studies over the past 20 years including the Master Environmental Impact Report No. 2012111015 for the Fresno General Plan, the MEIR 10130 for the 2025 Fresno General Plan, Final EIR No.10100, Final EIR No.10117 and Final EIR No. SCH 95022029 (Fresno Metropolitan Water Resource Management Plan), et al. These conditions include water quality degradation due to contamination from 1,2-dibromo-3-chloropropane (DBCP), ethylene-dibromide (EDB), trichloroethylene (TCE), 1,2,3-trichloropropane (TCP), tetrachloroethylene (PCE), 1,1-dichloroethane (DCE), nitrate, and from naturally occurring arsenic, iron, manganese, and radon concentrations; low water well yields in some parts of the City; limited aquifer storage capacity from over-utilization; limited recharge activities; and, intensive urban or semi-urban development occurring up-gradient from the Fresno Metropolitan Area.

This mitigated negative declaration prepared for the proposed project is tiered from MEIR SCH No. 2012111015 prepared for the Fresno General Plan, which contains measures to mitigate projects' individual and cumulative impacts to groundwater resources and to reverse the groundwater basin's overdraft conditions.

The City of Fresno is actively addressing these issues through citywide metering and updating water use targets and the water shortage contingency plan in the City's Urban Water Management Plan (UWMP). The Fresno Metropolitan Water Resource Management Plan, which has been adopted and the accompanying Final EIR (SCH #95022029) certified. The purpose of these management plans is to provide safe, adequate, and dependable water supplies in order to adequately meet existing and the future needs of the metropolitan area in an economical manner; protect groundwater quality from further degradation and overdraft; and, provide a plan of reasonably implementable measures and facilities. City water wells, pump stations, recharge facilities, water treatment and distribution systems have been expanded incrementally to mitigate increased water demands and respond to groundwater quality challenges.

In response to the need for a comprehensive long-range water supply and distribution strategy, the Fresno General Plan recognizes regional water resource planning efforts, such as, the Kings Basin's Integrated Regional Water Management Plan, the Fresno-Area Regional Groundwater Management Plan, and City of Fresno Metropolitan Water Resource Management Plan and cites the findings of the City of Fresno 2010 UWMP. The purpose of these management plans is to provide safe, adequate, and dependable water supplies on order to adequately meet existing and future needs of the Kings Basin regions and the Fresno-Clovis metropolitan area in an economical manner; protect groundwater quality from further degradation and overdraft; and, provide a plan of reasonably implementable measures and facilities.

The 2010 Urban Water Management Plan, Figure 4-3 (incorporated by reference) illustrates the City of Fresno's goals to achieve a 'water balance' between supply and demand while decreasing reliance upon and use of groundwater. To achieve these goals the City is implementing a host of strategies, including:

- Intentional groundwater recharge through reclamation at the City's groundwater recharge facility at Leaky Acres (located northwest of Fresno-Yosemite international Airport), refurbish existing streams and canals to increase percolation, and recharge at Fresno Metropolitan Flood Control District's (FMFCD) storm water basins;

- Increase use of existing surface water entitlements from the Kings River, United States Bureau of Reclamation and Fresno Irrigation District for treatment at the Northeast Surface Water Treatment Facility (NESWTF) and construct a new Southeast Surface Water Treatment Facility (SESWTF); and

- Recycle wastewater at the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) for treatment and re-use for irrigation, and to percolation ponds for groundwater recharge. Further actions include the General Plan, Policy RC-6-d to prepare, adopt and implement a City of Fresno Recycled Water Master Plan.

The City has indicated that groundwater wells, pump stations, recharge facilities, water treatment and distribution systems shall be expanded incrementally to mitigate increased water demands. One of the primary objectives of Fresno's future water supply plans detailed in Fresno's Metropolitan Water Resources Management Plan, 2010 & 2015 UWMPs is to balance groundwater operations through a host of strategies. Through careful planning, Fresno has designed a comprehensive plan to accomplish this objective by increasing utilization of surface water supplies through expansion of surface water treatment facilities, intentional recharge, and conservation, thereby reducing groundwater pumping. The City continually monitors impacts of land use changes and development project proposals on water supply facilities by assigning fixed demand allocations to each parcel by land use as currently zoned or proposed to be rezoned.

Until 2004, groundwater was the sole source of water for the City. In June 2004, the 30 Million Gallon Per Day (MGD) Northeast Surface Water Treatment Facility ("NESWTF") began providing Fresno with water treated to drinking water standards and in May 2018, the 54 MGD Southeast Surface Water Treatment Facility ("SESWTF") became operational. In order to meet demands anticipated by the growth implicit in the 2025 Fresno General Plan further construction of surface water treatments facilities and recycled water facilities will be required. Surface water is used to replace lost groundwater through Fresno's intentional recharge program at the City-owned Leaky Acres, Nielsen Recharge Facility, and smaller facilities in Southeast Fresno. Fresno holds contracts to surface water supplies from Millerton Lake and contractual rights to surface water from Pine Flat Reservoir. In 2010, Fresno renewed its contract with the United States Bureau of Reclamation, which entitles the City to 60,000 acre-feet per year of Class 1 water into the extended future. This water supply has further increased the reliability of Fresno's water supply.

Also, during the period 2005 to 2014, Fresno updated its Metropolitan Water Resources Management Plan designed to ensure the Fresno metro area has a reliable water supply through 2025. The plan implements a conjunctive use program, combining groundwater, treated surface water, intentional recharge and an enhanced water conservation program.

The use of groundwater will continue to be an important part of the City's supply but will not be relied upon as heavily as has historically been the case. The 2015 UWMP shows that groundwater pumped by the City has decreased from approximately 148,006 AF/year in 2008 to approximately 83,360 AF/year in 2015. With the 54-MGD SESWTF (expandable to 80-MGD) coming online in 2018 it is anticipated further groundwater pumping reductions will be realized. The projected total estimated groundwater yield for the 2040 is approximately 148,900 AF/year, inclusive of intentional recharge (Table 6-3, 2015 UWMP). In order to meet future demand projections, the City is planning to rely on expanding their delivery and treatment of surface water supplies and groundwater recharge activities.

The City has been adding to and upgrading its water supplies through capital improvements, including adding pipelines to distribute treated surface water as previously discussed. Additionally, in 2009, the treatment capacity of the Fresno/Clovis Regional Wastewater Reclamation Facility was improved. The City has recently been providing tertiary treatment at some of its wastewater treatment plants to supply tertiary treated recycled water for landscape irrigation to new growth areas and the North Fresno Wastewater Reclamation Facilities Satellite Plant was developed to serve the Copper River development and golf course in the northern part of Fresno.

In addition, the General Plan policies require the City to maintain a comprehensive conservation program to help reduce per capita water usage, and includes conservation programs such as landscaping standards for drought tolerance, irrigation control devices, leak detection and retrofits, water audits, public education and implementing US Bureau of Reclamation Best Management Practices for water conservation to maintain surface water entitlements.

The City also has implemented an extensive water conservation program which is detailed in Fresno's current UWMP and additional conservation is anticipated as more of the City's residential customers become metered. The City implemented a residential water meter program; installing and metering water service for all single-family residential customers in the City by 2013. In terms of water conservation efforts, the recent completion of the residential meter installation project realized the single largest reduction of water use. Prior to initializing the meter installation project water use in the City was at a high of 168,122 AF/year in 2008 (Table 4-1, 2015 UWMP). At completion of the meter installation project water use dropped to 135,595 AF/year. Although implementation of this project occurred during the economic downturn, water use has remained at or below this value, except in 2013 when there was a noticeable jump in use. The implementation of the metering project yielded a water savings of approximately 30,000 AF/year.

Fresno continues to periodically update its water management plans to ensure the cost-effective use of water resources and continued availability of groundwater and surface water supplies.

In accordance with the provisions of the Fresno General Plan and Master EIR No. 2012111015 mitigation measures, project specific water supply and distribution requirements must assure that an adequate source of water is available to serve the project. SGMA compliance requirements are incorporated into the water supply conditions of approval for the project.

In order for the City to develop an SGMA compliance plan for this proposed development project, a Water Demand Analysis has been calculated which yielded the following:

In accordance with Fresno Municipal Code (FMC) Section 6-501, the estimated peak hour water demands for the proposed project shall be based on 2.12 Gallons per Minute (GPM) for single family residential units. In addition, the Fire Protection Water Demand shall be added to the overall project water demand at 1,500 gpm. The sum of the Peak Hour and Fire Protection Water Demands shall establish the total instantaneous water supply flow required for the project, inclusive of fire protection.

The average homes developed within the proposed project will have wash basins, showers, low flow toilets, hose connections, a clothes washer, and a dishwasher. The proposed project would result in the construction of residential housing that would generate an estimated 1,116 people. According to the 2015 UWMP, the actual water use in 2015 was 190 gallons per capita per day (gpcd). Therefore, the proposed project would result in an estimated water demand of 212,040 gallons per day (or 237.25 acre-feet per year).

The City's General Plan designates the project area as Neighborhood Park/Medium Density Residential (approximately 9.34 acres), Medium Density Residential (approximately 24.96 acres), Medium Low Density Residential (approximately 23.0 acres) and Low Density Residential (11.85 acres). The Medium Density Residential designation allows for residential densities of 5 to 12 dwelling units per acre. The Medium Low Density Residential designation allows for residential densities of 3.5 to 6 dwelling units per acre. The Low Density Residential designation allows for residential densities of 1.0 to 3.5 dwelling units per acre. Therefore, the City's General Plan anticipated up to 9.34 acres of park or up to 112 Medium Density Residential units (on the land designated Neighborhood Park/Medium Density Residential), up to 299 Medium Density Residential units (on the land designated Medium Density Residential), up to 138 units (on the land designated Medium Low Density Residential), and up to 41 units (on the land designated Low Density Residential). This would result in a total of up to 9.34 acres of park and up to 478 units, or 0.0 acres of park and up to 590 units. This would result in an associated population of 1,529 to 1,888 persons within the project area. The analysis included in the City's General Plan MEIR assumed that the site would be developed with Neighborhood Park/Medium Density Residential, Medium Density Residential, and Medium Low Density Residential uses. The project would not increase development beyond the level assumed for the site in the City's General Plan MEIR. Because the recently adopted 2015 UWMP analyzed the Fresno General Plan land use capacity, the water demand resulting from the proposed project (i.e., 237.25 acre-feet per year) would be less than anticipated in the UWMP.

The proposed project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted). The City's General Plan designates the project area as Neighborhood Park/Medium Density Residential (approximately 9.34 acres), Medium Density Residential (approximately 34.96 acres), and Medium Low Density Residential (approximately 23.0 acres). The Medium Density Residential designation allows for residential densities of 5 to 12 dwelling units per acre. The Medium Low Density Residential designation allows for residential densities of 3.5 to 6 dwelling units per acre. Therefore, the City's General Plan anticipated up to 9.34 acres of park or up to 112 Medium Density Residential units (on the land designated Neighborhood Park/Medium Density Residential), up to 419 Medium Density Residential units (on the land designated Medium Density Residential) and up to 138 units (on the land designated Medium Low Density Residential).

Project construction would add additional impervious surfaces to the project site; however, various areas of the project site would remain largely pervious, which would allow infiltration to underlying groundwater. For example, the project would include seven storm drain outlet/open space areas throughout the project site, for a total of approximately 1.52 acres. Additionally, the project includes ample landscaping areas that would remain pervious. The areas would continue to contribute to groundwater recharge following construction of the project. Furthermore, the project is not anticipated to significantly affect groundwater quality because sufficient stormwater infrastructure would be constructed as part of project to detain and filter stormwater runoff and prevent long-term water quality degradation. Therefore, project construction and operation would not substantially deplete or interfere with groundwater supply or quality.

The mitigation measures of the MEIR are incorporated herein by reference and are required to be implemented by the attached mitigation monitoring checklist. In summary, these mitigation measures equate to City of Fresno policies and initiatives aimed toward ensuring that the City has a reliable, long-range source of water through the implementation of measures to promote water conservation through standards, incentives and capital investments.

Private development participates in the City's ability to meet water supply goals and initiatives through payment of fees established by the city for construction of recharge facilities, the construction of recharge facilities directly by the project, or participation in augmentation/enhancement/enlargement of the recharge capability of Fresno Metropolitan Flood Control District storm water ponding basins. While the proposed project may be served by conventional groundwater pumping and distribution systems, full development of the Fresno General Plan boundaries may necessitate utilization of treated surface water due to inadequate groundwater aquifer recharge capabilities.

The Department of Public Utilities works with Fresno Metropolitan Flood Control District to utilize suitable FMFCD ponding (drainage) basins for the groundwater recharge program, and works with Fresno Irrigation District to ensure that the City's allotment of surface water is beneficially used for intentional groundwater recharge.

The City of Fresno Department of Public Utilities, Water Division has reviewed the proposed project and associated water demand analysis and has determined that water service will be available to the proposed project subject to water mains being extended within the proposed subdivision to provide service to each lot created; and, subject to payment of applicable water charges. These charges include payment of the adopted Water Capacity Fee charge, which is based upon the number and size of service connections and water meters required to serve the property as necessary in order to contribute a project's share towards funding installation of new water service capacity, recharge, and savings initiatives to achieve water balance.

The applicant will be required to comply with all requirements of the City of Fresno Department of Public Utilities that will reduce the project's water impacts to less than significant.

The developer will be required to provide improvements which will convey surface drainage to Master Plan inlets and which will provide a path for major storm conveyance. When development permits are issued, the subject site will be required to pay drainage fees pursuant to the Drainage Fee Ordinance.

Portions of the subject property may be adequately served with permanent drainage service through existing Master Plan facilities or required Master Plan facilities to be developed in conjunction with the proposed project. However, in areas where permanent drainage service will not be available, the District recommends temporary ponding facilities until permanent service is available through future Master Plan Facilities.

Lot coverage will be required to be provided to the FMFCD prior to submittal of improvement plans. The final drainage fee will be calculated commensurate with the lot coverage provided by the developer. If the lot coverage indicates a density higher than Master Planned, mitigation may be required. The lot coverage calculated by the FMFCD includes the front yard walkway, sidewalk walkway and the rear yard patio equaling an additional 6% of impervious area in addition to the City typical lot coverage calculation.

The Master Plan system has been designed such that during a two-year event flow will not exceed the height of the 6-inch curb. Should wedge curb (4.5 inch height) be used the same criteria shall apply whereby flow remains below the top of curb.

If surface water runoff or event flows exceed volumes for which the Master Plan drainage system is designed to accommodate and the existing Master Plan storm drainage facilities do not have capacity to serve the proposed land use to avoid flooding, then the developer will be required to mitigate the impacts of the increased runoff from the proposed use to a rate that would be expected if developed in accordance with the Master Plan. The developer may either make improvements to the existing pipeline system to provide additional capacity or may use some type of permanent peak reducing facility in order to eliminate adverse impacts on the existing system. Should the developer choose to construct a permanent peak-reducing facility, such a system would be required to reduce runoff accordingly. Implementation of the mitigation measures may be deferred until time of development.

As a condition of approval, any pre-existing on-site domestic or agricultural water wells that may be on the site shall be properly abandoned, in order to prevent the spread of contaminants from the ground surface or from shallow groundwater layers into deeper and cleaner levels of the aquifer.

Implementation of proposed project would not violate any water quality or waste discharge requirements. Construction activities including grading could temporarily increase soil erosion rates during and shortly after project construction. Construction-related erosion could result in the loss of soil and could adversely affect water quality in nearby surface waters. The Regional Water Quality Control Board requires a project specific Storm Water Pollution Prevention Plan (SWPPP) to be prepared for each project that disturbs an area one acre or larger. The SWPPP is required to include project specific best management measures that are designed to control drainage and erosion. Furthermore, the proposed project has been designed to control storm water runoff and erosion, both during and after construction. The SWPPP and the project specific drainage improvements would reduce the potential for the proposed project to violate water quality standards during construction.

Due to the rural residence that was previously on the subject property, on-site waste (septic) disposal systems may be present. As a condition of approval, any pre-existing septic systems shall be properly abandoned.

Occupancy of this site will generate wastewater containing human waste, which is required to be conveyed and treated by the Fresno-Clovis Regional Wastewater Treatment and Reclamation Facility. There will not be any onsite wastewater treatment system. The proposed project will be required to install sewer mains and branches, and to pay connection and sewer facility fees to provide for reimbursement of preceding investments in sewer trunks to connect this site to a publicly owned treatment works.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the subject site is not located within a flood prone or hazard area, necessitating appropriate floodplain management action. The project site is mostly flat and the project would not substantially alter the existing drainage pattern of the site or area. The project site does not have a stream or river. The project would not result in substantial erosion or siltation on- or off-site, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. The storm drainage plan will be supported by engineering calculations to ensure that the project does not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

Implementation of the Fresno General Plan policies, the Kings Basin Integrated Regional Water Management Plan, City of Fresno Urban Water Management Plan, Fresno-Area Regional Groundwater Management Plan, and City of Fresno Metropolitan Water Resource Management Plan and the applicable mitigation measures of previously approved environmental review documents, as well as those mitigation measures included herein, will address the issues of providing an adequate, reliable, and sustainable water supply for the project's urban domestic and public safety consumptive purposes.

In conclusion, with implementation of the project specific mitigation measures identified below, the project will not result in any hydrology or water quality impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

- The proposed project shall implement and incorporate, as applicable, the hydrology related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XI. LAND USE AND PLANNING – Would the project:				
a) Physically divide an established community?			X	

b) 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?			X	

The project site is located within the City's Sphere of Influence and is adjacent primarily to residential uses and vacant agricultural land. The proposed single-family residential project is consistent with the surrounding uses to the north, south, east, and west (existing and planned) and would not physically divide an established community.

The City's General Plan designates the project area as Neighborhood Park/Medium Density Residential (approximately 9.34 acres), Medium Density Residential (approximately 24.96 acres), Medium Low Density Residential (approximately 23.0 acres) and Low Density Residential (approximately 11.85 acres). See Figure LU-2: Dual Designation, of the Fresno General Plan. It is noted that, as shown in Figure LU-2 of the Fresno General Plan, the northwestern corner of the project site has a dual designation: Neighborhood Park and Medium Density Residential. All new parks, open space, and public facilities (such as school sites) in the City have a dual land use designation. If the park, open space, or public facility is not needed, private and public development consistent with the zoning and development standards may be approved.

The project would require approval of the Vesting Tentative Tract Map. The project site is zoned AE-20 by the County of Fresno. Upon annexation of the Plan Area, the Fresno County General Plan and Fresno County Zoning Code would not apply to the project. Further, upon approval of the requested entitlements, the proposed project would not conflict with any land use plan, policy or regulation.

The current AE-20 County zoning not consistent with the General Plan land use for the site. The proposed project would require prezoning of the entire project site to RS-4/UGM and RS-5/UGM. Approval of the prezoning would ensure that the zoning designation is consistent with the land use designation for the project site.

The Fresno Zoning Code implements the General Plan. The project site is currently within the jurisdiction of Fresno County. The Fresno LAFCo will require the Plan Area to be pre-zoned by the City of Fresno in conjunction with the proposed annexation. The City's pre-zoning will include the RS-3/ANX/UGM (*Residential Single Family, Low Density) (±11.85 acres),* RS-4/UGM (*Residential Single Family, Medium Low Density/Urban Growth Management) (±23 acres)* and RS-5/UGM (*Residential Single Family, Medium Density/Urban Growth Management)* (±34.3 acres) zoning designations. The pre-zoning would go into effect upon annexation into the City of Fresno. These proposed zone change would ensure that zoning would be consistent with the proposed General Plan designation for the site. Approval of the prezone would ensure that the proposed project would be consistent with the Zoning Code.

The Medium Density Residential land use designation covers developments of 5 to 12 units per acre and is intended for areas with predominantly single-family residential development, but can also accommodate a mix of housing types, including small-lot starter homes, zero-lot-line developments, duplexes, and townhouses. Much of the City's established neighborhoods fall within this designation. The proposed project would include 349 units on 57.3 acres, for a density of 6.1 units per acre. The proposed residential use is allowed within this land use designation, and the project does not exceed the maximum density.

Annexation Application No. P18-03263 proposes to initiate annexation proceedings for the Shields-Temperance No. 2 Reorganization proposing incorporation of the subject property within the City of Fresno; and, detachment from the Kings River Conservation District and Fresno County Fire Protection District (±11.85 acres). The proposed annexation will include an ANX (*Annexed Rural Residential Transitional)* Overlay District to the parcels proposed to be prezoned to RS-3 (*Residential Single Family, Low Density*) (±11.85) to allow rural residential uses to continue. The annexation is consistent with the City's land use vision for the project site, and the site is located within the City's Sphere of Influence.

A prezone application has been filed to facilitate: (1) Annexation of the site to the City of Fresno and detachment from the Kings River Conservation District and Fresno County Fire Protection District in accordance with Annexation Application No. P18-03263 for the Shields-Temperance No. 2 Reorganization (these actions are under the jurisdiction of the Fresno Local Area Formation Commission [LAFCO]); and, (2) Authorization to subdivide a ±57.3 net acre portion of the subject property for purposes of creating a 349-lot conventional single family residential development at a density of ±6.09 dwelling units/acre pursuant to Vesting Tentative Tract Map No. 6224.

<u>Fresno General Plan Goals, Objectives and Policies</u>

As proposed, the project will be consistent with the following Fresno General Plan goals:

- Provide for a diversity of districts, neighborhoods, housing types (including affordable housing), residential densities, job opportunities, recreation, open space, and educational venues that appeal to a broad range of people throughout the city.

- Make full use of existing infrastructure, and investment in improvements to increase competitiveness and promote economic growth.

- Promote orderly land use development in pace with public facilities and services needed to serve development.

- Develop Complete Neighborhoods and districts with an efficient and diverse mix of residential densities, building types, and affordability which are designed to be healthy, attractive, and centered by schools, parks, and public and commercial services to provide a sense of place and that provide as many services as possible within walking distance.

These Goals contribute to the establishment of a comprehensive city-wide land use planning strategy to meet economic development objectives, achieve efficient and equitable use of resources and infrastructure, and create an attractive living environment in accordance with Objective LU-1 of the Fresno General Plan.

Objective LU-5 aims to plan for a diverse housing stock that will support balanced urban growth, and make efficient use of resources and public facilities. The project includes a range of home types, home sizes, and yard sizes. The General Plan includes Policy LU-5-a, which promotes low density residential uses only where there are established neighborhoods with semi-rural or estate characteristics. Existing, planned, and/or future low density residential uses surround the proposed project site. Likewise, Policy LU-5-g allows new development in or adjacent to established neighborhoods that is compatible in scale and character with the surrounding area by promoting a transition in scale and architectural character between new buildings and established neighborhoods, as well as integrating pedestrian circulation and vehicular routes. The proposed project site is located adjacent to existing residential subdivisions to the north and west. The proposed density is similar to these adjacent uses. The project includes development of pedestrian and vehicular routes that connect to the existing roadway system. The project also includes circulation improvements that would connect future planned residential uses to the east of the site.

Additionally, the project will be consistent with the following Fresno General Plan policies:

- Adopt implementing policies and requirements that achieve annexations to the City that conform to the General Plan Land Use Designations and open space and park system, and are revenue neutral and cover all costs for public infrastructure, public facilities, and public services on an ongoing basis consistent with the requirements of ED-5-b.

- Require new residential and commercial development that requires annexation to the City to pay its fair and proportional share of needed community improvements through impact fees, assessment districts, and other mechanisms. Approve new residential and commercial development projects that require annexation to the City only after making findings that all of the following conditions are met:

a. No City revenue will be used to replace or provide developer funding that has or would have been committed to any mitigation project;
b. The development project will fully fund public facilities and infrastructure as necessary to mitigate any impacts arising from the new development;
c. The development project will pay for public facilities and infrastructure improvements in proportion to the development's neighborhood and citywide impacts; and
d. The development will fully fund ongoing public facility and infrastructure maintenance and public service costs.

This project supports the above-mentioned goals and policies in that the density of the proposed development conforms to the requested land use designation (Medium Density Residential) of the Fresno General Plan.

The project will not conflict with any conservation plans since it is not located within any conservation plan areas. No habitat conservation plans or natural community conservation plans in the region pertain to the natural resources that exist on the subject site or in its immediate vicinity. Therefore, there would be no impacts.

In conclusion, the proposed project would not result in any land use and planning environmental impacts beyond those analyzed in MEIR SCH No. 2012111015.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XII. MINERAL RESOURCES – Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?			X	
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?			X	

The subject site is not located in an area designated for mineral resource preservation or recovery, therefore, the project will not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state. The subject site is not delineated on a local general plan, specific plan or other land use plan as a locally-important mineral resource recovery site; therefore, it will not result in the loss of availability of a locally-important mineral resource.

In conclusion, the proposed project would not result in any mineral resource environmental impacts beyond those analyzed in MEIR SCH No. 2012111015.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. NOISE – Would the project result in:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?		X		
b) Generation of excessive groundborne vibration or groundborne noise levels?			X	
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?			X	

Generally, the three primary sources of substantial noise that affect the City of Fresno and its residents are transportation-related and consist of major streets and regional highways; airport operations at the Fresno Yosemite International, the Fresno-Chandler Downtown, and the Sierra Sky Park Airports; and railroad operations along the BNSF Railway and the Union Pacific Railroad lines.

In developed areas of the community, noise conflicts often occur when a noise sensitive land use is located adjacent or in proximity to a noise generator. Noise in these situations frequently stems from on-site operations, use of outdoor equipment, uses where large numbers of persons assemble, and vehicular traffic. Some land uses, such as residential dwellings hospitals, office buildings and schools, are considered noise sensitive receptors and involve land uses associated with indoor and/or outdoor activities that may be subject to stress and/or significant interference from noise.

Stationary noise sources can also have an effect on the population, and unlike mobile, transportation-related noise sources, these sources generally have a more permanent and consistent impact on people. These stationary noise sources involve a wide spectrum of uses and activities, including various industrial uses, commercial operations, agricultural production, school playgrounds, high school football games, HVAC units, generators, lawn maintenance equipment and swimming pool pumps.

Potential noise sources at the project site would occur primarily from roadway noise on the project area roadways and the centrally-located park area.

The City of Fresno Noise Element of the Fresno General Plan establishes a land use compatibility criterion of 60 dB DNL for exterior noise levels in outdoor areas of noise-sensitive land uses. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation. The proposed residential uses are considered sensitive land uses. Furthermore, the Noise Element also requires that interior noise levels attributable to exterior noise sources not exceed 45 dB DNL. The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep. Project Specific Mitigation Measure NOI-1 requires an analysis to determine the appropriate noise attenuation features (sounds walls) to ensure acceptable levels of noise along the perimeter of the site.

Existing sensitive receptors, including single-family ranchette-style homes, are located approximately 150 feet or further south and west of the project site. In order to ensure that the exterior and interior noise levels at this residence do not exceed the City’s noise standards, a project-specific noise analysis is required as a standard in the City. The noise analysis will include noise modeling for anticipated stationary and mobile noise sources under the Existing Plus Project and Cumulative Plus Project conditions. If required, the noise analysis will include noise mitigation measures in order to reduce the resulting noise at the single-family home to a level at or below the City’s noise standards. Typical mitigation measures may include sound walls, combination sound walls and berms, changes to site setbacks, changes to site layout, or other strategies. As noted above, a noise analysis is required by Project Specific Mitigation Measures NOI-1.

For stationary noise sources, the noise element establishes noise compatibility criteria in terms of the exterior hourly equivalent sound level (L_{eq}) and maximum sound level (L_{max}). The standards are more restrictive during the nighttime hours, defined as 10:00 p.m. to 7:00 a.m. The standards may be adjusted upward (less restrictive) if the existing ambient noise level without the source of interest already exceeds these standards. The Noise Element standards for stationary noise sources are: (1) 50 dBA L_{eq} for the daytime and 45 dBA L_{eq} for the nighttime hourly equivalent sound levels; and, (2) 70 dBA L_{max} for the daytime and 65 dBA L_{max} for the nighttime maximum sound levels.

Noise created by any proposed stationary noise sources or existing stationary noise sources which undergo modification that may increase noise levels shall be mitigated so as not to exceed the noise level standards of Table 5.11-8 of the MEIR at noise sensitive land uses. If the existing ambient noise levels equal or exceed these levels, mitigation is required to limit noise to the ambient noise level plus 5 dB.

The project site is currently used for agricultural uses. Therefore, it is reasonable to assume that the proposed project will result in an increase in temporary and/or periodic ambient noise levels on the subject property above existing levels. However, these noise levels will not exceed those generated by adjacent existing or planned land uses.

The City of Fresno Noise Element of the General Plan sets noise compatibility standards for transportation noise sources in terms of the Day-Night Average Level (Ldn). Implementing Policy NS-1-a of the noise element establishes a land use compatibility criterion as 65 dB Ldn for exterior noise exposure within outdoor activity areas of residential land uses. Outdoor activity areas generally include backyards of single-family residences, individual patios or decks of multi-family developments and common outdoor recreation areas of multi-family developments. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation.

Additionally, Implementing Policy NS-1-h of the noise element requires that interior noise levels attributable to exterior transportation noise sources not exceed 45 dB Ldn. The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep.

Short-term Noise Impacts

The construction of a project involves both short-term, construction related noise, and long-term noise potentially generated by increases in area traffic, nearby stationary sources, or other transportation sources. The Fresno Municipal Code (FMC) allows for construction noise in excess of standards if it complies with the section below (Chapter 10, Article 1, Section 10-109 – Exemptions). It states that the provisions of Article 1 – Noise Regulations of the FMC shall not apply to:

> Construction, repair or remodeling work accomplished pursuant to a building, electrical, plumbing, mechanical, or other construction permit issued by the city or other governmental agency, or to site preparation and grading, provided such work takes place between the hours of 7:00 a.m. and 10:00 p.m. on any day except

Sunday.

Thus, construction activity would be exempt from City of Fresno noise regulations, as long as such activity is conducted pursuant to an applicable construction permit and occurs between 7:00 a.m. and 10:00 p.m., excluding Sunday. Therefore, short-term construction impacts associated with the exposure of persons to or the generation of noise levels in excess of standards established in the general plan or noise ordinance or applicable standards of other agencies would be less than significant.

Long Term Noise Impacts

An Acoustical Analysis was completed for the proposed project by WJV Acoustics, Inc. (October 2018). The following discussion summarizes the results of the Acoustical Analysis. The full report is included as Appendix B of this document.

The proposed project includes future residential uses. The immediate vicinity consists of existing and planned residential uses, which produce noise levels which are likely similar to noise levels produced by the proposed project.

As part of the Acoustical Analysis, noise exposure from traffic on North Temperance Avenue and East Shields Avenue was calculated for existing and future (2035) conditions. The calculated noise exposures for existing and future (2035) traffic conditions for the closest proposed setbacks to North Temperance Avenue were approximately 64 dB Ldn and 70 dB Ldn, respectively. The calculated noise exposures for existing and future (2035) traffic conditions for the closest proposed setbacks to East Shields Avenue were approximately 60 dB Ldn and 65 dB Ldn, respectively. Noise exposure levels for future (2035) traffic conditions are above the applicable City of Fresno exterior noise level standard of 65 dB Ldn, and further mitigation is required.

Exterior Noise Exposure and Mitigation

To mitigate exterior traffic noise exposure along North Temperance Avenue and East Shields Avenue, a sound wall would be required along the project roadway frontages. The sound wall would provide acoustical shielding of the outdoor activity areas located closest to the roadways.

The noise level reduction for sound walls of various heights were calculated. The calculations indicate that a sound wall along North Temperance Avenue with a minimum height of 6.5 feet relative to the closest building pad elevations would reduce traffic noise exposure within individual backyards by approximately 6 dB, resulting in a projected future exposure of approximately 64 dB Ldn. In order to be effective, the sound wall should be turned inward (eastward) at lots located adjacent to roadway access points (lots 263, 264, 289, and 290).

The calculations also indicate that a sound wall along East Shields Avenue with a minimum height of 6.0 feet relative to the closest building pad elevations would reduce traffic noise exposure within individual backyards by approximately 5 to 6 dB, resulting in a projected future exposure of approximately 59 to 60 dB Ldn. In order to be effective, the sound wall should be turned inward (southward) at lots located adjacent to roadway access points (lots 12 and 13).

It should be noted that the above-described sound walls would be effective at first-floor receiver locations only, and would not provide acoustical shielding to any proposed second-floor receivers. Therefore, individual second-floor balconies should not be constructed facing North Temperance Avenue or East Shields Avenue for the first row of homes adjacent to the roadways.

A Project Specific Mitigation Measure is included in the attached Project Specific Mitigation Monitoring Checklist dated August 2019 to address exterior noise levels.

Interior Noise Exposure and Mitigation

The City of Fresno interior noise level standard is 45 dB Ldn. The worst-case future noise exposure within the proposed residential development would be approximately 64 dB Ldn at first-floor receiver locations and approximately 70 dB Ldn at second-floor receiver locations. Therefore, the proposed residential construction must be capable of providing a minimum outdoor-to-indoor noise level reduction of approximately 25 dB.

It would be reasonable to assume that residential construction methods complying with current building code requirements will reduce exterior noise levels by approximately 25 dB if windows and doors are closed. This will be sufficient for compliance with the City's 45 dB Ldn interior standard at all proposed lots adjacent to North Temperance Avenue and East Shields Avenue. A requirement that it be possible for windows and doors to remain closed for sound insulation means that air conditioning or mechanical ventilation will be required.

A Project Specific Mitigation Measure is included in the attached Project Specific Mitigation Monitoring Checklist dated August 9, 2019 to address interior noise levels.

Conclusion

Although the project will create additional activity in the area, the project will be required to comply with all noise policies and mitigation measures identified within the Fresno General Plan and MEIR as well as the noise ordinance of the Fresno Municipal Code. Through compliance with the policies and mitigation measures, the interior and exterior noise levels would comply with the City's noise standards.

In conclusion, with the MEIR and Project Specific Mitigation Measures incorporated the proposed project will not result in any noise impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the noise related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

2. The proposed project shall implement and incorporate the noise related mitigation measure as identified in the attached Project Specific Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XIV. POPULATION AND HOUSING – Would the project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?			X	
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				X

According to the 2019 US Department of Finance population estimates, the population in Fresno is 536,683 people, and the average persons per household is 3.20. The proposed project would result in the construction of residential housing that would generate an estimated 1,116 people. This is an estimated 0.21 percent growth in Fresno. An estimated 0.21 percent growth in Fresno is not considered substantial growth in Fresno or the region and it is consistent with the assumed growth in the General Plan. The 1,116 people may come from Fresno or surrounding communities. The proposed project would not include upsizing of offsite infrastructure or roadways. The installation of new infrastructure would be limited to the internal single family residences. The sizing of the infrastructure would be specific to the number of units proposed within the project site. Implementation of the proposed project would not induce substantial population growth in an area, either directly or indirectly.

The surrounding area is mostly developed or will be developed with residential uses. The proposed project is generally consistent with the General Plan designations for the project site. The City's General Plan designates the project area as Neighborhood Park/Medium Density Residential (approximately 9.34 acres), Medium Density Residential (approximately 24.96 acres), Medium Low Density Residential (approximately 23.0 acres) and Low Density Residential (11.85 acres). The Medium Density Residential designation allows for residential densities of 5 to 12 dwelling units per acre. The Medium Low Density Residential designation allows for residential densities of 3.5 to 6 dwelling units per acre. The Low Density Residential designation allows for residential densities of 1.0 to 3.5 dwelling units per acre. Therefore, the City's General Plan anticipated up to 9.34 acres of park or up to 112 Medium Density Residential units (on the land designated Neighborhood Park/Medium Density Residential), up to 299 Medium Density Residential units (on the land designated Medium Density Residential), up to 138 units (on the land designated Medium Low Density Residential), and up to 41 units (on the land designated Low Density Residential). This would result in a total of up to 9.34 acres of park and up to 478 units, or 0.0 acres of park and up to 590 units. This would result in an associated population of 1,529 to 1,888 persons within the project area. The analysis included in the City's General Plan MEIR assumed that the site would be developed with Neighborhood Park/Medium Density Residential, Medium Density Residential, and Medium Low Density Residential uses. The project would not increase development beyond the level assumed for the site in the City's General Plan MEIR.

The proposed project will not displace any existing housing. The project will not result in displacement of any persons as there are no residential units on the subject property.

In conclusion, the proposed project would not result in any population and housing environmental impacts beyond those analyzed in MEIR SCH No. 2012111015.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XV. PUBLIC SERVICES – Would the project:				

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?		X		
Police protection?		X		
Schools?			X	
Parks?		X		
Drainage and flood control?		X		
Other public facilities?			X	

The subject property is located approximately 2.28 air miles (or 2.50 road miles) southeast from Fire Station 10.

The City of Fresno Fire Department operates its facilities under the guidance set by the National Fire Protection Association in NFPA 1710, the Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operation to the Public by Career Fire Departments. NFPA 1710 sets standards for turnout time, travel time, and total response time for fire and emergency medical incidents, as well as other standards for operation and fire service. The Fire Department has established the objectives set forth in NFPA 1710 as department objectives to ensure the public health, safety, and welfare.

Demand for fire service generated by the project is within planned services levels of the Fire Department and the applicant will pay any required impact fees at the time building permits are obtained.

According to the Fresno General Plan MEIR, development impact fees are currently collected for the provision of capital facilities for fire facilities that will provide for future facilities as the City's population increases. Recognizing that there would be an increased demand for fire and emergency medical response, the General Plan Update includes several policies to support the activities of the Fresno Fire Department. The policies and objectives from the General Plan will ensure that the proposed project does not significantly affect fire protection.

Additional fire service requirements for development of the proposed project will include installation of public fire hydrants and the provision of adequate fire flows per Public Works Standards. Review for compliance with fire and life safety requirements for proposed residences are reviewed by both the Fire Department and the Building and Safety Services Section of the Planning and Development Department when a submittal for building plan review is made as required by the California Building Code.

City police protection services are also available to serve the proposed project with no new facilities required for police protection.

Development of the property requires compliance with grading and drainage standards of the City of Fresno.

The proposed project does include uses that would increase the use of park and recreation facilities in the area. The project would include seven storm drain outlet/open space areas throughout the project site, for a total of approximately 1.52 acres. The centrally-located open space area could function as a recreational amenity for the proposed residences. The City of Fresno maintains a park goal to provide five acres of city park space per 1,000 residents. To meet this park goal, the project would require up to 5.6 acres of park uses for the 1,116 residents. Because the project does not meet this goal, the applicant would be required to pay the required park impact fees.

Demand for parks generated by the project is within planned services levels of the City of Fresno Parks and Community Services Department and the applicant will pay any required impact fees at the time building permits are obtained.

Similarly, the proposed residential uses result in generation of students, which would impact the District's student classroom capacity. The developer will pay appropriate school fees at time of building permits. The proposed project does not result in the construction of new school facilities.

The Department of Public Utilities (DPU) has determined that adequate sanitary sewer and water services are available to serve the project site subject to implementation of the Fresno General Plan policies, the mitigation measures of the related MEIR, the requirements outlined in the Review Comments for Tentative Map Tract application: P18-03724 (May 21, 2019), and the construction and installation of public facilities and infrastructure in accordance with DPU standards, specifications and policies.

For sanitary sewer service these infrastructure improvements and facilities include typical requirements for construction and extension of sanitary sewer mains and branches within the interior of the future proposed residential development. The proposed project will also be required to provide payment of sewer connection charges.

Implementation of the Fresno General Plan policies and the mitigation measures of the associated MEIR, along with the implementation of the Water Resources Management Plan, would ensure drainage impacts are less than significant. Installation of these services with meters to the proposed buildings and payment of applicable Water Capacity Charges will provide an adequate, reliable, and sustainable water supply for the project's urban domestic and public safety consumptive purposes.

According to the FEMA FIRM, the subject site is not located within a flood prone or hazard area, necessitating appropriate floodplain management action. The project site is mostly flat and the project would not substantially alter the existing drainage pattern of the site or area. The project site does not have a stream or river. The project would not result in substantial erosion or siltation on- or off-site, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. The storm drainage plan will be supported by engineering calculations to ensure that the project does not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

In conclusion, with implementation of the MEIR Public Service Mitigation measures, the project will not result in any public service impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the Public Service related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated February 8, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XVI. RECREATION - Would the project:				

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			X	
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?			X	

Although the proposed project does include uses that would increase the use of park and recreation facilities in the area, the proposed project will not result in the physical deterioration of existing parks or recreational facilities. As noted previously, the project would include seven storm drain outlet/open space areas throughout the project site, for a total of approximately 1.52 acres. The centrally-located open space area could function as a recreational amenity for the proposed residences.

Demand for parks generated by the project would be minimal and is within planned services levels of the City of Fresno Parks and Community Services Department. The applicant will pay any required impact fees at the time building permits are obtained or receive credits for construction as may be memorialized within a development agreement.

In conclusion, the proposed project would not result in any recreation environmental impacts beyond those analyzed in MEIR SCH No. 2012111015. Impacts related to recreation would be less than significant.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION – Would the project:				

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?		X		
b) Conflict or be inconsistent with CEQA Guidelines § 15064.3, subdivision (b)?			X	
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			X	
d) Result in inadequate emergency access?			X	

The proposed project is located within Traffic Impact Zone III. Traffic Impact Zone III represents areas near or outside the City Limits but within the SOI as of December 31, 2012. Within this Zone, the City aims to maintain a peak hour LOS standard of D or better for all intersections and roadway segments. A Traffic Impact Study (TIS) will be required for all development in this Zone projected to generate 100 or more peak hour new vehicle trips.

The proposed project would generate 100 or more peak hour new vehicle trips. The ITE Trip Generation Manual land use description/code which corresponds to the proposed project is “Single Family Homes/210”. Using this ITE code and corresponding trip generation rate, the project would generate approximately 3,322 new daily vehicles trips, 262 new AM peak hour trips, and 349 PM peak hour trips. Therefore, a Traffic Impact Analysis is required for the proposed project.

A Traffic Impact Study was prepared for the proposed project (ND Engineering, PC, 2019). The project study area for the analysis of traffic impacts extends from Dakota Avenue (north) to Tulare Avenue (south) and from Armstrong Avenue (west) to DeWolf Avenue (east). The Traffic Impact Study analyzes 11 intersections for two time periods, weekday AM and PM peak hour of the street. To analyze the traffic impacts resulting from the build out of the Project, seven scenarios were evaluated. Time frames included in the seven scenarios are: Existing (2018), Existing plus Approved/Pending/Proposed (approximately 2022), and 2035. Appendix C contains a description of the methodology used in the Traffic Impact Study.

On-site circulation was analyzed as part of the Traffic Impact Study. Additionally, the intersections were analyzed for Existing (2018), Existing (2018) Plus Project, Existing (2018) Plus Approved/Pending/Proposed Projects, Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project, Cumulative (2035), and Cumulative (2035) Plus Project level of Service (LOS), queue lengths, and signal warrants. Detailed results are included in Appendix C.

<u>On-Site Circulation</u>

The design of the proposed development has been evaluated and determined to be consistent with respect to compliance with City of Fresno standards, specification and policies. As part of the Traffic Impact Study, a review was made of the onsite roadway system to ensure that the project provides for a "livable residential neighborhood". The roadway system is designed with discontinuous streets with the longest street segment at approximately 1,000 feet. However, this approximately 1,000-foot segment is broken into two segments of approximately 500 feet each by a bulb out in the midblock. There are no street segments in the neighborhood that exceed the City of Fresno maximum 600-foot block length requirement without a midblock bulb out. The discontinuous street network along with the less than approximately 500 feet block lengths discourage both cut through and speeding traffic. All internal roadways are two lanes wide with parking allowed on both sides of the roadway and widths ranging from 50 to 54 feet. These roadway widths conform to the City of Fresno standard drawings for local streets. Another safety feature built into the neighborhood is the use of T- or three-leg intersections. The use of T-intersections will reduce the number of potential accidents when compared to four-leg intersections. Sidewalks are provided along all streets in the neighborhood to promote pedestrian travel. Overall, the project would not increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment). Additionally, the proposed circulation improvements would allow for greater emergency access relative to existing conditions.

<u>Conclusions and Recommendations</u>

As shown the Traffic Impact Study, the following locations, by scenario, are projected to operate below the appropriate adopted LOS standard:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hour
- Temperance Avenue at Belmont Avenue – AM/PM peak hour

- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hour
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Cumulative (2035) Project (With the Project)

- Temperance Avenue at Shields Avenue – PM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – PM peak hour
- Temperance Avenue at Tulare Avenue – PM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – PM peak hours

Cumulative Mitigated (2035) Project (With the Project)

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours

Rural peak hour volume signal warrants were also prepared for the unsignalized study intersections. Based on the rural peak hour volume signal warrant, the warrant is met at the following locations by scenario:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hour
- Shields Avenue at DeWolf Avenue – AM/PM peak hour
- Armstrong Avenue at Clinton Avenue – AM/PM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

As shown in the previous sections, the following locations, by scenario, are projected to have queue storage length exceedances:

Existing (2018) (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Mitigated Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour
- Shields Avenue at Locan Avenue
  - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
  - EB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
  - SB right – AM peak hour
- Shields Avenue at Locan Avenue
  - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Shields Avenue
  - WB left – AM peak hour
- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
  - SB right – AM peak hour
- Shields Avenue at Locan Avenue
  - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Mitigated Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour

Cumulative (2035) Project (With the Project)

- Temperance Avenue at Dakota Avenue
  - NB left – PM peak hour
  - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
  - NB left – AM peak hour
  - NB right – AM/PM peak hours
  - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
  - NB left – AM peak hour
  - SB left – AM peak hour
  - EB left – PM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
  - NB left – AM peak hour
  - SB left – PM peak hour
  - EB left – PM peak hour
  - EB right – PM peak hour
  - WB left – AM/PM peak hour
- Temperance Avenue at Olive Avenue
  - EB left – AM/PM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
  - EB left – AM/PM peak hours
- Temperance Avenue at Tulare Avenue
  - SB left – PM peak hour
  - WB left – AM peak hour

- Shields Avenue at Locan Avenue
    - NB left – AM/PM peak hours
    - SB through – AM peak hour
    - SB right – AM peak hour
    - EB left – AM/PM peak hours
- Shields Avenue at DeWolf Avenue
    - EB left – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue
    - WB left – AM peak hour
- Armstrong Avenue at Olive Avenue
    - EB left – PM peak hour
    - WB left – AM peak hour

Mitigated Cumulative (2035) Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - NB left – PM peak hour
    - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
    - NB left – AM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
    - NB left – AM peak hour
    - SB right – AM peak hour
    - EB left – PM peak hour
    - EB right – PM peak hour
    - WB left – AM peak hour
- Temperance Avenue at Olive Avenue
    - EB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
    - EB left – PM peak hour
- Temperance Avenue at Tulare Avenue
    - SB left – PM peak hour
    - WB left – AM peak hour
- Shields Avenue at Locan Avenue
    - NB left – PM peak hour
    - EB left – PM peak hour
- Armstrong Avenue at Clinton Avenue
    - WB left – AM peak
- Armstrong Avenue at Olive Avenue
    - EB left – PM peak hour

- WB left – AM peak hour

To mitigate the intersections that are projected to operate below the appropriate adopted LOS standard, meet the rural peak hour volume signal warrant, or exceed the available storage lengths with the 95th percentile queue lengths, the recommended improvements by scenario are listed in the previous sections.

Based on the results of the Traffic Impact Study, the majority of the impacts are caused by the planned growth in the area. Even with the ultimate build out lane configurations, two intersections are projected to operate with a LOS “F” in the Mitigated 2035 Project scenario. As discussed in Appendix C, the Temperance Avenue at Shields Avenue intersection is an end point of a road segment designated as being evaluated using a peak hour LOS “F” and a second segment designated as being evaluated using a peak hour LOS “E”. As such, this intersection may operate at a LOS “F” without further mitigations and be considered as operating at the adopted LOS standard. Further mitigation of this intersection would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Temperance Avenue at McKinley Avenue is located in the road segment designated as being evaluated using a peak hour LOS “E” standard. It should be noted that a roadway segment projected to operate at designated LOS threshold can have intersections that may operate below the segment LOS depending on the amount of turning movement conflicts. As such, it is possible that the Temperance Avenue at McKinley Avenue intersection could operate at a LOS “F” while the overall segment could operate at a LOS “E”. Again, to mitigate this intersection it would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

All turn pocket length extensions shown in this document are a representative snap shot based on the LOS analysis results that are generated by the optimization of the intersection signals. These lengths are subject to change based on re-optimization of signals and ultimately on changes in volumes. Therefore, final decisions on extension of the various turn pockets beyond the City of Fresno standard should be made at the time of intersection modifications based on current volumes and traffic patterns.

In addition, the overall system of study intersections is optimized to generate the lowest overall delay to all vehicles in the system. As such some movements and intersections are “sacrificed” to operate at a lower LOS (increased vehicle delay) so that the majority of the vehicles and intersections in the system can operate at the highest LOS (decreased vehicle delay) possible.

Mitigation Impact Fees

Assuming the site develops consistent with the Traffic Impact Study, the Project would pay the following Traffic Signal Mitigation Impact Fee (TSMI), New Growth Area Street Fee (FMSI), and Regional Transportation Mitigation Fee (RTMF):

TMSI = 349 dwelling units X $475 (fee rate per latest City of Fresno fee schedule) = $165,775

FMSI = 55.1 acres X $28,585 (fee rate per latest City of Fresno fee schedule) = $1,575,033.50

RTMF = 349 dwelling units X $1,637 (fee rate per latest Fresno COG fee schedule) = $571,313

The TSMI fee would at a minimum include the following signals:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at Shields Avenue – signal appears to be complete
- Temperance Avenue at Clinton Avenue – signal appears to be complete
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue – This signal was removed from the TSMI fee program because of its location in the Southeast Growth Area (SEGA) which is currently not allowed for development. However, this signal is a Fresno County requirement for the school development at the northeast corner of Shields Avenue and Locan Avenue
- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

In addition, the New Growth Area FMSI fee would at a minimum include the following improvements:

- Travel lanes
- Medians and median landscaping
- Parking lanes
- Bike lanes
- Curb and gutter
- Bus bays
- Irrigation pipes and canals
- Railroad crossings
- Soft costs (engineering, plan check, and inspection costs)

The streets that are included in the FMSI include:

- Temperance Avenue – 6-lane super arterial – Jensen Avenue to north of Dakota Avenue
- Shields Avenue – 4-lane arterial – west of Fowler Avenue to Locan Avenue
- Belmont Avenue – 4-lane arterial – west of Clovis Avenue to Temperance Avenue
- Dakota Avenue – 3-lane/5-lane collector – Fowler Avenue to Temperance Avenue
- Clinton Avenue – 3-lane collector – west of Sunnyside Avenue to Locan Avenue
- McKinley Avenue – 3-lane collector – Clovis Avenue to Locan Avenue
- Olive Avenue – 5-lane collector – west of Clovis Avenue to Temperance Avenue
- Tulare Avenue – 3-lane collector – Fancher Creek to Fowler Avenue
- Locan Avenue – 3-lane collector – Clinton Avenue to north of Shields Avenue
- Armstrong Avenue – 3-lane/5-lane collector – Jensen Avenue to north of Dakota Avenue

Again, DeWolf Avenue is located in the SEGA and therefore not allowed for development.

Finally, the Regional RTMF fee is intended to ensure that future development contributes to its fair share towards the cost of infrastructure to mitigate the cumulative, indirect regional transportation impacts of new growth in a manner consistent with the provisions of the State of California Mitigation Fee Act. The fees will help fund improvements needed to maintain the target level of service in the face of higher traffic volumes brought on by new developments.

Therefore, any improvements that the Project makes to any of these facilities should be credited towards their impact fees.

Fair Share Percentage

In addition to the analyses requested by the City of Fresno, Fresno County requested a Fair Share Percentage be calculated for the Fowler Avenue at Olive Avenue intersection. The Fair Share Percentage for the Fowler Avenue at Olive Avenue intersections was calculated by using the following formula:

Project Trips ÷ 2035 Project Volumes

The Fair Share Percentage for the Fowler Avenue at Olive Avenue intersection using the AM peak hour volumes would be 0.58% and using the PM peak hour volumes would be 0.66%.

Transit Services

Currently, there are no Fresno Area Express or Fresno County Rural Transit options available in the study area. The TIS for the proposed project did not identify any potential impacts to the transit services in the project area.

Bicycle and Pedestrian Facilities

Bicycle Facilities

According to the City of Fresno Active Transportation Plan, Class II, bike lanes, provide striped lanes for one-way bike travel on a street or highway. Class III, bike routes, are signed shared roadway with vehicular traffic with no additional markings or barriers.

In the study area, there is a Class I bike path that extends along Temperance Avenue north of Shields Avenue for approximately 1,300 feet on the west side of the roadway. Ultimately this path will extend to north of Dakota Avenue as vacant lands are developed. Class I, shared use paths, are non-motorized facilities, paved or unpaved, physically separated from motorized vehicular traffic by an open space or barrier.

There are also two (2) Class II bike lanes in the study area:

- Shields Avenue – Fowler Avenue (west) to Temperance Avenue (east) – both sides of the roadway
- Shields Avenue – Temperance Avenue (west) to Locan Avenue (east) – north side of the roadway
- Belmont Avenue – North Sunnyside Avenue (west) to Fowler Avenue (east) – south side of the roadway
- Belmont Avenue – Fowler Avenue (west) to City of Fresno Sphere of Influence (east) – both sides of the roadway

  This bike lane actually extends west to Clovis Avenue on the south side of the roadway but there is a an approximately 1,000-foot gap between North Manila Avenue and North Sunnyside Avenue.

The TIS for the proposed project did not identify any potential impacts to the bicycle facilities in the project area.

Pedestrian

In the study area, there are sidewalks located in the neighborhoods on the northeast, northwest, and southwest corners of the Temperance Avenue at Shields Avenue intersection. Likewise, there are sidewalks located in the neighborhood on the northwest corner of the Shields Avenue at Locan Avenue intersection.

Sidewalks would be provided along all project area roadways. The TIS for the proposed project did not identify any potential impacts to the pedestrian facilities in the project area.

Conclusion

Payment of the applicable impact fees (including, but not limited to, the TMSI Fee, FMSI Fee, and RTMF) would be required.

The project is not located near an airport; therefore, it will not change air traffic levels. The proposed streets will not create hazards or conflict with emergency access.

In conclusion, with the MEIR Mitigation Measures and Project Specific Mitigation Measure incorporated the proposed project will not result in any transportation impacts beyond those analyzed in MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the transportation related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

2. The proposed project shall implement and incorporate the transportation related mitigation measure as identified in the attached Project Specific Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XVII. TRIBAL CULTURAL RESOURCES – Would the project:				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC section 5020.1(k), or,			X	
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC section 5024.1. In applying the criteria set forth in subdivision (c) of PRC section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.			X	

The State requires lead agencies to consider the potential effects of proposed projects and consult with California Native American tribes during the local planning process for the purpose of protecting Traditional Tribal Cultural Resources through the CEQA Guidelines. Pursuant to PRC Section 21080.3.1, the lead agency shall begin consultation with the California Native American tribe that is traditionally and culturally affiliated with the geographical area of the proposed project. Such significant cultural resources are either sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a tribe which is either on or eligible for inclusion in the California Historic Register or local historic register, or, the lead agency, at its discretion, and support by substantial evidence, choose to treat the resources as a Tribal Cultural Resources (PRC Section 21074(a)(1-2)).

Additional information may also be available from the California Native American Heritage Commission’s Sacred Lands File per PRC Section 5097.96 and the California Historical Resources Information System administered by the California Office of Historic Preservation. Please also note that PRC Section 21082.3(c) contains provisions specific to confidentiality.

Pursuant to AB 52, the Table Mountain Rancheria of California and Dumna Wo Wah Tribal Government were invited to consult under AB 52. The City of Fresno mailed notices of the proposed project to each of these tribes on December 31, 2018 which included the required 30-day time period for tribes to request consultation.

Under invitations to consult under AB 52, the Table Mountain Rancheria of California responded on February 5, 2019. The response letter notes that the Table Mountain Rancheria declines participation at this time, but would appreciate being notified in the unlikely event that cultural resources are identified.

The site currently contains one agricultural building and orchard uses. The site has been routinely disturbed as part of the agricultural operations. If any artifacts are inadvertently discovered during ground-disturbing activities, existing federal, State, and local laws and regulations as well as the mitigation measures of the Fresno General Plan MEIR will require construction activities to cease until such artifacts are properly examined and determined not to be of significance by a qualified cultural resources professional.

In conclusion, with implementation of the MEIR Cultural Resource Mitigation measures, impacts related to tribal cultural resources would be less than significant.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the cultural resources related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XIX. UTILITIES AND SERVICE SYSTEMS – Would the project:				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effect?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			X	
c) Result in a determination by the waste water treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			X	
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?			X	
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?			X	

The proposed project will require construction of new infrastructure to connect to the existing utility infrastructure. This will include water, wastewater, and storm water drainage connections. Additionally, the project will include connections for electric power, natural gas, and telecommunications facilities. The installation of this infrastructure will not require any major upsizing or other offsite construction activities that would cause a significant impact. The new infrastructure would be connected to existing infrastructure that is adjacent to the project site.

As discussed under the Hydrology and Water Quality section of this Initial Study, the City has adequate water supply and the applicant will be required to comply with all requirements of the City of Fresno Department of Public Utilities to reduce the project's water impacts to less than significant.

The City of Fresno acts as the Regional Sewering Agency and is responsible for operating the Fresno/Clovis Regional Wastewater Reclamation Facility and the North Fresno Wastewater Reclamation Facility (NFWRF). The Regional Facility provides wastewater treatment for a service area that includes most of the Cities of Fresno and Clovis, and some unincorporated areas of Fresno County. According to the City's General Plan MEIR, the Regional Facility received and treated approximately 72,302 acre-feet (AF) of wastewater during 2011, representing an annual average daily flow of approximately 64.5 million gallons per day (MGD). The quantity of wastewater received and treated by the Regional Facility has been declining since 2006, when it peaked at a total of approximately 80,801 AF, representing an annual average daily flow of approximately 72.1 MGD. The permitted wastewater treatment capacity of the Regional Facility is currently 80.0 MGD as an annual monthly average flow, and 88.0 MGD as a maximum monthly average flow. The City is currently evaluating upgrades and modifications to the existing Regional Facility that may result in a capacity rating increase of 15.0 MGD. The City of Clovis owns 9.3 MGD of wastewater treatment capacity at the Regional Facility, and the City of Fresno owns the remaining capacity.

The NFWRF was constructed in late 2006 to provide wastewater treatment service for residential and commercial development in the surrounding area of north Fresno. The permitted capacity of the NFWRF is 0.71 MGD, as an average monthly flow, and 1.07 MGD, as a maximum daily flow. The City's master plan for the NFWRF calls for ultimate expansion to an average monthly flow capacity of 1.07 MGD upon full development of the NFWRF service area.

The General Plan MEIR concludes that impacts associated with wastewater treatment facilities and capacity resulting from buildout of the General Plan, including the proposed project site, would be less than significant with implementation of Mitigation Measures USS-1 (which requires development and implementation of a wastewater master plan update), USS-2 (which requires evaluation of the wastewater system and construction of expansions at the Regional Facility and NFWRF), and USS-3 (which requires evaluation of the wastewater system and construction of a wastewater treatment facility within the Southeast Development Area). The project site is not within the Southeast Development Area.

The City of Fresno Department of Public Utilities has reviewed the project and determined that sanitary sewer facilities are available to provide service to the site, subject to the required conditions of approval. The conditions of approval include payment of the applicable sanitary sewer fees, which would eventually be used to provide funding for the improvements at the Regional Facility and NFWRF in order to expand capacity (as required by Mitigation Measure USS-2 of the MEIR). The proposed project will not result in a determination by the waste water treatment provider that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments. It is further noted that the project would result in fewer units than were anticipated for the project site by the City's General Plan MEIR. As such, the project would generate less wastewater than was anticipated for the site by the MEIR.

Impacts to storm drainage facilities have been previously discussed under the Hydrology and Water Quality section included within this analysis herein above. While the proposed project will result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction such facilities will not cause significant environmental effects.

The proposed project would be subject to the payment of any applicable connection charges and/or fees and extension of services in a manner which is compliant with the Department of Public Utilities standards, specifications, and policies.

Sanitary sewer and water service delivery is also subject to payment of applicable connection charges and/or fees; compliance with the Department of Public Utilities standards, specifications, and policies; the rules and regulations of the California Public Utilities Commission and California Health Services; and, implementation of the City-wide program for the completion of incremental expansions to facilities for planned water supply, treatment, and storage.

According to the City's General Plan MEIR, garbage disposed of in the City of Fresno is taken to Cedar Avenue Recycling and Transfer Station. Once trash has been off-loaded at the transfer station, it is sorted and non-recyclable solid waste is loaded onto large trucks and taken to the American Avenue Landfill located approximately six miles southwest of Kerman. American Avenue Landfill is owned and operated by Fresno County and began operations in 1992 for both public and commercial solid waste haulers. The American Avenue Landfill is a sanitary landfill, meaning that it is a disposal site for non-hazardous solid waste spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day.

The American Avenue Landfill (i.e. American Avenue Disposal Site 10-AA-0009) has a maximum permitted capacity of 32,700,000 cubic yards and a remaining capacity of 29,358,535 cubic yards, with an estimated closure date of August 31, 2031. The maximum permitted throughput is 2,200 tons per day. Other landfills within the County of Fresno include the Clovis Landfill with a maximum remaining permitted capacity of 7,740,000 cubic yards, a maximum permitted throughput of 2,000 tons per day, and an estimated closure date of 2047. There is also the Coalinga Landfill with a maximum remaining capacity of 1,930,062 cubic yards, a maximum permitted throughput of 200 tons per day, and an estimated closure date of 2029.

Using the solid waste generation rates included in the City's General Plan MEIR, the proposed 349 units would generate 3,490 pounds of waste per day (or 637 tons per year). The project site will be serviced by the solid waste division, and the solid waste generated by the project would be sent to the American Avenue Landfill. As noted above, the estimated closure date of the American Avenue Landfill is 2031. Additional capacity also exists at the Clovis Landfill and Coalinga Landfill. The 637 tons per year would not result in exceedance of the local capacity infrastructure. It is further noted that the project would result in fewer units than were anticipated for the project site by the City's General Plan MEIR. As such, the project would generate less solid waste than was anticipated for the site by the MEIR.

In conclusion, with MEIR mitigation measures incorporated, the proposed project would not result in any utility and service system environmental impacts beyond those analyzed in the MEIR SCH No. 2012111015.

Mitigation Measures

1. The proposed project shall implement and incorporate, as applicable, the utilities related mitigation measures as identified in the attached MEIR SCH No. 2012111015 Fresno General Plan Mitigation Monitoring Checklist dated August 9, 2019.

ENVIRONMENTAL ISSUES	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
XX. WILDFIRE – If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?			X	
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?			X	
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?			X	

There are no State Responsibility Areas (SRAs) within the vicinity of the project site. The project site is not categorized as a "Very High" Fire Hazard Severity Zone (FHSZ) by CalFire. Although this CEQA topic only applies to areas within an SRA or Very High FHSZ, out of an abundance of caution, these checklist questions are analyzed below.

The project site will connect to an existing network of City streets. The proposed circulation improvements include six access points, all of which would be available during an emergency. The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

The risk of wildfire is related to a variety of parameters, including fuel loading (vegetation), fire weather (winds, temperatures, humidity levels and fuel moisture contents) and topography (degree of slope). Steep slopes contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult. Fuels such as grass are highly flammable because they have a high surface area to mass ratio and require less heat to reach the ignition point. The project site is located in an area that is predominately agricultural and urban, which is not considered at a significant risk of wildlife.

The project includes development of infrastructure (water, sewer, and storm drainage) required to support the proposed residential uses. The project site is surrounded by existing and future urban development. The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. The project would not require the installation or maintenance of infrastructure that may exacerbate fire risk.

The proposed project would require the installation of storm drainage infrastructure to ensure that storm waters properly drain from the project site and does not result in downstream flooding or major drainage changes. The proposed storm drainage plan includes an engineered network of storm drain lines and landscaped bioswales. The storm drainage plan was designed and engineered to ensure proper construction of storm drainage infrastructure to control runoff and prevent flooding, erosion, and sedimentation.

Runoff from the project site currently flows to the existing City storm drains located in N. Temperance Avenue and E. Shields Avenue. Upon development of the site, stormwater would flow to the on-site landscaped bioswales and/or the existing storm drains in the adjacent roadways. Additionally, the project site is located within FEMA Zone X (un-shaded), indicating that the site is located outside of the 100-year flood hazard zone. Further, because the site is essentially flat and located in an existing urbanized area of the City, downstream landslides would not occur.

Landslides include rockfalls, deep slope failure, and shallow slope failure. Factors such as the geological conditions, drainage, slope, vegetation, and others directly affect the potential for landslides. One of the most common causes of landslides is construction activity that is associated with road building (i.e. cut and fill). The project site is relatively flat; therefore, the potential for a landslide in the project site is essentially non-existent.

In conclusion, the wildfire environmental impacts would be less than significant, and no mitigation is required.

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?			X	

ENVIRONMENTAL ISSUES	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			X	
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?			X	

The proposed project is considered to be proposed at a size and scope which is neither a direct or indirect detriment to the quality of the environment through reductions in habitat, populations, or examples of local history (through either individual or cumulative impacts).

The proposed project does not have the potential to degrade the quality of the environment or reduce the habitat of wildlife species and will not threaten plant communities or endanger any floral or faunal species. Furthermore the project has no potential to eliminate important examples of major periods in history.

The project is consistent with applicable environmental policies and mitigation measures are required in several impact areas to reduce any potential significant impacts to less than significant. Additionally, due to the extensive buildout of the area and existing and future land constraints, it is not anticipated that future substantial development will occur in the immediate area above those levels planned by the City's General Plan and analyzed in the General Plan EIR. For the reasons stated here and in the Initial Study, it has been determined that this project does not have cumulatively considerable impacts.

In summary, given the mitigation measures required of the proposed project and the analysis detailed in the preceding Initial Study, the proposed project:

- Does not have environmental impacts which will cause substantial adverse effects on human beings, either directly nor indirectly.

- Does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish/wildlife or native plant species (or cause their population to drop below self-sustaining levels), does not threaten to eliminate a native plant or animal community, and does not threaten or restrict the range of a rare or endangered plant or animal.
- Does not eliminate important examples of elements of California history or prehistory.
- Does not have impacts which would be cumulatively considerable even though individually limited.

Therefore, there are no mandatory findings of significance and preparation of an Environmental Impact Report is not warranted for this project.

MEIR Mitigation Measure Monitoring Checklist for EA No. P18-03724

August 9, 2019

INCORPORATING MEASURES FROM THE MASTER ENVIRONMENTAL IMPACT REPORT (MEIR) CERTIFIED FOR THE CITY OF FRESNO GENERAL PLAN UPDATE (SCH No. 2012111015)

This mitigation measure monitoring and reporting checklist was prepared pursuant to California Environmental Quality Act (CEQA) Guidelines Section 15097 and Section 21081.6 of the Public Resources Code (PRC). It was certified as part of the Fresno City Council's approval of the MEIR for the Fresno General Plan update (Fresno City Council Resolution 2014-225, adopted December 18, 2014).

Letter designations to the right of each MEIR mitigation measure listed in this Exhibit note how the mitigation measure relates to the environmental assessment of the above-listed project, according to the key found at right and at the bottoms of the following pages:

A - Incorporated into Project
B - Mitigated
C - Mitigation in Progress
D - Responsible Agency Contacted
E - Part of City-wide Program
F - Not Applicable

The timing of implementing each mitigation measure is identified in in the checklist, as well as identifies the entity responsible for verifying that the mitigation measures applied to a project are performed. Project applicants are responsible for providing evidence that mitigation measures are implemented. As lead agency, the City of Fresno is responsible for verifying that mitigation is performed/completed.

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Aesthetics:								
AES-1. Lighting systems for street and parking areas shall include shields to direct light to the roadway surfaces and parking areas. Vertical shields on the light fixtures shall also be used to direct light away from adjacent light sensitive land uses such as residences. **Verification comments:**	Prior to issuance of building permits	Public Works Department (PW) and Development & Resource Management Dept. (DARM)	X				X	

Aesthetics *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AES-2: Lighting systems for public facilities such as active play areas shall provide adequate illumination for the activity; however, low intensity light fixtures and shields shall be used to minimize spillover light onto adjacent properties. **Verification comments:**	Prior to issuance of building permits	DARM	X				X	
AES-3: Lighting systems for non-residential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur. **Verification comments:**	Prior to issuance of building permits	DARM	X				X	
AES-4: Lighting systems for freestanding signs shall not exceed 100 foot Lamberts (FT-L) when adjacent to streets which have an average light intensity of less than 2.0 horizontal footcandles and shall not exceed 500 FT-L when adjacent to streets which have an average light intensity of 2.0 horizontal footcandles or greater. **Verification comments:**	Prior to issuance of building permits	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Aesthetics *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AES-5: Materials used on building facades shall be non-reflective. **Verification comments:**	Prior to development project approval	DARM	X					

Air Quality:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AIR-1: Projects that include five or more heavy-duty truck deliveries per day with sensitive receptors located within 300 feet of the truck loading area shall provide a screening analysis to determine if the project has the potential to exceed criteria pollutant concentration based standards and thresholds for NO2 and PM2.5. If projects exceed screening criteria, refined dispersion modeling and health risk assessment shall be accomplished and if needed, mitigation measures to reduce impacts shall be included in the project to reduce the impacts to the extent feasible. Mitigation measures include but are not limited to: • Locate loading docks and truck access routes as far from sensitive receptors as reasonably possible considering site design limitations to comply with other City design standards. • Post signs requiring drivers to limit idling to 5 minutes or less. **Verification comments:**	Prior to development project approval	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Air Quality *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AIR-2: Projects that result in an increased cancer risk of 10 in a million or exceed criteria pollutant ambient air quality standards shall implement site-specific measures that reduce toxic air contaminant (TAC) exposure to reduce excess cancer risk to less than 10 in a million. Possible control measures include but are not limited to: • Locate loading docks and truck access routes as far from sensitive receptors as reasonably possible considering site design limitations to comply with other City design standards. • Post signs requiring drivers to limit idling to 5 minutes or less • Construct block walls to reduce the flow of emissions toward sensitive receptors • Install a vegetative barrier downwind from the TAC source that can absorb a portion of the diesel PM emissions • For projects proposing to locate a new building containing sensitive receptors near existing sources of TAC emissions, install HEPA filters in HVAC systems to reduce TAC emission levels exceeding risk thresholds. • Install heating and cooling services at truck stops to eliminate the need for idling during overnight stops to run onboard systems. *(continued on next page)*	Prior to development project approval	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Air Quality *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AIR-2 *(continued from previous page)* • For large distribution centers where the owner controls the vehicle fleet, provide facilities to support alternative fueled trucks powered by fuels such as natural gas or bio-diesel • Utilize electric powered material handling equipment where feasible for the weight and volume of material to be moved. **Verification comments:**	*[see previous page]*	*[see previous page]*						
AIR-3: Require developers proposing projects on ARB's list of projects in its Air Quality and Land Use Handbook (Handbook) warranting special consideration to prepare a cumulative health risk assessment when sensitive receptors are located within the distance screening criteria of the facility as listed in the ARB Handbook. **Verification comments:**	Prior to development project approval	DARM					**X**	

Air Quality *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
AIR-4: Require developers of projects containing sensitive receptors to provide a cumulative health risk assessment at project locations exceeding ARB Land Use Handbook distance screening criteria or newer criteria that may be developed by the San Joaquin Valley Air Pollution Control District (SJVAPCD). **Verification comments:**	Prior to development project approval	DARM					X	
AIR-5: Require developers of projects with the potential to generate significant odor impacts as determined through review of SJVAPCD odor complaint history for similar facilities and consultation with the SJVAPCD to prepare an odor impact assessment and to implement odor control measures recommended by the SJVAPCD or the City to the extent needed to reduce the impact to less than significant. **Verification comments:**	Prior to development project approval	DARM				X	X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Biological Resources:								
BIO-1: Construction of a proposed project should avoid, where possible, vegetation communities that provide suitable habitat for a special-status species known to occur within the Planning Area. If construction within potentially suitable habitat must occur, the presence/absence of any special-status plant or wildlife species must be determined prior to construction, to determine if the habitat supports any special-status species. If special-status species are determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible. **Verification comments:**	Prior to development project approval	DARM	**X**				**X**	
BIO-2: Direct or incidental take of any state or federally listed species should be avoided to the greatest extent feasible. If construction of a proposed project will result in the direct or incidental take of a listed species, consultation with the resources agencies and/or additional permitting may be required. Agency consultation through the California Department of Fish and Wildlife (CDFW) 2081 and U.S. Fish and Wildlife Service (USFWS) Section 7 or Section 10 permitting processes must take place prior to any action that *(continued on next page)*	Prior to development project approval	DARM	**X**				**X**	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
BIO-2 *(continued from previous page)* may result in the direct or incidental take of a listed species. Specific mitigation measures for direct or incidental impacts to a listed species will be determined on a case-by-case basis through agency consultation. **Verification comments:**	*[see previous page]*	*[see previous page]*						
BIO-3: Development within the Planning Area should avoid, where possible, special-status natural communities and vegetation communities that provide suitable habitat for special-status species. If a proposed project will result in the loss of a special-status natural community or suitable habitat for special-status species, compensatory habitat-based mitigation is required under CEQA and the California Endangered Species Act (CESA). Mitigation will consist of preserving on-site habitat, restoring similar habitat or purchasing off-site credits from an approved mitigation bank. Compensatory mitigation will be determined through consultation with the City and/or resource agencies. An appropriate mitigation strategy and ratio will be agreed upon by the developer and lead agency to reduce project impacts to special-status natural communities to a less than significant *(continued on next page)*	Prior to development project approval	DARM	X				X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)*:

BIO-3 *(continued from previous page)*: level. Agreed-upon mitigation ratios will depend on the quality of the habitat and presence/absence of a special-status species. The specific mitigation for project level impacts will be determined on a case-by-case basis. **Verification comments:**	*[see previous page]*	*[see previous page]*						
BIO-4: Proposed projects within the Planning Area should avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA), if it is determined that suitable nesting habitat occurs on a project site. If construction cannot avoid the nesting season, a pre-construction clearance survey must be conducted to determine if any nesting birds or nesting activity is observed on or within 500-feet of a project site. If an active nest is observed during the survey, a biological monitor must be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer will be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities *(continued on next page)*	Prior to development project approval and during construction activities	DARM	**X**				**X**	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)***:**

BIO-4 *(continued from previous page)***:** may continue in the vicinity of the nest only at the discretion of the biological monitor. **Verification comments:**	*[see previous page]*	*[see previous page]*						
BIO-5: If a proposed project will result in the removal or impact to any riparian habitat and/or a special-status natural community with potential to occur in the Planning Area, compensatory habitat-based mitigation shall be required to reduce project impacts. Compensatory mitigation must involve the preservation or restoration or the purchase of off-site mitigation credits for impacts to riparian habitat and/or a special-status natural community. Mitigation must be conducted in-kind or within an approved mitigation bank in the region. The specific mitigation ratio for habitat-based mitigation will be determined through consultation with the appropriate agency (*i.e.*, CDFW or USFWS) on a case-by-case basis. **Verification comments:**	Prior to development project approval	DARM						**X**

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)*:

BIO-6: Project impacts that occur to riparian habitat may also result in significant impacts to streambeds or waterways protected under Section 1600 of Fish and Wildlife Code and Section 404 of the CWA. CDFW and/or USACE consultation, determination of mitigation strategy, and regulatory permitting to reduce impacts, as required for projects that remove riparian habitat and/or alter a streambed or waterway, shall be implemented. **Verification comments:**	Prior to development project approval	DARM						X

BIO-7: Project-related impacts to riparian habitat or a special-status natural community may result in direct or incidental impacts to special-status species associated with riparian or wetland habitats. Project impacts to special-status species associated with riparian habitat shall be mitigated through agency consultation, development of a mitigation strategy, and/or issuing incidental take permits for the specific special-status species, as determined by the CDFW and/or USFWS. **Verification comments:**	Prior to development project approval	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
BIO-8: If a proposed project will result in the significant alteration or fill of a federally protected wetland, a formal wetland delineation conducted according to U.S. Army Corps of Engineers (USACE) accepted methodology is required for each project to determine the extent of wetlands on a project site. The delineation shall be used to determine if federal permitting and mitigation strategy are required to reduce project impacts. Acquisition of permits from USACE for the fill of wetlands and USACE approval of a wetland mitigation plan would ensure a "no net loss" of wetland habitat within the Planning Area. Appropriate wetland mitigation/creation shall be implemented in a ratio according to the size of the impacted wetland. **Verification comments:**	Prior to development project approval	DARM						X
BIO-9: In addition to regulatory agency permitting, Best Management Practices (BMPs) identified from a list provided by the USACE shall be incorporated into the design and construction phase of the project to ensure that no pollutants or siltation drain into a federally protected wetland. Project design features such as fencing, appropriate drainage and *(continued on next page)*	Prior to development project approval; but for long-term operational BMPs, prior to issuance of occupancy	DARM	X			X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Biological Resources *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
BIO-9 *(continued from previous page)*: incorporating detention basins shall assist in ensuring project-related impacts to wetland habitat are minimized to the greatest extent feasible. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Cultural Resources:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-1: If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance. If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	**X**				**X**	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-1 *(continued from previous page)* recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-germ preservation to allow future scientific study. **Verification comments:**	*[see previous page]*	*[see previous page]*						
CUL-2: Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for prehistoric archaeological resources shall be conducted. The following procedures shall be followed. If prehistoric resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that buried prehistoric *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	**X**					

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)***:**

CUL-2 *(continued from previous page)* archaeological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified archaeologist shall be consulted to determine whether the resource requires further study. The qualified archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with CEQA Guidelines Section 15064.5. If the resources are determined to be unique prehistoric archaeological resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided *(continued on next page)*	*[see previous page]*	*[see previous page]*	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)***:**

CUL-2 *(further continued from previous two pages)* to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study. If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If the resources are found to be significant, measures shall be identified by the qualified archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified archaeologist. If additional prehistoric archaeological resources are found during *(continued on next page)*	*[see Page 14]*	*[see Page 14]*	

Cultural Resources *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-2 *(further continued from previous three pages)* excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed. **Verification comments:**	*[see Page 14]*	*[see Page 14]*						
CUL-3: Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for unique paleontological/geological resources shall be conducted. The following procedures shall be followed: If unique paleontological/geological resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that unique paleontological/geological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified paleontologist shall be consulted to determine whether the resource requires further study. The qualified paleontologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	X					

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
CUL-3 *(continued from previous page)* resources, including but not limited to, excavation of the finds and evaluation of the finds. If the resources are determined to be significant, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any paleontological/geological resources recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study. If unique paleontological/geological resources are found during the field survey or literature review, the resources shall be inventoried and evaluated for significance. If the resources are found to be significant, mitigation measures shall be identified by the qualified paleontologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the *(continued on next page)*	*[see previous page]*	*[see previous page]*						

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)*:

			A	B	C	D	E	F
CUL-3 *(further continued from previous two pages)* resources found during the field survey or literature review shall include a paleontological monitor. The monitoring period shall be determined by the qualified paleontologist. If additional paleontological/geological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed. **Verification comments:**	*[see Page 17]*	*[see Page 17]*						
CUL-4: In the event that human remains are unearthed during excavation and grading activities of any future development project, all activity shall cease immediately. Pursuant to Health and Safety Code (HSC) Section 7050.5, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98(a). If the remains are determined to be of Native American descent, the coroner shall within 24 hours notify the Native American Heritage Commission (NAHC). The NAHC shall then contact the most *(continued on next page)*	Prior to commencement of, and during, construction activities	DARM	X				X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Cultural Resources *(continued)*:

CUL-4 *(continued from previous page)* likely descendent of the deceased Native American, who shall then serve as the consultant on how to proceed with the remains. Pursuant to PRC Section 5097.98(b), upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment. **Verification comments:**	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Hazards and Hazardous Materials								
HAZ-1: Re-designate the existing vacant land proposed for low density residential located northwest of the intersection of East Garland Avenue and North Dearing Avenue and located within Fresno Yosemite International Airport Zone 1-RPZ, to Open Space. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-2: Limit the proposed low density residential (1 to 3 dwelling units per acre) located northwest of the airport, and located within Fresno Yosemite International Airport Zone 3-Inner Turning Area, to 2 dwelling units per acre or less. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-3: Re-designate the current area within Fresno Yosemite International Airport Zone 5-Sideline located northeast of the airport to Public Facilities-Airport or Open Space. **Verification comments:**	Prior to development approvals	DARM						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
Hazards and Hazardous Materials *(continued)***:**								
HAZ-4: Re-designate the current vacant lots at the northeast corner of Kearney Boulevard and South Thorne Avenue to Public Facilities-Airport or Open Space. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-5: Prohibit residential uses within Safety Zone 1 northwest of the Hawes Avenue and South Thorne Avenue intersection. **Verification comments:**	Prior to development approvals	DARM						X
HAZ-6: Establish an alternative Emergency Operations Center in the event the current Emergency Operations Center is under redevelopment or blocked. **Verification comments:**	Prior to redevelopment of the current Emergency Operations Center	Fresno Fire Department and Mayor/ City Manager's Office						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
HYD-1: The City shall develop and implement water conservation measures to reduce the per capita water use to 215 gallons per capita per day. **Verification comments:**	Prior to water demand exceeding water supply	Department of Public Utilities (DPU)					X	
HYD-2: The City shall continue to be an active participant in the Kings Water Authority and the implementation of the Kings Basin IRWMP. **Verification comments:**	Ongoing	DPU					X	
HYD-5.1: The City and partnering agencies shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan collection systems to less than significant. • Implement the existing Storm Drainage Master Plan (SDMP) for collection systems in drainage areas where the amount of imperviousness is unaffected by the change in land uses. *(continued on next page)*	Prior to exceedance of capacity of existing stormwater drainage facilities	Fresno Metropolitan Flood Control District (FMFCD), DARM, and PW	X			X	X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

HYD-5.1 *(continued from previous page)* • Update the SDMP in those drainage areas where the amount of imperviousness increased due to the change in land uses to determine the changes in the collection systems that would need to occur to provide adequate capacity for the stormwater runoff from the increased imperviousness. • Implement the updated SDMP to provide stormwater collection systems that have sufficient capacity to convey the peak runoff rates from the areas of increased imperviousness. Require developments that increase site imperviousness to install, operate, and maintain FMFCD approved on-site detention systems to reduce the peak runoff rates resulting from the increased imperviousness to the peak runoff rates that will not exceed the capacity of the existing stormwater collection systems. **Verification comments:**	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

HYD-5.2: The City and partnering agencies shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan retention basins to less than significant: Consult the SDMP to analyze the impacts to existing and planned retention basins to determine remedial measures required to reduce the impact on retention basin capacity to less than significant. Remedial measures would include: • Increase the size of the retention basin through the purchase of more land or deepening the basin or a combination for planned retention basins. • Increase the size of the emergency relief pump capacity required to pump excess runoff volume out of the basin and into adjacent canal that convey the stormwater to a disposal facility for existing retention basins. • Require developments that increase runoff volume to install, operate, and maintain, Low Impact Development (LID) measures to reduce runoff volume to the runoff volume that will not exceed the capacity of the existing retention basins. **Verification comments:**	Prior to exceedance of capacity of existing retention basin facilities	FMFCD, DARM, and PW				X	X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)***:**

HYD-5.3: The City and partnering agencies shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan urban detention (stormwater quality) basins to less than significant. Consult the SDMP to determine the impacts to the urban detention basin weir overflow rates and determine remedial measures required to reduce the impact on the detention basin capacity to less than significant. Remedial measures would include: • Modify overflow weir to maintain the suspended solids removal rates adopted by the FMFCD Board of Directors. • Increase the size of the urban detention basin to increase residence time by purchasing more land. The existing detention basins are already at the adopted design depth. • Require developments that increase runoff volume to install, operate, and maintain, Low Impact Development (LID) measures to reduce peak runoff rates and runoff volume to the runoff rates and volumes that will not exceed the weir overflow rates of the existing urban detention basins. **Verification comments:**	Prior to exceedance of capacity of existing urban detention basin (stormwater quality) facilities	FMFCD, DARM, and PW					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Hydrology and Water Quality *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
HYD-5.4: The City shall implement the following measures to reduce the impacts on the capacity of existing or planned storm drainage Master Plan pump disposal systems to less than significant. • Consult the SDMP to determine the extent and degree to which the capacity of the existing pump system will be exceeded. • Require new developments to install, operate, and maintain FMFCD design standard on-site detention facilities to reduce peak stormwater runoff rates to existing planned peak runoff rates. • Provide additional pump system capacity to maximum allowed by existing permitting to increase the capacity to match or exceed the peak runoff rates determined by the SDMP. **Verification comments:**	Prior to exceedance of capacity of existing pump disposal systems	FMFCD, DARM, and PW					X	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Hydrology and Water Quality *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
HYD-5.5: The City shall work with FMFCD to develop and adopt an update to the SDMP for the Southeast Development Area that would be adequately designed to collect, convey and dispose of runoff at the rates and volumes which would be generated by the planned land uses in that area. **Verification comments:**	Prior to development approvals in the Southeast Development Area	FMFCD, DARM, and PW					X	

Public Services:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
PS-1: As future fire facilities are planned, the fire department shall evaluate if specific environmental effects would occur. Typical impacts from fire facilities include noise, traffic, and lighting. Typical mitigation to reduce these impacts includes: • *Noise:* Barriers and setbacks on the fire department sites. • *Traffic:* Traffic devices for circulation and a “keep clear zone” during emergency responses. • *Lighting:* Provision of hoods and deflectors on lighting fixtures on the fire department sites. **Verification comments:**	During the planning process for future fire department facilities	DARM					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Public Services *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
PS-2: As future police facilities are planned, the police department shall evaluate if specific environmental effects would occur. Typical impacts from police facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts from police department facilities includes: • *Noise:* Barriers and setbacks on the police department sites. • *Traffic:* Traffic devices for circulation. • *Lighting:* Provision of hoods and deflectors on lighting fixtures on the police department sites. **Verification comments:**	During the planning process for future Police Department facilities	DARM					X	
PS-3: As future public and private school facilities are planned, school districts shall evaluate if specific environmental effects would occur with regard to public schools, and DARM shall evaluate other school facilities. Typical impacts from school facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts from school facilities includes: *(continued on next page)*	During the planning process for future school facilities	DARM, local school districts, and the Division of the State Architect					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Public Services *(continued)*:

PS-3 *(continued from previous page)* • *Noise*: Barriers and setbacks placed on school sites. • *Traffic*: Traffic devices for circulation. • *Lighting*: Provision of hoods and deflectors on lighting fixtures for stadium lights. **Verification comments:**	*[see previous page]*	*[see previous page]*						
PS-4: As future parks and recreational facilities are planned, the City shall evaluate if specific environmental effects would occur. Typical impacts from school facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts from park and recreational facilities includes: • *Noise*: Barriers and setbacks placed on school sites. • *Traffic*: Traffic devices for circulation. • *Lighting*: Provision of hoods and deflectors on lighting fixtures for outdoor play area/field lights. **Verification comments:**	During the planning process for future park and recreation facilities	DARM					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Public Services *(continued)***:**

PS-5: As future detention, court, library, and hospital facilities are planned, the appropriate agencies shall evaluate if specific environmental effects would occur. Typical impacts from court, library, and hospital facilities include noise, traffic, and lighting. Typical mitigation to reduce potential impacts includes: • *Noise:* Barriers and setbacks placed on school sites. • *Traffic:* Traffic devices for circulation. • *Lighting:* Provision of hoods and deflectors on outdoor lighting fixtures. **Verification comments:**	During the planning process for future detention, court, library, and hospital facilities	DARM, to the extent that agencies constructing these facilities are subject to City of Fresno regulation					X	

Utilities and Service Systems

USS-1: The City shall develop and implement a wastewater master plan update. **Verification comments:**	Prior to wastewater conveyance and treatment demand exceeding capacity	DPU					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-2: Prior to exceeding existing wastewater treatment capacity, the City shall evaluate the wastewater system and shall not approve additional development that contributes wastewater to the wastewater treatment facility that could exceed capacity until additional capacity is provided. By approximately the year 2025, the City shall construct the following improvements: • Construct an approximately 70 MGD expansion of the Regional Wastewater Treatment and Reclamation Facility and obtain revised waste discharge permits as the generation of wastewater is increased. • Construct an approximately 0.49 MGD expansion of the North Facility and obtain revised waste discharge permits as the generation of wastewater is increased. **Verification comments:**	Prior to exceeding existing wastewater treatment capacity	DPU					X	
USS-3: Prior to exceeding existing wastewater treatment capacity, the City shall evaluate the wastewater system and shall not approve additional development that contributes wastewater to the wastewater treatment facility that could exceed capacity until additional capacity is provided. After *(continued on next page)*	Prior to exceeding existing wastewater treatment capacity	DPU						X

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-3 *(continued from previous page)* approximately the year 2025, the City shall construct the following improvements: • Construct an approximately 24 MGD wastewater treatment facility within the Southeast Development Area and obtain revised waste discharge requirements as the generation of wastewater is increased. • Construct an approximately 9.6 MGD expansion of the Regional Wastewater Treatment and Reclamation Facility and obtain revised waste discharge permits as the generation of wastewater is increased. **Verification comments:**	*[see previous page]*	*[see previous page]*						
USS-4: A Traffic Control/Traffic Management Plan to address traffic impacts during construction of water and sewer facilities shall be prepared and implemented, subject to approval by the City (and Fresno County, when work is being done in unincorporated area roadways). The plan shall identify access and parking restrictions, pavement markings and signage, and hours of construction and for deliveries. It shall include haul routes, the notification plan, and coordination with emergency service providers and schools. **Verification comments:**	Prior to construction of water and sewer facilities	PW for work in the City; PW and Fresno County Public Works and Planning when unincorporated area roadways are involved					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

USS-5: Prior to exceeding capacity within the existing wastewater collection system facilities, the City shall evaluate the wastewater collection system and shall not approve additional development that would generate additional wastewater and exceed the capacity of a facility until additional capacity is provided. By approximately the year 2025, the following capacity improvements shall be provided. • Orange Avenue Trunk Sewer: This facility shall be improved between Dakota and Jensen Avenues. Approximately 37,240 feet of new sewer main shall be installed and approximately 5,760 feet of existing sewer main shall be rehabilitated. The size of the new sewer main shall range from 27 inches to 42 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are RS03A, RL02, C01-REP, C02-REP, C03-REP, C04-REP, C05-REP, C06-REL and C07-REP. • Marks Avenue Trunk Sewer: This facility shall be improved between Clinton Avenue and Kearney Boulevard. Approximately 12,150 feet of new sewer main shall be installed. The size of the new sewer main shall range from 33 inches to 60 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are CM1-REP and CM2-REP. *(continued on next page)*	Prior to exceeding capacity within the existing wastewater collection system facilities	DPU					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

USS-5 *(continued from previous page)* • North Avenue Trunk Sewer: This facility shall be improved between Polk and Fruit Avenues and also between Orange and Maple Avenues. Approximately 25,700 feet of new sewer main shall be installed. The size of the new sewer main shall range from 48 inches to 66 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are CN1-REL1 and CN3-REL1. • Ashlan Avenue Trunk Sewer: This facility shall be improved between Hughes and West Avenues and also between Fruit and Blackstone Avenues. Approximately 9,260 feet of new sewer main shall be installed. The size of the new sewer main shall range from 24 inches to 36 inches in diameter. The associated project designations in the 2006 Wastewater Master Plan are CA1-REL and CA2-REP. **Verification comments:**	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-6: Prior to exceeding capacity within the existing 28 pipeline segments shown in Figures 1 and 2 in Appendix J-1, the City shall evaluate the wastewater collection system and shall not approve additional development that would generate additional wastewater and exceed the capacity of one of the 28 pipeline segments until additional capacity is provided. **Verification comments:**	Prior to exceeding capacity within the existing 28 pipeline segments shown in Figures 1 and 2 in Appendix J-1 of the MEIR	DPU					X	
USS-7: Prior to exceeding existing water supply capacity, the City shall evaluate the water supply system and shall not approve additional development that demand additional water until additional capacity is provided. By approximately the year 2025, the following capacity improvements shall be provided. • Construct an approximately 80 million gallon per day (MGD) surface water treatment facility near the intersection of Armstrong and Olive Avenues, in accordance with Chapter 9 and Figure 9-1 of the City of Fresno Metropolitan Water Resources Management Plan Update (2014 Metro Plan Update) Phase 2 Report, dated January 2012. *(continued on next page)*	Prior to exceeding existing water supply capacity	DPU					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-7 *(continued from previous page)* • Construct an approximately 30 MGD expansion of the existing northeast surface water treatment facility for a total capacity of 60 MGD, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct an approximately 20 MGD surface water treatment facility in the southwest portion of the City, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. **Verification comments:**	*[see previous page]*	*[see previous page]*						
USS-8: Prior to exceeding capacity within the existing water conveyance facilities, the City shall evaluate the water conveyance system and shall not approve additional development that would demand additional water and exceed the capacity of a facility until additional capacity is provided. The following capacity improvements shall be provided by approximately 2025. • Construct 65 new groundwater wells, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. *(continued on next page)*	Prior to exceeding capacity within the existing water conveyance facilities	DPU					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)***:**

USS-8 *(continued from previous page)* • Construct a 2.0 million gallon potable water reservoir (Reservoir T2) near the intersection of Clovis and California Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 3.0 million gallon potable water reservoir (Reservoir T3) near the intersection of Temperance and Dakota Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 3.0 million gallon potable water reservoir (Reservoir T4) in the Downtown Planning Area, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 4.0 million gallon potable water reservoir (Reservoir T5) near the intersection of Ashlan and Chestnut Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct a 4.0 million gallon potable water reservoir (Reservoir T6) near the intersection of Ashlan Avenue and Highway 99, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. *(continued on next page)*	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)*:

USS-8 *(continued from previous two pages)* • Construct 50.3 miles of regional water transmission mains ranging in size from 24-inch to 48-inch diameter, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. • Construct 95.9 miles of 16-inch diameter transmission grid mains, in accordance with Chapter 9 and Figure 9-1 of the 2014 Metro Plan Update. **Verification comments:**	*[see Page 37]*	*[see Page 37]*						
USS-9: Prior to exceeding capacity within the existing water conveyance facilities, the City shall evaluate the water conveyance system and shall not approve additional development that would demand additional water and exceed the capacity of a facility until additional capacity is provided. The following capacity improvements shall be provided after approximately the year 2025 and additional water conveyance facilities shall be provided prior to exceedance of capacity within the water conveyance facilities to accommodate full buildout of the General Plan Update. *(continued on next page)*	Prior to exceeding capacity within the existing water conveyance facilities	DPU					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-9 *(continued from previous page)* • Construct a 4.0 million gallon potable water reservoir (SEDA Reservoir 1) within the northern part of the Southeast Development Area. • Construct a 4.0 million gallon potable water reservoir (SEDA Reservoir 2) within the southern part of the Southeast Development Area. Additional water conveyance facilities shall be provided prior to exceedance of capacity within the water conveyance facilities to accommodate full buildout of the General Plan Update. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Utilities and Service Systems - *Hydrology and Water Quality*

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-10: In order to maintain Fresno Irrigation District canal operability, FMFCD shall maintain operational intermittent flows during the dry season, within defined channel capacity and downstream capture capabilities, for recharge. **Verification comments:**	During the dry season	Fresno Irrigation District (FID)				X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources:*

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-11: When FMFCD proposes to provide drainage service outside of urbanized areas: (a) FMFCD shall conduct preliminary investigations on undeveloped lands outside of highly urbanized areas. These investigations shall examine wetland hydrology, vegetation and soil types. These preliminary investigations shall be the basis for making a determination on whether or not more in-depth wetland studies shall be necessary. If the proposed project site does not exhibit wetland hydrology, support a prevalence of wetland vegetation and wetland soil types then no further action is required. (b) Where proposed activities could have an impact on areas verified by the Corps as jurisdictional wetlands or waters of the U.S. (urban and rural streams, seasonal wetlands, and vernal pools), FMFCD shall obtain the necessary Clean Water Act, Section 404 permits for activities where fill material shall be placed in a wetland, obstruct the flow or circulation of waters of the United States, impair or reduce the reach of such waters. As part of FMFCD's Memorandum of Understanding with CDFG, Section 404 and 401 permits would be obtained from the U.S. Army Corps of Engineers and from the *(continued on next page)*	Prior to development approvals outside of highly urbanized areas	California Regional Water Quality Control Board (RWQCB), and USACE				**X**		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)**:***

USS-11 *(continued from previous page)* Regional Water Quality Control Board for any activity involving filling of jurisdictional waters). At a minimum, to meet "no net loss policy," the permits shall require replacement of wetland habitat at a 1**:**1 ratio. (c) Where proposed activities could have an impact on areas verified by the Corps as jurisdictional wetlands or waters of the U.S. (urban and rural streams, seasonal wetlands, and vernal pools), FMFCD shall submit and implement a wetland mitigation plan based on the wetland acreage verified by the U.S. Army Corps of Engineers. The wetland mitigation plan shall be prepared by a qualified biologist or wetland scientist experienced in wetland creation, and shall include the following or equally effective elements: i. Specific location, size, and existing hydrology and soils within the wetland creation area. ii. Wetland mitigation techniques, seed source, planting specifications, and required buffer setbacks. In addition, the mitigation plan shall ensure adequate water supply is provided to the created wetlands in order to maintain the proper *(continued on next page)*	*[see previous page]*	*[see previous page]*	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)**:***

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A-F
USS-11 *(continued from previous two pages)* hydrologic regimes required by the different types of wetlands created. Provisions to ensure the wetland water supply is maintained in perpetuity shall be included in the plan. iii. A monitoring program for restored, enhanced, created, and preserved wetlands on the project site. A monitoring program is required to meet three objectives; 1) establish a wetland creation success criteria to be met; 2) to specify monitoring methodology; 3) to identify as far as is possible, specific remedial actions that will be required in order to achieve the success criteria; and 4) to document the degree of success achieved in establishing wetland vegetation. (d) A monitoring plan shall be developed and implemented by a qualified biologist to monitor results of any on-site wetland restoration and creation for five years. The monitoring plan shall include specific success criteria, frequency and timing of monitoring, and assessment of whether or not maintenance activities are being carried out and how these shall be adjusted if necessary. *(continued on next page)*	*[see Page 41]*	*[see Page 41]*	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

Utilities and Service Systems - *Biological Resources* *(continued)****:***

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-11 *(continued from previous three pages)* If monitoring reveals that success criteria are not being met, remedial habitat creation or restoration should be designed and implemented by a qualified biologist and subject to five years of monitoring as described above. Or (e) In lieu of developing a mitigation plan that outlines the avoidance, purchase, or creation of wetlands, FMFCD could purchase mitigation credits through a Corps approved Mitigation Bank. **Verification comments:**	*[see Page 41]*	*[see Page 41]*						
USS-12: When FMFCD proposes to provide drainage service outside in areas that support seasonal wetlands or vernal pools: (a) During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools, FMFCD shall conduct a preliminary rare plant assessment. The assessment will determine the likelihood on whether or not the project site could support rare plants. If it is determined that the project site would not support rare plants, then no further *(continued on next page)*	During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools	California Department of Fish & Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS)				X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)*:

USS-12 *(continued from previous page)* action is required. However, if the project site has the potential to support rare plants; then a rare plant survey shall be conducted. Rare plant surveys shall be conducted by qualified biologists in accordance with the most current CDFG/USFWS guidelines or protocols and shall be conducted at the time of year when the plants in question are identifiable. (b) Based on the results of the survey, prior to design approval, FMFCD shall coordinate with CDFG and/or implement a Section 7 consultation with USFWS, shall determine whether the project facility would result in a significant impact to any special status plant species. Evaluation of project impacts shall consider the following: • The status of the species in question (*e.g.*, officially listed by the State or Federal Endangered Species Acts). • The relative density and distribution of the on-site occurrence versus typical occurrences of the species in question. *(continued on next page)*	*[see previous page]*	*[see previous page]*	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-12 *(continued from previous two pages)* • The habitat quality of the on-site occurrence relative to historic, current or potential distribution of the population. (c) Prior to design approval, and in consultation with the CDFG and/or the USFWS, FMFCD shall prepare and implement a mitigation plan, in accordance with any applicable State and/or federal statutes or laws, that reduces impacts to a less than significant level. **Verification comments:**	*[see Page 44]*	*[see Page 44]*						
USS-13: When FMFCD proposes to provide drainage service outside in areas that support seasonal wetlands or vernal pools: (a) During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools, FMFCD shall conduct a preliminary survey to determine the presence of listed vernal pool crustaceans. *(continued on next page)*	During facility design and prior to initiation of ground disturbing activities in areas that support seasonal wetlands or vernal pools	CDFW and USFWS				X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)***:**

USS-13 *(continued from previous page)* (b) If potential habitat (vernal pools, seasonally inundated areas) or fairy shrimp exist within areas proposed to be disturbed, FMFCD shall complete the first and second phase of fairy shrimp presence or absence surveys. If an absence finding is determined and accepted by the USFWS, then no further mitigation shall be required for fairy shrimp. (c) If fairy shrimp are found to be present within vernal pools or other areas of inundation to be impacted by the implementation of storm drainage facilities, FMFCD shall mitigate impacts on fairy shrimp habitat in accordance with the USFWS requirements of the Programmatic Biological Opinion. This shall include on-site or off-site creation and/or preservation of fairy shrimp habitat at ratios ranging from 3:1 to 5:1 depending on the habitat impacted and the choice of on-site or off-site mitigation. Or mitigation shall be the purchase of mitigation credit through an accredited mitigation bank. **Verification comments:**	*[see previous page]*	*[see previous page]*	

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-14: When FMFCD proposes to construct drainage facilities in an area where elderberry bushes may occur: (a) During facility design and prior to initiation of construction activities, FMFCD shall conduct a project-specific survey for all potential Valley Elderberry Longhorn Beetle (VELB) habitats (elderberry shrubs), including a stem count and an assessment of historic or current VELB habitat. (b) FMFCD shall avoid and protect all potential identified VELB habitat where feasible. (c) Where avoidance is infeasible, develop and implement a VELB mitigation plan in accordance with the most current USFWS mitigation guidelines for unavoidable take of VELB habitat pursuant to either Section 7 or Section 10(a) of the Federal Endangered Species Act. The mitigation plan shall include, but might not be limited to, relocation of elderberry shrubs, planting of elderberry shrubs, and monitoring of relocated and planted elderberry shrubs. **Verification comments:**	During facility design and prior to initiation of construction activities	CDFW and USFWS				X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)***:**

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-15: Prior to ground disturbing activities during nesting season (March through July) for a project that supports bird nesting habitat, FMFCD shall conduct a survey of trees. If nests are found during the survey, a qualified biologist shall assess the nesting activity on the project site. If active nests are located, no construction activities shall be allowed within 250 feet of the nest until the young have fledged. If construction activities are planned during the no n-breeding period (August through February), a nest survey is not necessary. **Verification comments:**	Prior to ground disturbing activities during nesting season (March through July) for a project that supports bird nesting habitat	CDFW and USFWS				X		
USS-16: When FMFCD proposes to construct drainage facilities in an area that supports bird nesting habitat: (a) FMFCD shall conduct a pre-construction breeding-season survey (approximately February 1 through August 31) of proposed project sites in suitable habitat (levee and canal berms, open grasslands with suitable burrows) during the same calendar year that construction is planned to begin. If phased construction procedures are planned for the proposed project, the results of the above survey shall be valid only for the season when it is conducted. *(continued on next page)*	Prior to ground disturbing activities during nesting season (March through July) for a project that supports bird nesting habitat	CDFW and USFWS				X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)***:**

USS-16 *(continued from previous page)* (b) During the construction stage, FMFCD shall avoid all burrowing owl nest sites potentially disturbed by project construction during the breeding season while the nest is occupied with adults and/or young. The occupied nest site shall be monitored by a qualified biologist to determine when the nest is no longer used. Avoidance shall include the establishment of a 160-foot diameter non-disturbance buffer zone around the nest site. Disturbance of any nest sites shall only occur outside of the breeding season and when the nests are unoccupied based on monitoring by a qualified biologist. The buffer zone shall be delineated by highly visible temporary construction fencing. Based on approval by CDFG, pre-construction and pre-breeding season exclusion measures may be implemented to preclude burrowing owl occupation of the project site prior to project-related disturbance. Burrowing owls can be passively excluded from potential nest sites in the construction area, either by closing the burrows or placing one-way doors in the burrows according to current CDFG protocol. Burrows shall be examined not more than 30 days before construction to ensure that no owls have recolonized the area of construction. *(continued on next page)*	*[see previous page]*	*[see previous page]*	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems - *Biological Resources* *(continued)*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-16 *(continued from previous two pages)* For each burrow destroyed, a new burrow shall be created (by installing artificial burrows at a ratio of 2:1 on protected lands nearby. **Verification comments:**	*[see Page 49]*	*[see Page 49]*						
USS-17: When FMFCD proposes to construct drainage facilities in the San Joaquin River corridor: (a) FMFCD shall not conduct instream activities in the San Joaquin River between October 15 and April 15. If this is not feasible, FMFCD shall consult with the National Marine Fisheries Service and CDFW on the appropriate measures to be implemented in order to protect listed salmonids in the San Joaquin River. (b) Riparian vegetation shading the main–channel that is removed or damaged shall be replaced at a ratio and quantity sufficient to maintain the existing shading of the channel. The location of replacement trees on or within *(continued on next page)*	During instream activities conducted between October 15 and April 15	National Marine Fisheries Service (NMFS), CDFW, and Central Valley Flood Protection Board (CVFPB)				X		

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems / *Biological Resources* *(continued)***:**

USS-17 *(continued from previous page)* FMFCD berms, detention ponds or river channels shall be approved by FMFCD and the Central Valley Flood Protection Board. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Utilities and Service Systems – *Recreation / Trails*:

USS-18: When FMFCD updates its District Service Plan: Prior to final design approval of all elements of the District Services Plan, FMFCD shall consult with Fresno County, City of Fresno, and City of Clovis to determine if any element would temporarily disrupt or permanently displace adopted existing or planned trails and associated recreational facilities as a result of the proposed District Services Plan. If the proposed project would not temporarily disrupt or permanently displace adopted existing or planned trails, no further mitigation is necessary. If the proposed project would have an effect on the trails and associated facilities, FMFCD shall implement the following: *(continued on next page)*	Prior to final design approval of all elements of the District Services Plan	DARM, PW, City of Clovis, and County of Fresno				**X**		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems – *Recreation / Trails* (*continued*):

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-18 *(continued from previous page)* (a) If short-term disruption of adopted existing or planned trails and associated recreational facilities occur, FMFCD shall consult and coordinate with Fresno County, City of Fresno, and City of Clovis to temporarily re-route the trails and associated facilities. (b) If permanent displacement of the adopted existing or planned trails and associated recreational facilities occur, the appropriate design modifications to prevent permanent displacement shall be implemented in the final project design or FMFCD shall replace these facilities. **Verification comments:**	*[see previous page]*	*[see previous page]*						

Utilities and Service Systems – *Air Quality*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-19: When District drainage facilities are constructed, FMFCD shall: (a) Minimize idling time of construction equipment vehicles to no more than ten minutes, or require that engines be shut off when not in use. *(continued on next page)*	During storm water drainage facility construction activities	Fresno Metropolitan Flood Control District and SJVAPCD				X		

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems – *Air Quality* (*continued*):

USS-19 *(continued from previous page)* (b) Construction shall be curtailed as much as possible when the Air Quality Index (AQI) is above 150. AQI forecasts can be found on the SJVAPCD web site. (c) Off-road trucks should be equipped with on-road engines if possible. (d) Construction equipment should have engines that meet the current off-road engine emission standard (as certified by CARB), or be re-powered with an engine that meets this standard. **Verification comments:**	*[see previous page]*	*[see previous page]*	

Utilities and Service Systems – *Adequacy of Storm Water Drainage Facilities*:

			A	B	C	D	E	F
USS-20: Prior to exceeding capacity within the existing storm water drainage facilities, the City shall coordinate with FMFCD to evaluate the storm water drainage system and shall not approve additional development that would convey additional storm water to a facility that would experience an exceedance of capacity until the necessary additional capacity is provided. **Verification comments:**	Prior to exceeding capacity within the existing storm water drainage facilities	FMFCD, PW, and DARM				**X**	**X**	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F

Utilities and Service Systems – *Adequacy of Water Supply Capacity*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-21: Prior to exceeding existing water supply capacity, the City shall evaluate the water supply system and shall not approve additional development that demand additional water until additional capacity is provided. By approximately the year 2025, the City shall construct an approximately 25,000 AF/year tertiary recycled water expansion to the Fresno-Clovis Regional Wastewater Reclamation Facility in accordance with the 2013 Recycled Water Master Plan and the 2014 City of Fresno Metropolitan Water Resources Management Plan update. Implementation of Mitigation Measure USS-5 is also required prior to approximately the year 2025. **Verification comments:**	Prior to exceeding existing water supply capacity	DPU and DARM				X	X	

Utilities and Service Systems – *Adequacy of Landfill Capacity*:

MITIGATION MEASURE	WHEN IMPLEMENTED	COMPLIANCE VERIFIED BY	A	B	C	D	E	F
USS-22: Prior to exceeding landfill capacity, the City shall evaluate additional landfill locations and shall not approve additional development that could contribute solid waste to a landfill that is at capacity until additional capacity is provided. **Verification comments:**	Prior to exceeding landfill capacity	DPU and DARM					X	

A - Incorporated into Project
B - Mitigated
C - Mitigation in Process
D - Responsible Agency Contacted
E - Part of City-Wide Program
F - Not Applicable

CITY OF FRESNO
MITIGATED NEGATIVE DECLARATION
PROJECT SPECIFIC MITIGATION MONITORING CHECKLIST
ENVIRONMENTAL ASSESSMENT NO. P18-03724

Project/EA No. **P18-03724** Date: August 9, 2019

	Mitigation Measure	Implemented By	When Implemented	Verified By
	AG-1. Prior to initiation of grading activities, the project proponent shall implement the following measure to mitigate impacts on Important Farmland located on the site: • The project proponent shall mitigate the loss of Prime Farmland on the project site at a 1:1 ratio. The acreage of lost Prime Farmland shall be determined using the Land Evaluation and Site Assessment (LESA) Model. The LESA Model evaluates measures of soil resource quality, a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. Once the acreage of Prime Farmland converted is determined, one of the following mitigation options shall be utilized to mitigate the loss: Restrictive Covenants or Deeds, In Lieu Fees, Mitigation Banks, Fee Title Acquisition, Conservation Easements, or Land Use Regulation. • The mitigation shall be verified by the City for each phase of the project during improvement plan review.			
	BIO-1. The project proponent shall implement the following measure to avoid or minimize impacts on other protected bird species that may occur on the site: • Preconstruction surveys for active nests of special-status birds shall be conducted by a qualified biologist in all areas of suitable habitat within 500 feet of project disturbance. Surveys shall be conducted within 14 days before commencement of any construction activities that occur during the nesting season (February 15 to August 31) in a given area. • If any active nests, or behaviors indicating that active nests are present, are observed, appropriate buffers around the nest sites shall be determined by a qualified biologist to avoid nest failure resulting from project activities. The size of the buffer shall depend on the species, nest location, nest stage, and specific construction activities to be performed while the nest is active. The buffers may			

	Mitigation Measure	Implemented By	When Implemented	Verified By
	be adjusted if a qualified biologist determines it would not be likely to adversely affect the nest. If buffers are adjusted, monitoring will be conducted to confirm that project activity is not resulting in detectable adverse effects on nesting birds or their young. No project activity shall commence within the buffer areas until a qualified biologist has determined that the young have fledged or the nest site is otherwise no longer in use.			
	HAZ-1. The project proponent shall hire a qualified consultant to perform additional testing prior to the issuance of grading permits or demolition permits for construction activities for each phase of the project in the following area that have been deemed to have potential hazardous conditions present: The agricultural structure unit. The intent of the additional testing is to investigate whether the building contains hazardous materials, such as lead-based paint or asbestos. If asbestos-containing materials and/or lead are found in the building, a Cal-OSHA certified ACBM and lead based paint contractor shall be retained to remove the asbestos-containing materials and lead in accordance with EPA and California Occupational Safety and Health Administration (Cal/OSHA) standards. In addition, all activities (construction or demolition) in the vicinity of this structure shall comply with Cal/OSHA asbestos and lead worker construction standards. The ACBM and lead shall be disposed of properly at an appropriate offsite disposal facility. If surface staining is found on the project site, a hazardous waste specialist shall be engaged to further assess the stained area.			
	NOI-1. The following improvements shall be incorporated into the project design: 1. A sound wall with a minimum height of 6.5 feet shall be constructed along the lot property lines adjacent to North Temperance Avenue. The wall shall be turned inward (eastward) along the lots adjacent to roadway access points (lots 263, 264, 289, and 290). Suitable construction materials which shall be used			

CITY OF FRESNO
MITIGATED NEGATIVE DECLARATION
PROJECT SPECIFIC MITIGATION MONITORING CHECKLIST
ENVIRONMENTAL ASSESSMENT NO. P18-03724

Project/EA No. **P18-03724** Date: August 9, 2019

	Mitigation Measure	Implemented By	When Implemented	Verified By
	to construct the wall include concrete blocks, masonry, or stucco on both sides of a wood or steel stud wall. 2. A sound wall with a minimum height of 6.0 feet shall be constructed along the lot property lines adjacent to East Shields Avenue. The wall shall be turned inward (southward) along the lots adjacent to roadway access points (lots 12 and 13). Suitable construction materials which shall be used to construct the wall include concrete blocks, masonry, or stucco on both sides of a wood or steel stud wall. 3. If two-story construction is proposed for the first row of homes facing North Temperance Avenue and East Shields Avenue, second story balconies facing the respective roadways shall not be incorporated into project design. These improvements and design requirements shall be included on the project Improvement Plans, subject to review and approval by the City Engineer.			
	NOI-2. The following improvements shall be incorporated into the project design: 1. Mechanical ventilation or air conditioning shall be provided for all homes so that windows and doors can remain closed for sound insulation purposes. 2. Acoustic baffles shall be installed on the interior side of gable vents that face, or are perpendicular to, North Temperance Avenue and East Shields Avenue. An example of a suitable attic vent baffle is shown by Appendix C of the Acoustical Analysis (Appendix B of the Initial Study). These improvements shall be included on the project Improvement Plans, subject to review and approval by the City Engineer.			

CITY OF FRESNO
MITIGATED NEGATIVE DECLARATION
PROJECT SPECIFIC MITIGATION MONITORING CHECKLIST
ENVIRONMENTAL ASSESSMENT NO. P18-03724

Project/EA No. **P18-03724** Date: August 9, 2019

	Mitigation Measure	Implemented By	When Implemented	Verified By
	CIRC-1. Prior to issuance of a building permit, the project proponent shall pay the applicable traffic impact fees (including, but not limited to, the new Growth Area Street [FMSI] Fee, Traffic Signal Mitigation Impact Fee [TSMI] and the Regional Transportation Mitigation Fee [RTMF]).			

Appendix A

Air Quality and Energy Calculations

P18-03724 CalEEMod Assumptions

PROJECT CHARACTERISTICS TAB:

Project Location – Air District: San Joaquin Valley Air Pollution Control District
CEC Forecasting Climate Zone: 3
Land Use Setting: Urban
Start of Construction: Monday, November 4, 2019
Operational Year: 2021
Utility Company: PG&E
CO_2 Intensity Factor: 290 lbs/MWh

- Note: Updated PG&E emission factor for 2020 reflecting RPS reductions per PG&E's *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (November 2015). Available: <https://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf>.

LAND USE TAB:

LAND USE TYPE AND SUBTYPE	UNIT AMOUNT AND METRIC[1]	ACREAGE[1]	SQUARE FOOTAGE	POPULATION[2]
Residential – Single Family Housing	349 DU	56.96	--	1,116
[1] *SOURCE: YAMABE & HORN ENGINEERING, INC., 2019.* [2] *ACCORDING TO THE MOST RECENT U.S. DEPARTMENT OF FINANCE (2019) ESTIMATES, THE AVERAGE NUMBER OF PERSONS RESIDING IN A DWELLING UNIT IN THE CITY OF FRESNO IS 3.20.*				

CONSTRUCTION TAB – PHASING:

PHASE #	PHASE NAME	START DATE	END DATE	# DAYS/WEEK	# DAYS
1	Demolition	11/4/2019	11/8/2019	5	5
2	Site Preparation	2/8/2020	4/3/2020	5	40
3	Grading	4/4/2020	9/4/2020	5	110
4	Paving	12/7/2024	3/21/2025	5	75
5	Building Construction	9/5/2020	12/6/2024	5	1,110
6	Architectural Coating	3/22/2025	7/4/2025	5	75

- Note: The CalEEMod Defaults were used for Phases 2 through 6 (Site Preparation through Architectural Coating). The CalEEMod Default for Phase 1 (Demolition) was 70 days, which is too long for the demolition required for the proposed project. The demolition would include one 10,302-square feet-agricultural building, which is currently not architecturally sound. Demolition would likely take 5 days or less.

CONSTRUCTION TAB – OFF-ROAD EQUIPMENT: CalEEMod Defaults

CONSTRUCTION TAB – DEMOLITION: Demolition of one 10,302 square foot building

OPERATIONAL TAB – MOBILE: According to the Traffic Impact Study prepared for the project (ND Engineering, PC, March 2019), the project would generate 9.44 daily trips per dwelling unit.

MITIGATION TAB:

Traffic:

- Project Setting: Low Density Suburban
- Increase Density: 396 du/56.96 ac = 6.13 du/ac
- Increase Destination Accessibility: Distance to Downtown/Job Center is 7.1 miles (from project site to downtown Fresno)
- Increase Transit Accessibility: Distance to Transit is 1.26 miles (Fresno Area Express Route 45 has a stop at Shields / Business Park)
- Improve Pedestrian Network: Project Site and Connecting Off-Site (project includes connections from the site to the adjacent shopping center)

Area:

- Only Natural Gas Hearth (Per SJVAPCD Rule 4901: Wood-Burning Fireplaces and Wood-Burning Heaters, open-hearth fireplaces are not allowed in new construction projects which would result in more than two homes per acre. The proposed project includes more than two homes per acre.)

P18-03724

San Joaquin Valley Unified APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	349.00	Dwelling Unit	56.96	628,200.00	1116

1.2 Other Project Characteristics

Urbanization Urban

Wind Speed (m/s) 2.7

Precipitation Freq (Days) 45

Climate Zone 3

Operational Year 2021

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 290

CH4 Intensity (lb/MWhr) 0.029

N2O Intensity (lb/MWhr) 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - See CalEEMod Assumptions

Land Use - See CalEEMod Assumptions

Construction Phase - See CalEEMod Assumptions

Demolition -

Vehicle Trips - See CalEEMod Assumptions

Energy Use -

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Area Mitigation -

Energy Mitigation -

Water Mitigation -

Grading - Entire project site (56.96 acres) will be graded.

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	5
tblConstructionPhase	NumDays	70.00	5.00
tblGrading	AcresOfGrading	275.00	56.96
tblLandUse	LotAcreage	113.31	56.96
tblLandUse	Population	1,107.00	1,116.00
tblProjectCharacteristics	CO2IntensityFactor	641.35	290
tblVehicleTrips	ST_TR	9.91	9.44
tblVehicleTrips	SU_TR	8.62	9.44
tblVehicleTrips	WD_TR	9.52	9.44
tblWoodstoves	NumberCatalytic	56.96	0.00
tblWoodstoves	NumberNoncatalytic	56.96	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	9.1600e-003	0.0966	0.0574	1.2000e-004	5.8500e-003	4.5200e-003	0.0104	9.7000e-004	4.2000e-003	5.1700e-003	0.0000	10.7407	10.7407	2.5200e-003	0.0000	10.8037
2020	0.4500	4.6236	3.1284	6.2800e-003	0.7870	0.2119	0.9989	0.4013	0.1959	0.5972	0.0000	554.2369	554.2369	0.1470	0.0000	557.9113
2021	0.3277	2.8492	2.6951	6.1300e-003	0.1635	0.1275	0.2910	0.0442	0.1199	0.1641	0.0000	545.4001	545.4001	0.0858	0.0000	547.5451
2022	0.2953	2.5698	2.6113	6.0500e-003	0.1628	0.1073	0.2702	0.0440	0.1010	0.1450	0.0000	538.1735	538.1735	0.0843	0.0000	540.2814
2023	0.2693	2.2914	2.5451	5.9800e-003	0.1628	0.0922	0.2550	0.0440	0.0867	0.1308	0.0000	531.0958	531.0958	0.0806	0.0000	533.1102
2024	0.2465	2.1190	2.4856	5.7800e-003	0.1545	0.0803	0.2347	0.0418	0.0754	0.1172	0.0000	513.6608	513.6608	0.0809	0.0000	515.6838
2025	5.9332	0.2941	0.5162	8.6000e-004	0.0110	0.0141	0.0251	2.9200e-003	0.0132	0.0161	0.0000	75.7885	75.7885	0.0195	0.0000	76.2750
Maximum	**5.9332**	**4.6236**	**3.1284**	**6.2800e-003**	**0.7870**	**0.2119**	**0.9989**	**0.4013**	**0.1959**	**0.5972**	**0.0000**	**554.2369**	**554.2369**	**0.1470**	**0.0000**	**557.9113**

2.1 Overall Construction

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	9.1600e-003	0.0966	0.0574	1.2000e-004	5.8500e-003	4.5200e-003	0.0104	9.7000e-004	4.2000e-003	5.1700e-003	0.0000	10.7407	10.7407	2.5200e-003	0.0000	10.8037
2020	0.4500	4.6236	3.1284	6.2800e-003	0.7870	0.2119	0.9989	0.4013	0.1959	0.5972	0.0000	554.2364	554.2364	0.1470	0.0000	557.9108
2021	0.3277	2.8492	2.6951	6.1300e-003	0.1635	0.1275	0.2910	0.0442	0.1199	0.1641	0.0000	545.3997	545.3997	0.0858	0.0000	547.5448
2022	0.2953	2.5698	2.6113	6.0500e-003	0.1628	0.1073	0.2702	0.0440	0.1010	0.1450	0.0000	538.1731	538.1731	0.0843	0.0000	540.2811
2023	0.2693	2.2914	2.5451	5.9800e-003	0.1628	0.0922	0.2550	0.0440	0.0867	0.1308	0.0000	531.0955	531.0955	0.0806	0.0000	533.1098
2024	0.2465	2.1190	2.4856	5.7800e-003	0.1545	0.0803	0.2347	0.0418	0.0754	0.1172	0.0000	513.6604	513.6604	0.0809	0.0000	515.6835
2025	5.9332	0.2941	0.5162	8.6000e-004	0.0110	0.0141	0.0251	2.9200e-003	0.0132	0.0161	0.0000	75.7884	75.7884	0.0195	0.0000	76.2749
Maximum	**5.9332**	**4.6236**	**3.1284**	**6.2800e-003**	**0.7870**	**0.2119**	**0.9989**	**0.4013**	**0.1959**	**0.5972**	**0.0000**	**554.2364**	**554.2364**	**0.1470**	**0.0000**	**557.9108**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**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**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**11-4-2019**	**2-3-2020**	0.0756	0.0756
2	**2-4-2020**	**5-3-2020**	1.5197	1.5197
3	**5-4-2020**	**8-3-2020**	1.8005	1.8005
4	**8-4-2020**	**11-3-2020**	1.2022	1.2022

5	**11-4-2020**	**2-3-2021**	0.8538	0.8538
6	**2-4-2021**	**5-3-2021**	0.7748	0.7748
7	**5-4-2021**	**8-3-2021**	0.7995	0.7995
8	**8-4-2021**	**11-3-2021**	0.8003	0.8003
9	**11-4-2021**	**2-3-2022**	0.7736	0.7736
10	**2-4-2022**	**5-3-2022**	0.7014	0.7014
11	**5-4-2022**	**8-3-2022**	0.7239	0.7239
12	**8-4-2022**	**11-3-2022**	0.7246	0.7246
13	**11-4-2022**	**2-3-2023**	0.6973	0.6973
14	**2-4-2023**	**5-3-2023**	0.6271	0.6271
15	**5-4-2023**	**8-3-2023**	0.6476	0.6476
16	**8-4-2023**	**11-3-2023**	0.6480	0.6480
17	**11-4-2023**	**2-3-2024**	0.6350	0.6350
18	**2-4-2024**	**5-3-2024**	0.5980	0.5980
19	**5-4-2024**	**8-3-2024**	0.6106	0.6106
20	**8-4-2024**	**11-3-2024**	0.6110	0.6110
21	**11-4-2024**	**2-3-2025**	0.4302	0.4302
22	**2-4-2025**	**5-3-2025**	2.5940	2.5940
23	**5-4-2025**	**8-3-2025**	3.5134	3.5134
		Highest	3.5134	3.5134

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.1370	0.1605	2.6526	9.7000e-004		0.0249	0.0249		0.0249	0.0249	0.0000	155.4223	155.4223	7.0000e-003	2.7700e-003	156.4233
Energy	0.0492	0.4205	0.1789	2.6800e-003		0.0340	0.0340		0.0340	0.0340	0.0000	889.1169	889.1169	0.0496	0.0173	895.4957
Mobile	1.2419	13.4088	12.9035	0.0608	3.6411	0.0558	3.6969	0.9794	0.0528	1.0322	0.0000	5,642.2518	5,642.2518	0.3740	0.0000	5,651.6019
Waste						0.0000	0.0000		0.0000	0.0000	85.2339	0.0000	85.2339	5.0372	0.0000	211.1633
Water						0.0000	0.0000		0.0000	0.0000	7.2140	22.7847	29.9987	0.7432	0.0180	53.9333
Total	**4.4281**	**13.9898**	**15.7350**	**0.0644**	**3.6411**	**0.1147**	**3.7558**	**0.9794**	**0.1116**	**1.0910**	**92.4478**	**6,709.5758**	**6,802.0236**	**6.2110**	**0.0380**	**6,968.6175**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.1370	0.1605	2.6526	9.7000e-004		0.0249	0.0249		0.0249	0.0249	0.0000	155.4223	155.4223	7.0000e-003	2.7700e-003	156.4233
Energy	0.0492	0.4205	0.1789	2.6800e-003		0.0340	0.0340		0.0340	0.0340	0.0000	881.3993	881.3993	0.0488	0.0171	887.7111
Mobile	1.2068	12.9810	12.2285	0.0572	3.3899	0.0524	3.4423	0.9118	0.0495	0.9614	0.0000	5,312.4896	5,312.4896	0.3658	0.0000	5,321.6351
Waste						0.0000	0.0000		0.0000	0.0000	85.2339	0.0000	85.2339	5.0372	0.0000	211.1633
Water						0.0000	0.0000		0.0000	0.0000	7.2140	22.7847	29.9987	0.7432	0.0180	53.9333
Total	**4.3930**	**13.5620**	**15.0600**	**0.0609**	**3.3899**	**0.1113**	**3.5012**	**0.9118**	**0.1084**	**1.0202**	**92.4478**	**6,372.0960**	**6,464.5438**	**6.2020**	**0.0378**	**6,630.8662**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.79**	**3.06**	**4.29**	**5.54**	**6.90**	**2.96**	**6.78**	**6.90**	**2.88**	**6.49**	**0.00**	**5.03**	**4.96**	**0.14**	**0.42**	**4.85**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	11/4/2019	11/8/2019	5	5	
2	Site Preparation	Site Preparation	2/8/2020	4/3/2020	5	40	
3	Grading	Grading	4/4/2020	9/4/2020	5	110	
4	Building Construction	Building Construction	9/5/2020	12/6/2024	5	1110	
5	Paving	Paving	12/7/2024	3/21/2025	5	75	
6	Architectural Coating	Architectural Coating	3/22/2025	7/4/2025	5	75	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 56.96

Acres of Paving: 0

Residential Indoor: 1,272,105; Residential Outdoor: 424,035; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	47.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	126.00	37.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	25.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1500e-003	0.0000	5.1500e-003	7.8000e-004	0.0000	7.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.7800e-003	0.0895	0.0552	1.0000e-004		4.4900e-003	4.4900e-003		4.1700e-003	4.1700e-003	0.0000	8.6566	8.6566	2.4100e-003	0.0000	8.7168
Total	**8.7800e-003**	**0.0895**	**0.0552**	**1.0000e-004**	**5.1500e-003**	**4.4900e-003**	**9.6400e-003**	**7.8000e-004**	**4.1700e-003**	**4.9500e-003**	**0.0000**	**8.6566**	**8.6566**	**2.4100e-003**	**0.0000**	**8.7168**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-004	7.0100e-003	1.0100e-003	2.0000e-005	4.0000e-004	3.0000e-005	4.3000e-004	1.1000e-004	3.0000e-005	1.4000e-004	0.0000	1.8063	1.8063	1.0000e-004	0.0000	1.8089
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2300e-003	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2778	0.2778	1.0000e-005	0.0000	0.2780
Total	**3.7000e-004**	**7.1300e-003**	**2.2400e-003**	**2.0000e-005**	**7.0000e-004**	**3.0000e-005**	**7.3000e-004**	**1.9000e-004**	**3.0000e-005**	**2.2000e-004**	**0.0000**	**2.0841**	**2.0841**	**1.1000e-004**	**0.0000**	**2.0869**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1500e-003	0.0000	5.1500e-003	7.8000e-004	0.0000	7.8000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.7800e-003	0.0895	0.0552	1.0000e-004		4.4900e-003	4.4900e-003		4.1700e-003	4.1700e-003	0.0000	8.6566	8.6566	2.4100e-003	0.0000	8.7168
Total	**8.7800e-003**	**0.0895**	**0.0552**	**1.0000e-004**	**5.1500e-003**	**4.4900e-003**	**9.6400e-003**	**7.8000e-004**	**4.1700e-003**	**4.9500e-003**	**0.0000**	**8.6566**	**8.6566**	**2.4100e-003**	**0.0000**	**8.7168**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.0000e-004	7.0100e-003	1.0100e-003	2.0000e-005	4.0000e-004	3.0000e-005	4.3000e-004	1.1000e-004	3.0000e-005	1.4000e-004	0.0000	1.8063	1.8063	1.0000e-004	0.0000	1.8089
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.7000e-004	1.2000e-004	1.2300e-003	0.0000	3.0000e-004	0.0000	3.0000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.2778	0.2778	1.0000e-005	0.0000	0.2780
Total	**3.7000e-004**	**7.1300e-003**	**2.2400e-003**	**2.0000e-005**	**7.0000e-004**	**3.0000e-005**	**7.3000e-004**	**1.9000e-004**	**3.0000e-005**	**2.2000e-004**	**0.0000**	**2.0841**	**2.0841**	**1.1000e-004**	**0.0000**	**2.0869**

3.3 Site Preparation - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3613	0.0000	0.3613	0.1986	0.0000	0.1986	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0815	0.8484	0.4303	7.6000e-004		0.0440	0.0440		0.0404	0.0404	0.0000	66.8614	66.8614	0.0216	0.0000	67.4020
Total	**0.0815**	**0.8484**	**0.4303**	**7.6000e-004**	**0.3613**	**0.0440**	**0.4053**	**0.1986**	**0.0404**	**0.2390**	**0.0000**	**66.8614**	**66.8614**	**0.0216**	**0.0000**	**67.4020**

3.3 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5200e-003	1.0300e-003	0.0105	3.0000e-005	2.8800e-003	2.0000e-005	2.9000e-003	7.6000e-004	2.0000e-005	7.8000e-004	0.0000	2.5846	2.5846	7.0000e-005	0.0000	2.5864
Total	**1.5200e-003**	**1.0300e-003**	**0.0105**	**3.0000e-005**	**2.8800e-003**	**2.0000e-005**	**2.9000e-003**	**7.6000e-004**	**2.0000e-005**	**7.8000e-004**	**0.0000**	**2.5846**	**2.5846**	**7.0000e-005**	**0.0000**	**2.5864**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3613	0.0000	0.3613	0.1986	0.0000	0.1986	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0815	0.8484	0.4303	7.6000e-004		0.0440	0.0440		0.0404	0.0404	0.0000	66.8613	66.8613	0.0216	0.0000	67.4019
Total	**0.0815**	**0.8484**	**0.4303**	**7.6000e-004**	**0.3613**	**0.0440**	**0.4053**	**0.1986**	**0.0404**	**0.2390**	**0.0000**	**66.8613**	**66.8613**	**0.0216**	**0.0000**	**67.4019**

3.3 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5200e-003	1.0300e-003	0.0105	3.0000e-005	2.8800e-003	2.0000e-005	2.9000e-003	7.6000e-004	2.0000e-005	7.8000e-004	0.0000	2.5846	2.5846	7.0000e-005	0.0000	2.5864
Total	**1.5200e-003**	**1.0300e-003**	**0.0105**	**3.0000e-005**	**2.8800e-003**	**2.0000e-005**	**2.9000e-003**	**7.6000e-004**	**2.0000e-005**	**7.8000e-004**	**0.0000**	**2.5846**	**2.5846**	**7.0000e-005**	**0.0000**	**2.5864**

3.4 Grading - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3614	0.0000	0.3614	0.1853	0.0000	0.1853	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2448	2.7609	1.7577	3.4100e-003		0.1196	0.1196		0.1100	0.1100	0.0000	299.6636	299.6636	0.0969	0.0000	302.0865
Total	**0.2448**	**2.7609**	**1.7577**	**3.4100e-003**	**0.3614**	**0.1196**	**0.4810**	**0.1853**	**0.1100**	**0.2953**	**0.0000**	**299.6636**	**299.6636**	**0.0969**	**0.0000**	**302.0865**

3.4 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6500e-003	3.1600e-003	0.0321	9.0000e-005	8.7900e-003	6.0000e-005	8.8600e-003	2.3400e-003	6.0000e-005	2.4000e-003	0.0000	7.8972	7.8972	2.3000e-004	0.0000	7.9029
Total	**4.6500e-003**	**3.1600e-003**	**0.0321**	**9.0000e-005**	**8.7900e-003**	**6.0000e-005**	**8.8600e-003**	**2.3400e-003**	**6.0000e-005**	**2.4000e-003**	**0.0000**	**7.8972**	**7.8972**	**2.3000e-004**	**0.0000**	**7.9029**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3614	0.0000	0.3614	0.1853	0.0000	0.1853	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2448	2.7609	1.7577	3.4100e-003		0.1196	0.1196		0.1100	0.1100	0.0000	299.6633	299.6633	0.0969	0.0000	302.0862
Total	**0.2448**	**2.7609**	**1.7577**	**3.4100e-003**	**0.3614**	**0.1196**	**0.4810**	**0.1853**	**0.1100**	**0.2953**	**0.0000**	**299.6633**	**299.6633**	**0.0969**	**0.0000**	**302.0862**

3.4 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.6500e-003	3.1600e-003	0.0321	9.0000e-005	8.7900e-003	6.0000e-005	8.8600e-003	2.3400e-003	6.0000e-005	2.4000e-003	0.0000	7.8972	7.8972	2.3000e-004	0.0000	7.9029
Total	**4.6500e-003**	**3.1600e-003**	**0.0321**	**9.0000e-005**	**8.7900e-003**	**6.0000e-005**	**8.8600e-003**	**2.3400e-003**	**6.0000e-005**	**2.4000e-003**	**0.0000**	**7.8972**	**7.8972**	**2.3000e-004**	**0.0000**	**7.9029**

3.5 Building Construction - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0890	0.8058	0.7076	1.1300e-003		0.0469	0.0469		0.0441	0.0441	0.0000	97.2762	97.2762	0.0237	0.0000	97.8695
Total	**0.0890**	**0.8058**	**0.7076**	**1.1300e-003**		**0.0469**	**0.0469**		**0.0441**	**0.0441**	**0.0000**	**97.2762**	**97.2762**	**0.0237**	**0.0000**	**97.8695**

3.5 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.1600e-003	0.1892	0.0359	4.4000e-004	0.0103	1.0400e-003	0.0113	2.9800e-003	1.0000e-003	3.9700e-003	0.0000	41.9611	41.9611	3.3100e-003	0.0000	42.0439
Worker	0.0224	0.0152	0.1543	4.2000e-004	0.0423	3.0000e-004	0.0426	0.0113	2.8000e-004	0.0115	0.0000	37.9929	37.9929	1.0900e-003	0.0000	38.0201
Total	**0.0285**	**0.2044**	**0.1902**	**8.6000e-004**	**0.0526**	**1.3400e-003**	**0.0540**	**0.0142**	**1.2800e-003**	**0.0155**	**0.0000**	**79.9540**	**79.9540**	**4.4000e-003**	**0.0000**	**80.0640**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0890	0.8058	0.7076	1.1300e-003		0.0469	0.0469		0.0441	0.0441	0.0000	97.2761	97.2761	0.0237	0.0000	97.8694
Total	**0.0890**	**0.8058**	**0.7076**	**1.1300e-003**		**0.0469**	**0.0469**		**0.0441**	**0.0441**	**0.0000**	**97.2761**	**97.2761**	**0.0237**	**0.0000**	**97.8694**

3.5 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	6.1600e-003	0.1892	0.0359	4.4000e-004	0.0103	1.0400e-003	0.0113	2.9800e-003	1.0000e-003	3.9700e-003	0.0000	41.9611	41.9611	3.3100e-003	0.0000	42.0439
Worker	0.0224	0.0152	0.1543	4.2000e-004	0.0423	3.0000e-004	0.0426	0.0113	2.8000e-004	0.0115	0.0000	37.9929	37.9929	1.0900e-003	0.0000	38.0201
Total	**0.0285**	**0.2044**	**0.1902**	**8.6000e-004**	**0.0526**	**1.3400e-003**	**0.0540**	**0.0142**	**1.2800e-003**	**0.0155**	**0.0000**	**79.9540**	**79.9540**	**4.4000e-003**	**0.0000**	**80.0640**

3.5 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2481	2.2749	2.1631	3.5100e-003		0.1251	0.1251		0.1176	0.1176	0.0000	302.2867	302.2867	0.0729	0.0000	304.1099
Total	**0.2481**	**2.2749**	**2.1631**	**3.5100e-003**		**0.1251**	**0.1251**		**0.1176**	**0.1176**	**0.0000**	**302.2867**	**302.2867**	**0.0729**	**0.0000**	**304.1099**

3.5 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0156	0.5324	0.0971	1.3600e-003	0.0320	1.5000e-003	0.0335	9.2500e-003	1.4300e-003	0.0107	0.0000	129.1677	129.1677	9.8600e-003	0.0000	129.4143
Worker	0.0640	0.0420	0.4349	1.2600e-003	0.1315	9.0000e-004	0.1324	0.0349	8.3000e-004	0.0358	0.0000	113.9457	113.9457	3.0100e-003	0.0000	114.0210
Total	**0.0796**	**0.5743**	**0.5320**	**2.6200e-003**	**0.1635**	**2.4000e-003**	**0.1659**	**0.0442**	**2.2600e-003**	**0.0465**	**0.0000**	**243.1134**	**243.1134**	**0.0129**	**0.0000**	**243.4353**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2481	2.2749	2.1631	3.5100e-003		0.1251	0.1251		0.1176	0.1176	0.0000	302.2863	302.2863	0.0729	0.0000	304.1095
Total	**0.2481**	**2.2749**	**2.1631**	**3.5100e-003**		**0.1251**	**0.1251**		**0.1176**	**0.1176**	**0.0000**	**302.2863**	**302.2863**	**0.0729**	**0.0000**	**304.1095**

3.5 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0156	0.5324	0.0971	1.3600e-003	0.0320	1.5000e-003	0.0335	9.2500e-003	1.4300e-003	0.0107	0.0000	129.1677	129.1677	9.8600e-003	0.0000	129.4143
Worker	0.0640	0.0420	0.4349	1.2600e-003	0.1315	9.0000e-004	0.1324	0.0349	8.3000e-004	0.0358	0.0000	113.9457	113.9457	3.0100e-003	0.0000	114.0210
Total	**0.0796**	**0.5743**	**0.5320**	**2.6200e-003**	**0.1635**	**2.4000e-003**	**0.1659**	**0.0442**	**2.2600e-003**	**0.0465**	**0.0000**	**243.1134**	**243.1134**	**0.0129**	**0.0000**	**243.4353**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2218	2.0300	2.1272	3.5000e-003		0.1052	0.1052		0.0990	0.0990	0.0000	301.2428	301.2428	0.0722	0.0000	303.0471
Total	**0.2218**	**2.0300**	**2.1272**	**3.5000e-003**		**0.1052**	**0.1052**		**0.0990**	**0.0990**	**0.0000**	**301.2428**	**301.2428**	**0.0722**	**0.0000**	**303.0471**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0144	0.5024	0.0893	1.3400e-003	0.0319	1.2900e-003	0.0332	9.2100e-003	1.2400e-003	0.0105	0.0000	127.4779	127.4779	9.4700e-003	0.0000	127.7148
Worker	0.0591	0.0373	0.3948	1.2100e-003	0.1310	8.7000e-004	0.1318	0.0348	8.0000e-004	0.0356	0.0000	109.4527	109.4527	2.6800e-003	0.0000	109.5196
Total	**0.0735**	**0.5397**	**0.4840**	**2.5500e-003**	**0.1628**	**2.1600e-003**	**0.1650**	**0.0440**	**2.0400e-003**	**0.0461**	**0.0000**	**236.9306**	**236.9306**	**0.0122**	**0.0000**	**237.2344**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2218	2.0300	2.1272	3.5000e-003		0.1052	0.1052		0.0990	0.0990	0.0000	301.2425	301.2425	0.0722	0.0000	303.0467
Total	**0.2218**	**2.0300**	**2.1272**	**3.5000e-003**		**0.1052**	**0.1052**		**0.0990**	**0.0990**	**0.0000**	**301.2425**	**301.2425**	**0.0722**	**0.0000**	**303.0467**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0144	0.5024	0.0893	1.3400e-003	0.0319	1.2900e-003	0.0332	9.2100e-003	1.2400e-003	0.0105	0.0000	127.4779	127.4779	9.4700e-003	0.0000	127.7148
Worker	0.0591	0.0373	0.3948	1.2100e-003	0.1310	8.7000e-004	0.1318	0.0348	8.0000e-004	0.0356	0.0000	109.4527	109.4527	2.6800e-003	0.0000	109.5196
Total	**0.0735**	**0.5397**	**0.4840**	**2.5500e-003**	**0.1628**	**2.1600e-003**	**0.1650**	**0.0440**	**2.0400e-003**	**0.0461**	**0.0000**	**236.9306**	**236.9306**	**0.0122**	**0.0000**	**237.2344**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2045	1.8700	2.1117	3.5000e-003		0.0910	0.0910		0.0856	0.0856	0.0000	301.3462	301.3462	0.0717	0.0000	303.1383
Total	**0.2045**	**1.8700**	**2.1117**	**3.5000e-003**		**0.0910**	**0.0910**		**0.0856**	**0.0856**	**0.0000**	**301.3462**	**301.3462**	**0.0717**	**0.0000**	**303.1383**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0100	0.3880	0.0737	1.3100e-003	0.0319	3.8000e-004	0.0323	9.2100e-003	3.7000e-004	9.5800e-003	0.0000	124.3788	124.3788	6.5000e-003	0.0000	124.5414
Worker	0.0549	0.0334	0.3597	1.1700e-003	0.1310	8.5000e-004	0.1318	0.0348	7.8000e-004	0.0356	0.0000	105.3709	105.3709	2.3900e-003	0.0000	105.4305
Total	**0.0649**	**0.4214**	**0.4334**	**2.4800e-003**	**0.1628**	**1.2300e-003**	**0.1641**	**0.0440**	**1.1500e-003**	**0.0452**	**0.0000**	**229.7497**	**229.7497**	**8.8900e-003**	**0.0000**	**229.9719**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2045	1.8700	2.1117	3.5000e-003		0.0910	0.0910		0.0856	0.0856	0.0000	301.3458	301.3458	0.0717	0.0000	303.1380
Total	**0.2045**	**1.8700**	**2.1117**	**3.5000e-003**		**0.0910**	**0.0910**		**0.0856**	**0.0856**	**0.0000**	**301.3458**	**301.3458**	**0.0717**	**0.0000**	**303.1380**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0100	0.3880	0.0737	1.3100e-003	0.0319	3.8000e-004	0.0323	9.2100e-003	3.7000e-004	9.5800e-003	0.0000	124.3788	124.3788	6.5000e-003	0.0000	124.5414
Worker	0.0549	0.0334	0.3597	1.1700e-003	0.1310	8.5000e-004	0.1318	0.0348	7.8000e-004	0.0356	0.0000	105.3709	105.3709	2.3900e-003	0.0000	105.4305
Total	**0.0649**	**0.4214**	**0.4334**	**2.4800e-003**	**0.1628**	**1.2300e-003**	**0.1641**	**0.0440**	**1.1500e-003**	**0.0452**	**0.0000**	**229.7497**	**229.7497**	**8.8900e-003**	**0.0000**	**229.9719**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1803	1.6469	1.9804	3.3000e-003		0.0751	0.0751		0.0707	0.0707	0.0000	284.0152	284.0152	0.0672	0.0000	285.6942
Total	**0.1803**	**1.6469**	**1.9804**	**3.3000e-003**		**0.0751**	**0.0751**		**0.0707**	**0.0707**	**0.0000**	**284.0152**	**284.0152**	**0.0672**	**0.0000**	**285.6942**

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1400e-003	0.3627	0.0655	1.2200e-003	0.0301	3.6000e-004	0.0304	8.6800e-003	3.4000e-004	9.0200e-003	0.0000	116.3169	116.3169	6.2200e-003	0.0000	116.4723
Worker	0.0483	0.0283	0.3127	1.0600e-003	0.1234	7.8000e-004	0.1242	0.0328	7.2000e-004	0.0335	0.0000	95.5172	95.5172	2.0200e-003	0.0000	95.5677
Total	**0.0574**	**0.3910**	**0.3782**	**2.2800e-003**	**0.1535**	**1.1400e-003**	**0.1546**	**0.0415**	**1.0600e-003**	**0.0425**	**0.0000**	**211.8341**	**211.8341**	**8.2400e-003**	**0.0000**	**212.0400**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1803	1.6469	1.9804	3.3000e-003		0.0751	0.0751		0.0707	0.0707	0.0000	284.0148	284.0148	0.0672	0.0000	285.6939
Total	**0.1803**	**1.6469**	**1.9804**	**3.3000e-003**		**0.0751**	**0.0751**		**0.0707**	**0.0707**	**0.0000**	**284.0148**	**284.0148**	**0.0672**	**0.0000**	**285.6939**

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	9.1400e-003	0.3627	0.0655	1.2200e-003	0.0301	3.6000e-004	0.0304	8.6800e-003	3.4000e-004	9.0200e-003	0.0000	116.3169	116.3169	6.2200e-003	0.0000	116.4723
Worker	0.0483	0.0283	0.3127	1.0600e-003	0.1234	7.8000e-004	0.1242	0.0328	7.2000e-004	0.0335	0.0000	95.5172	95.5172	2.0200e-003	0.0000	95.5677
Total	**0.0574**	**0.3910**	**0.3782**	**2.2800e-003**	**0.1535**	**1.1400e-003**	**0.1546**	**0.0415**	**1.0600e-003**	**0.0425**	**0.0000**	**211.8341**	**211.8341**	**8.2400e-003**	**0.0000**	**212.0400**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.4000e-003	0.0810	0.1243	1.9000e-004		3.9800e-003	3.9800e-003		3.6600e-003	3.6600e-003	0.0000	17.0226	17.0226	5.5100e-003	0.0000	17.1602
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.4000e-003**	**0.0810**	**0.1243**	**1.9000e-004**		**3.9800e-003**	**3.9800e-003**		**3.6600e-003**	**3.6600e-003**	**0.0000**	**17.0226**	**17.0226**	**5.5100e-003**	**0.0000**	**17.1602**

3.6 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-004	2.3000e-004	2.5800e-003	1.0000e-005	1.0200e-003	1.0000e-005	1.0300e-003	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	0.7890	0.7890	2.0000e-005	0.0000	0.7894
Total	**4.0000e-004**	**2.3000e-004**	**2.5800e-003**	**1.0000e-005**	**1.0200e-003**	**1.0000e-005**	**1.0300e-003**	**2.7000e-004**	**1.0000e-005**	**2.8000e-004**	**0.0000**	**0.7890**	**0.7890**	**2.0000e-005**	**0.0000**	**0.7894**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.4000e-003	0.0810	0.1243	1.9000e-004		3.9800e-003	3.9800e-003		3.6600e-003	3.6600e-003	0.0000	17.0225	17.0225	5.5100e-003	0.0000	17.1602
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.4000e-003**	**0.0810**	**0.1243**	**1.9000e-004**		**3.9800e-003**	**3.9800e-003**		**3.6600e-003**	**3.6600e-003**	**0.0000**	**17.0225**	**17.0225**	**5.5100e-003**	**0.0000**	**17.1602**

3.6 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-004	2.3000e-004	2.5800e-003	1.0000e-005	1.0200e-003	1.0000e-005	1.0300e-003	2.7000e-004	1.0000e-005	2.8000e-004	0.0000	0.7890	0.7890	2.0000e-005	0.0000	0.7894
Total	**4.0000e-004**	**2.3000e-004**	**2.5800e-003**	**1.0000e-005**	**1.0200e-003**	**1.0000e-005**	**1.0300e-003**	**2.7000e-004**	**1.0000e-005**	**2.8000e-004**	**0.0000**	**0.7890**	**0.7890**	**2.0000e-005**	**0.0000**	**0.7894**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0265	0.2489	0.4228	6.6000e-004		0.0121	0.0121		0.0112	0.0112	0.0000	58.0558	58.0558	0.0188	0.0000	58.5253
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0265**	**0.2489**	**0.4228**	**6.6000e-004**		**0.0121**	**0.0121**		**0.0112**	**0.0112**	**0.0000**	**58.0558**	**58.0558**	**0.0188**	**0.0000**	**58.5253**

3.6 Paving - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2800e-003	7.2000e-004	8.1200e-003	3.0000e-005	3.4800e-003	2.0000e-005	3.5000e-003	9.2000e-004	2.0000e-005	9.4000e-004	0.0000	2.5856	2.5856	5.0000e-005	0.0000	2.5869
Total	**1.2800e-003**	**7.2000e-004**	**8.1200e-003**	**3.0000e-005**	**3.4800e-003**	**2.0000e-005**	**3.5000e-003**	**9.2000e-004**	**2.0000e-005**	**9.4000e-004**	**0.0000**	**2.5856**	**2.5856**	**5.0000e-005**	**0.0000**	**2.5869**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0265	0.2489	0.4228	6.6000e-004		0.0121	0.0121		0.0112	0.0112	0.0000	58.0558	58.0558	0.0188	0.0000	58.5252
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0265**	**0.2489**	**0.4228**	**6.6000e-004**		**0.0121**	**0.0121**		**0.0112**	**0.0112**	**0.0000**	**58.0558**	**58.0558**	**0.0188**	**0.0000**	**58.5252**

3.6 Paving - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2800e-003	7.2000e-004	8.1200e-003	3.0000e-005	3.4800e-003	2.0000e-005	3.5000e-003	9.2000e-004	2.0000e-005	9.4000e-004	0.0000	2.5856	2.5856	5.0000e-005	0.0000	2.5869
Total	**1.2800e-003**	**7.2000e-004**	**8.1200e-003**	**3.0000e-005**	**3.4800e-003**	**2.0000e-005**	**3.5000e-003**	**9.2000e-004**	**2.0000e-005**	**9.4000e-004**	**0.0000**	**2.5856**	**2.5856**	**5.0000e-005**	**0.0000**	**2.5869**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8962					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.4100e-003	0.0430	0.0678	1.1000e-004		1.9300e-003	1.9300e-003		1.9300e-003	1.9300e-003	0.0000	9.5747	9.5747	5.2000e-004	0.0000	9.5878
Total	**5.9026**	**0.0430**	**0.0678**	**1.1000e-004**		**1.9300e-003**	**1.9300e-003**		**1.9300e-003**	**1.9300e-003**	**0.0000**	**9.5747**	**9.5747**	**5.2000e-004**	**0.0000**	**9.5878**

3.7 Architectural Coating - 2025

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7500e-003	1.5500e-003	0.0175	6.0000e-005	7.5000e-003	5.0000e-005	7.5400e-003	1.9900e-003	4.0000e-005	2.0300e-003	0.0000	5.5724	5.5724	1.1000e-004	0.0000	5.5751
Total	**2.7500e-003**	**1.5500e-003**	**0.0175**	**6.0000e-005**	**7.5000e-003**	**5.0000e-005**	**7.5400e-003**	**1.9900e-003**	**4.0000e-005**	**2.0300e-003**	**0.0000**	**5.5724**	**5.5724**	**1.1000e-004**	**0.0000**	**5.5751**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.8962					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	6.4100e-003	0.0430	0.0678	1.1000e-004		1.9300e-003	1.9300e-003		1.9300e-003	1.9300e-003	0.0000	9.5747	9.5747	5.2000e-004	0.0000	9.5878
Total	**5.9026**	**0.0430**	**0.0678**	**1.1000e-004**		**1.9300e-003**	**1.9300e-003**		**1.9300e-003**	**1.9300e-003**	**0.0000**	**9.5747**	**9.5747**	**5.2000e-004**	**0.0000**	**9.5878**

3.7 Architectural Coating - 2025

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7500e-003	1.5500e-003	0.0175	6.0000e-005	7.5000e-003	5.0000e-005	7.5400e-003	1.9900e-003	4.0000e-005	2.0300e-003	0.0000	5.5724	5.5724	1.1000e-004	0.0000	5.5751
Total	**2.7500e-003**	**1.5500e-003**	**0.0175**	**6.0000e-005**	**7.5000e-003**	**5.0000e-005**	**7.5400e-003**	**1.9900e-003**	**4.0000e-005**	**2.0300e-003**	**0.0000**	**5.5724**	**5.5724**	**1.1000e-004**	**0.0000**	**5.5751**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Density

Improve Destination Accessibility

Increase Transit Accessibility

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.2068	12.9810	12.2285	0.0572	3.3899	0.0524	3.4423	0.9118	0.0495	0.9614	0.0000	5,312.4896	5,312.4896	0.3658	0.0000	5,321.6351
Unmitigated	1.2419	13.4088	12.9035	0.0608	3.6411	0.0558	3.6969	0.9794	0.0528	1.0322	0.0000	5,642.2518	5,642.2518	0.3740	0.0000	5,651.6019

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	3,294.56	3,294.56	3294.56	9,547,031	8,888,286
Total	3,294.56	3,294.56	3,294.56	9,547,031	8,888,286

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	45.60	19.00	35.40	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.506092	0.032602	0.169295	0.124521	0.019914	0.005374	0.021664	0.110051	0.001797	0.001623	0.005307	0.000969	0.000792

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Install Energy Efficient Appliances

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	394.4711	394.4711	0.0395	8.1600e-003	397.8894
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	402.1888	402.1888	0.0402	8.3200e-003	405.6740
NaturalGas Mitigated	0.0492	0.4205	0.1789	2.6800e-003		0.0340	0.0340		0.0340	0.0340	0.0000	486.9281	486.9281	9.3300e-003	8.9300e-003	489.8217
NaturalGas Unmitigated	0.0492	0.4205	0.1789	2.6800e-003		0.0340	0.0340		0.0340	0.0340	0.0000	486.9281	486.9281	9.3300e-003	8.9300e-003	489.8217

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	9.12469e+006	0.0492	0.4205	0.1789	2.6800e-003		0.0340	0.0340		0.0340	0.0340	0.0000	486.9281	486.9281	9.3300e-003	8.9300e-003	489.8217
Total		**0.0492**	**0.4205**	**0.1789**	**2.6800e-003**		**0.0340**	**0.0340**		**0.0340**	**0.0340**	**0.0000**	**486.9281**	**486.9281**	**9.3300e-003**	**8.9300e-003**	**489.8217**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	9.12469e+006	0.0492	0.4205	0.1789	2.6800e-003		0.0340	0.0340		0.0340	0.0340	0.0000	486.9281	486.9281	9.3300e-003	8.9300e-003	489.8217
Total		**0.0492**	**0.4205**	**0.1789**	**2.6800e-003**		**0.0340**	**0.0340**		**0.0340**	**0.0340**	**0.0000**	**486.9281**	**486.9281**	**9.3300e-003**	**8.9300e-003**	**489.8217**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	3.0575e +006	402.1888	0.0402	8.3200e-003	405.6740
Total		**402.1888**	**0.0402**	**8.3200e-003**	**405.6740**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	2.99883e +006	394.4711	0.0395	8.1600e-003	397.8894
Total		**394.4711**	**0.0395**	**8.1600e-003**	**397.8894**

6.0 Area Detail

6.1 Mitigation Measures Area

Use only Natural Gas Hearths

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.1370	0.1605	2.6526	9.7000e-004		0.0249	0.0249		0.0249	0.0249	0.0000	155.4223	155.4223	7.0000e-003	2.7700e-003	156.4233
Unmitigated	3.1370	0.1605	2.6526	9.7000e-004		0.0249	0.0249		0.0249	0.0249	0.0000	155.4223	155.4223	7.0000e-003	2.7700e-003	156.4233

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.5896					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.4534					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0153	0.1306	0.0556	8.3000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	151.1894	151.1894	2.9000e-003	2.7700e-003	152.0878
Landscaping	0.0787	0.0300	2.5970	1.4000e-004		0.0143	0.0143		0.0143	0.0143	0.0000	4.2330	4.2330	4.1000e-003	0.0000	4.3355
Total	**3.1370**	**0.1605**	**2.6526**	**9.7000e-004**		**0.0249**	**0.0249**		**0.0249**	**0.0249**	**0.0000**	**155.4223**	**155.4223**	**7.0000e-003**	**2.7700e-003**	**156.4233**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.5896					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.4534					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0153	0.1306	0.0556	8.3000e-004		0.0106	0.0106		0.0106	0.0106	0.0000	151.1894	151.1894	2.9000e-003	2.7700e-003	152.0878
Landscaping	0.0787	0.0300	2.5970	1.4000e-004		0.0143	0.0143		0.0143	0.0143	0.0000	4.2330	4.2330	4.1000e-003	0.0000	4.3355
Total	**3.1370**	**0.1605**	**2.6526**	**9.7000e-004**		**0.0249**	**0.0249**		**0.0249**	**0.0249**	**0.0000**	**155.4223**	**155.4223**	**7.0000e-003**	**2.7700e-003**	**156.4233**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	29.9987	0.7432	0.0180	53.9333
Unmitigated	29.9987	0.7432	0.0180	53.9333

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	22.7388 / 14.3353	29.9987	0.7432	0.0180	53.9333
Total		**29.9987**	**0.7432**	**0.0180**	**53.9333**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	22.7388 / 14.3353	29.9987	0.7432	0.0180	53.9333
Total		**29.9987**	**0.7432**	**0.0180**	**53.9333**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	85.2339	5.0372	0.0000	211.1633
Unmitigated	85.2339	5.0372	0.0000	211.1633

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	419.89	85.2339	5.0372	0.0000	211.1633
Total		**85.2339**	**5.0372**	**0.0000**	**211.1633**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	419.89	85.2339	5.0372	0.0000	211.1633
Total		**85.2339**	**5.0372**	**0.0000**	**211.1633**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Off-road Mobile (Construction) Energy Usage

Note: For the sake of simplicity, and as a conservative estimation, it was assumed that all off-road vehicles use diesel fuel as an energy source.
Demolition, site preparation, and grading energy were used as the basis of this calculation.

Given Factor:	375.18	**metric tons**	**CO_2**	**(provided in CalEEMod Output File)**
Conversion Factor:	2204.62	pounds	per metric ton	
Intermediate Result:	**827,132**	**pounds**	**CO_2**	
Conversion Factor(1):	22.38	pounds	CO_2 per 1 gallon of diesel fuel	
Final Result:	**36,958.53**	**gallons**	**diesel fuel**	

(1) Source: U.S. EIA, 2016. Website: http://www.eia.gov/tools/faqs/faq.cfm?id=307&t=11

On-road Mobile (Operational) Energy Usage

Note: For the sake of simplicity, it was assumed that passenger vehicles, light duty trucks, motorcycles, and mobile homes use gasoline, and all medium-duty trucks, heavy-duty trucks, and buses use diesel fuel.

Step 1: **Total Net Daily Trips (provided by ND Engineering, PC)**

3,295

	H-W	*H-S*	*H-O*
Trip Length (miles) (provided by CalEEMod)	10.8	7.3	7.5
Trip %	59.00%	0.00%	41.00%

Average Trip Length (weighted average)

9.4470

Average Trip Length

102.0276

Therefore:

Average Daily VMT:

336,181

Step 2: Given:

Fleet Mix (provided by CalEEMod v2016.3.2)

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
50.6%	3.3%	16.9%	12.5%	2.0%	0.7%	2.2%	11.0%	0.2%	0.2%	0.5%	0.0%	0.0%

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

LDA	LDT1	LDT2	MDV	MCY	MH	OBUS
30.52	25.22	22.47	16.07	37.87	6.6	6.53

Diesel MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

LHD1	LHD2	MHD	HHD	UBUS	SBUS
17.32	15.7	8.09	5.53	4.71	7.23

Therefore:

Weighted Average MPG Factors

Gasoline: **26.5** Diesel: **7.8**

Step 3: **Therefore:**

10,619 daily gallons of gasoline **7,047 daily gallons of diesel**

or

Result: **3,876,115.36 annual gallons of gasoline** **2,572,025 annual gallons of diesel**

On-road Mobile (Construction) Energy Usage - Demolition

Site preparation, and grading energy were used as the basis of this calculation.

Step 1:

Total Daily Worker Trips (provided by CalEEMod)
15

Total Daily Hauler Trips (provided by CalEEMod)
47

Worker Trip Length (miles) (provided by CalEEMod)
10.8

Hauling Trip Length (miles) (provided by CalEEMod)
20

Therefore:

Average Worker Daily VMT:
162

Average Hauling Daily VMT:
940

Step 2:

Given:

Assumed Fleet Mix for Workers

LDA	LDT1	LDT2
0.3333333	0.3333333	0.3333333

Assumed Fleet Mix for Vendors

MHD	HHD
0.5	0.5

And:

MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

Gasoline:

LDA	LDT1	LDT2
30.52	25.22	22.47

Diesel:

MHD	HHD
8.09	5.53

Therefore:

Weighted Average Worker (Gasoline) MPG Factor
26.1

Weighted Average Vendor (Diesel) MPG Factor
6.8

Weighted Average Hauling MPG Factor
0.0

Step 3:

Therefore:
6 **Worker daily gallons of gasoline**

Therefore:
138 **Vendor daily gallons of diesel**

Step 4:

5 **# of Days (see CalEEMod)**

Therefore:

Result: **31** **Total gallons of gasoline**

Therefore:

690 **Total gallons of diesel**

On-road Mobile (Construction) Energy Usage - Site Preparation

Site preparation, and grading energy were used as the basis of this calculation.

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

18

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

194

Step 2: Given:

Assumed Fleet Mix for Workers

LDA	**LDT1**	**LDT2**
0.3333333	0.333333	0.333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

LDA	**LDT1**	**LDT2**
30.52	25.22	22.47

Therefore:

Weighted Average Worker MPG Factor

26.1

Step 3: **Therefore:**

7.5 Worker daily gallons of gasoline

Step 4: 40 **# of Days (see CalEEMod)**

Therefore:

Result: **298** **Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Grading

Site preparation, and grading energy were used as the basis of this calculation.

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

20

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

216

Step 2: Given:

Assumed Fleet Mix for Workers

LDA	**LDT1**	**LDT2**
0.3333333	0.3333333	0.3333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

LDA	**LDT1**	**LDT2**
30.52	25.22	22.47

Therefore:

Weighted Average Worker MPG Factor

26.1

Step 3: **Therefore:**

8.3 Worker daily gallons of gasoline

Step 4: 110 **# of Days (see CalEEMod)**

Therefore:

Result: **911 Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Building Construction

Site preparation, and grading energy were used as the basis of this calculation.

Step 1:

Total Daily Worker Trips (provided by CalEEMod)	Total Daily Vendor Trips (provided by CalEEMod)	Total Daily Hauler Trips (provided by CalEEMod)
126	37	0

Worker Trip Length (miles) (provided by CalEEMod)	Vendor Trip Length (miles) (provided by CalEEMod)	Hauling Trip Length (miles) (provided by CalEEMod)
10.8	7.3	0

Therefore:

Average Worker Daily VMT:	Average Vendor Daily VMT:	Average Hauling Daily VMT:
1,360.80	270	-

Step 2: Given:

Assumed Fleet Mix for Workers

LDA	LDT1	LDT2
0.33333333	0.333333	0.333333

Assumed Fleet Mix for Vendors

MHD	HHD
0.5	0.5

And:

MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

Gasoline:

LDA	LDT1	LDT2
30.52	25.22	22.47

Diesel:

MHD	HHD
8.09	5.53

Therefore:

Weighted Average Worker (Gasoline) MPG Factor	Weighted Average Vendor (Diesel) MPG Factor	Weighted Average Hauling MPG Factor
26.1	6.8	0.0

Step 3: **Therefore:**

52 **Worker daily gallons of gasoline**

Therefore:

40 **Vendor daily gallons of diesel**

Step 4: 1110 **# of Days (see CalEEMod)**

Therefore:

Result: **57,940** **Total gallons of gasoline**

Therefore:

44,025 **Total gallons of diesel**

On-road Mobile (Construction) Energy Usage - Paving

Site preparation, and grading energy were used as the basis of this calculation.

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

15

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

162

Step 2: Given:

Assumed Fleet Mix for Workers

LDA	**LDT1**	**LDT2**
0.3333333	0.3333333	0.3333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

LDA	**LDT1**	**LDT2**
30.52	25.22	22.47

Therefore:

Weighted Average Worker MPG Factor

26.1

Step 3: **Therefore:**

6.2 Worker daily gallons of gasoline

Step 4: 75 **# of Days (see CalEEMod)**

Therefore:

Result: **466** **Total gallons of gasoline**

On-road Mobile (Construction) Energy Usage - Architectural Coating

Site preparation, and grading energy were used as the basis of this calculation.

Step 1: **Total Daily Worker Trips (provided by CalEEMod)**

25

Worker Trip Length (miles) (provided by CalEEMod)

10.8

Therefore:

Average Worker Daily VMT:

270

Step 2: Given:

Assumed Fleet Mix for Workers

LDA	LDT1	LDT2
0.3333333	0.3333333	0.3333333

And:

Gasoline MPG Factors for each Vehicle Class (from EMFAC2014) - Year 2021

LDA	LDT1	LDT2
30.52	25.22	22.47

Therefore:

Weighted Average Worker MPG Factor

26.1

Step 3: **Therefore:**

10.4 Worker daily gallons of gasoline

Step 4: 75 **# of Days (see CalEEMod)**

Therefore:

Result: **777 Total gallons of gasoline**

Appendix B

Acoustical Analysis

ACOUSTICAL ANALYSIS

TRACT 6224
FRESNO, CALIFORNIA

WJVA Project No. 18-036

PREPARED FOR

LENNAR HOMES OF CENTRAL CALIFORNIA
8080 NORTH PALM AVENUE, SUITE 110
FRESNO, CA 93711

PREPARED BY

WJV ACOUSTICS, INC.
VISALIA, CALIFORNIA

wjv acoustics

OCTOBER 25, 2018

INTRODUCTION

The project is a proposed 349-lot single-family residential development to be located in Fresno, California. The project site is located east of North Temperance Avenue and south of East Shields Avenue. The project applicant has requested an acoustical analysis to quantify project site noise exposure and determine noise mitigation requirements. This analysis, prepared by WJV Acoustics, Inc. (WJVA), is based upon a project lot layout map provided by the project applicant, Lennar Homes, traffic data provided by the Fresno Council of Governments (Fresno COG) and the findings of on-site noise level measurements. Revisions to the lot layout plan may affect the findings and recommendations of this report. The site plan is provided as Figure 1.

Appendix A provides a description of the acoustical terminology used in this report. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dB). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects. Appendix B provides typical A-weighted sound levels for common noise sources.

NOISE EXPOSURE CRITERIA

The City of Fresno Noise Element of the General Plan (adopted 12/18/14) sets noise compatibility standards for transportation noise sources in terms of the Day-Night Average Level (L_{dn}). Implementing Policy NS-1-a of the noise element establishes a land use compatibility criterion as 65 dB L_{dn} for exterior noise exposure within outdoor activity areas of residential land uses. Outdoor activity areas generally include backyards of single-family residences, individual patios or decks of multi-family developments and common outdoor recreation areas of multi-family developments. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation.

Additionally, Implementing Policy NS-1-h of the noise element requires that interior noise levels attributable to exterior transportation noise sources not exceed 45 dB L_{dn}. The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep.

PROJECT SITE NOISE EXPOSURE

The project site is located east of North Temperance Avenue and south of East Shields Avenue. The project site is exposed traffic noise. The distance from center of the backyards of the closest proposed lots to the centerline of North Temperance Avenue and East Shields Avenue is approximately 100 feet.

Traffic Noise Exposure:

Noise exposure from traffic on North Temperance Avenue and East Shields Avenue was calculated for existing and future (2035) conditions using the FHWA Traffic Noise Model and traffic data obtained from Fresno COG.

WJVA utilized the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA Model is a standard analytical method used for roadway traffic noise calculations. The model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within ±1.5 dB. To predict L_{dn} values, it is necessary to determine the hourly distribution of traffic for a typical day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Noise level measurements and concurrent traffic counts were conducted by WJVA staff within the project site on October 22, 2018. The purpose of the measurements was to evaluate the accuracy of the FHWA Model in describing traffic noise exposure within the project site. The measurement site was located within the project site at a distance of approximately 40 feet from the centerline of North Temperance Avenue and approximately 60 feet from the centerline of East Shields Avenue. The speed limit posted in the project vicinity was 45 mph (miles per hour) for both roadways. The project vicinity and noise monitoring site locations are provided as Figure 2.

Noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL-820 sound level analyzer equipped with a B&K Type 4176 1/2” microphone. The equipment complies with the specifications of the American National Standards Institute (ANSI) for Type I (Precision) sound level meters. The meter was calibrated in the field prior to use with a B&K Type 4230 acoustic calibrator to ensure the accuracy of the measurements. The microphone was located on a tripod at 5 feet above the ground. The project site presently consists of a citrus orchard.

Noise measurements were conducted in terms of the equivalent energy sound level (L_{eq}). Measured L_{eq} values were compared to L_{eq} values calculated (predicted) by the FHWA Model using as inputs the traffic volumes, truck mix and vehicle speed observed during the noise measurements. The results of that comparison are shown in Table I.

From Table I it may be determined that the traffic noise levels predicted by the FHWA Model were 0.4 dB and 2.4 higher than those measured for the traffic conditions observed at the time of the noise measurements for North Temperance Avenue and East Shields Avenue, respectively. This is reasonable agreement with the model and therefore no adjustments to the model are necessary.

TABLE I

COMPARISON OF MEASURED AND PREDICTED (FHWA MODEL) NOISE LEVELS TRACT 6224

	N. Temperance Ave.	E. Shields Ave.
Measurement Start Time	9:30 a.m.	9:05 a.m.
Observed # Autos/Hr.	384	240
Observed # Medium Trucks/Hr.	36	0
Observed # Heavy Trucks/Hr.	0	0
Posted Speed (MPH)	45	45
Distance, ft. (from center of roadway)	40	60
L_{eq}, dBA (Measured)	66.0	63.7
L_{eq}, dBA (Predicted)	65.6	61.3
Difference between Measured and Predicted L_{eq}, dBA	**+0.4**	**+2.4**

Note: FHWA "soft" site assumed for calculations.
Source: WJV Acoustics, Inc.

Annual Average Daily Traffic (AADT) data for North Temperance Avenue and East Shields Avenue in the project vicinity was obtained from Fresno COG. Truck percentages and the day/night distribution of traffic were estimated by WJVA, based upon previous studies conducted in the project vicinity since project-specific data were not available from government sources. A future speed limit of 50 mph was assumed for North Temperance Avenue, as the section of the roadway north of East Shields Avenue (where roadway widening improvements have already occurred) has a posted speed limit of 50 mph. Table II summarizes annual average traffic data used to model noise exposure within the project site.

	N. Temperance Ave.		E. Shields Ave.	
TABLE II **TRAFFIC NOISE MODELING ASSUMPTIONS** **TRACT 6224, FRESNO**	**Existing**	**2035**	**Existing**	**2035**
Annual Avenue Daily Traffic (AADT)	11,844	41,029	6,967	20,491
Day/Night Split (%)	90/10		90/10	
Assumed Vehicle Speed (mph)	50		45	
% Medium Trucks (% AADT)	2		2	
% Heavy Trucks (% AADT)	2		1	

Sources: Fresno COG
WJV Acoustics, Inc.

Using data from Table II, the FHWA Model, annual average traffic noise exposure was calculated for the closest proposed backyards from North Temperance Avenue and East Shields Avenue. The calculated noise exposures for existing and future (2035) traffic conditions for the closest proposed setbacks to North Temperance Avenue were approximately 64 dB L_{dn} and 70 dB L_{dn}, respectively. The calculated noise exposures for existing and future (2035) traffic conditions for the closest proposed setbacks to East Shields Avenue were approximately 60 dB L_{dn} and 65 dB L_{dn}, respectively. Noise exposure levels for future (2035) traffic conditions are above the applicable City of Fresno exterior noise level standard of 65 dB L_{dn}, and further mitigation is required.

NOISE MITIGATION

Exterior Noise Mitigation:

The City of Fresno Noise Element of the General Plan establishes a 65 dB L_{dn} criterion within outdoor activity areas (backyards) of single-family homes. The project site traffic noise exposure for future (2035) traffic conditions was calculated to be approximately 70 dB L_{dn} within the closest lots along North Temperance Avenue and approximately 65 dB L_{dn} within the closest lots along East Shields Avenue. These noise exposure levels meet or exceed the City of Fresno exterior noise level standard and mitigation must be considered.

To mitigate exterior traffic noise exposure along North Temperance Avenue and East Shields Avenue it will be necessary to construct a sound wall along the project roadway frontages. The sound wall would provide acoustical shielding of the outdoor activity areas located closest to the roadways.

A sound wall insertion loss program based on the FHWA Model was used to calculate the insertion loss (noise reduction) provided by the proposed sound walls. The model calculates the insertion loss of a wall of given height based on the effective height of the noise source, height of the receiver, distance from the receiver to the wall, and distance from the noise source to the wall. The standard assumptions used in the sound wall calculations are effective source heights of 8, 2 and 0 feet above the roadway for heavy trucks, medium trucks and automobiles, respectively. The standard height of a residential receiver is five feet above the ground elevation. It was assumed by WJVA that the building pad elevations at the closest proposed homes to North Temperance Avenue and East Shields Avenue would be approximately the same elevation as the roadway pavement.

Based upon the above-described assumptions and method of analysis, the noise level insertion loss values for sound walls of various heights were calculated. The calculations indicated that a sound wall along North Temperance Avenue with a minimum height of six-and-a-half (6.5) feet relative to the closest building pad elevations would reduce traffic noise exposure within individual backyards by approximately 6 dB, resulting in a projected future exposure of approximately 64 dB L_{dn}. In order to be effective, the sound wall should be turned inward (eastward) at lots located adjacent to roadway access points (lots 263, 264, 289 and 290).

The calculations also indicated that a sound wall along East Shields Avenue with a minimum height of six (6) feet relative to the closest building pad elevations would reduce traffic noise exposure within individual backyards by approximately 5-6 dB, resulting in a projected future exposure of approximately 59-60 dB L_{dn}. In order to be effective, the sound wall should be turned inward (southward) at lots located adjacent to roadway access points (lots 12 and 13).

It should be noted, the above-described sound walls would be effective at first-floor receiver locations only, and would not provide acoustical shielding to any proposed second-floor receivers. Therefore, individual second-floor balconies should not be constructed facing North Temperance Avenue or East Shields Avenue for the first row of homes adjacent to the roadways.

Interior Noise Exposure:

The City of Fresno interior noise level standard is 45 dB L_{dn}. The worst-case future noise exposure within the proposed residential development would be approximately 64 dB L_{dn} at first-floor receiver locations and approximately 70 dB L_{dn} at second-floor receiver locations. This means that the proposed residential construction must be capable of providing a minimum outdoor-to-indoor noise level reduction (NLR) of approximately 25 dB (70-45=25).

A specific analysis of interior noise levels was not performed. However, it may be assumed that residential construction methods complying with current building code requirements will reduce exterior noise levels by approximately 25 dB if windows and doors are closed. This will be sufficient for compliance with the City's 45 dB L_{dn} interior standard at all proposed lots adjacent to North Temperance Avenue and East Shields Avenue. Requiring that it be possible for windows and doors to remain closed for sound insulation means that air conditioning or mechanical ventilation will be required.

CONCLUSIONS AND RECOMMENDATIONS

Exterior Noise Compliance:

The proposed 349-lot residential development will comply with applicable City of Fresno exterior noise level requirements provided the following mitigation measures are incorporated into final project design.

1. A sound wall with a minimum height of six-and-a-half (6.5) feet is constructed along the lot property lines adjacent to North Temperance Avenue. The wall should be turned inward (eastward) along the lots adjacent to roadway access points (lots 263, 264, 289 and 290). Suitable construction materials include concrete blocks, masonry or stucco on both sides of a wood or steel stud wall.

2. A sound wall with a minimum height of six (6) feet is constructed along the lot property lines adjacent to East Shields Avenue. The wall should be turned inward (southward) along the lots adjacent to roadway access points (lots 12 and 13). Suitable construction materials include concrete blocks, masonry or stucco on both sides of a wood or steel stud wall.

3. If two-story construction is proposed for the first row of homes facing North Temperance Avenue and East Shields Avenue, second story balconies facing the respective roadways should not be incorporated into project design.

Interior Noise Compliance:

The proposed 349-lot residential development will comply with applicable City of Fresno interior noise level requirements provided the following mitigation measures are incorporated into final project design.

1. Mechanical ventilation or air conditioning must be provided for all homes so that windows and doors can remain closed for sound insulation purposes.

2. Acoustic baffles should be installed on the interior side of gable vents that face, or are perpendicular to, North Temperance Avenue and East Shields Avenue. An example of a suitable attic vent baffle is shown by Appendix C.

The conclusions and recommendations of this acoustical analysis are based upon the best information known to WJV Acoustics Inc. (WJVA) at the time the analysis was prepared concerning the proposed lot layout plan, project site elevation, railway operations, traffic volumes and roadway configurations. Any significant changes in these factors will require a reevaluation of the findings of this report. Additionally, any significant future changes in motor vehicle technology, railway technology, noise regulations or other factors beyond WJVA's control may result in long-term noise results different from those described by this analysis.

Respectfully submitted,

Walter J. Van Groningen
President

WJV:wjv

FIGURE 1: SITE PLAN AND SOUND WALL LOCATIONS

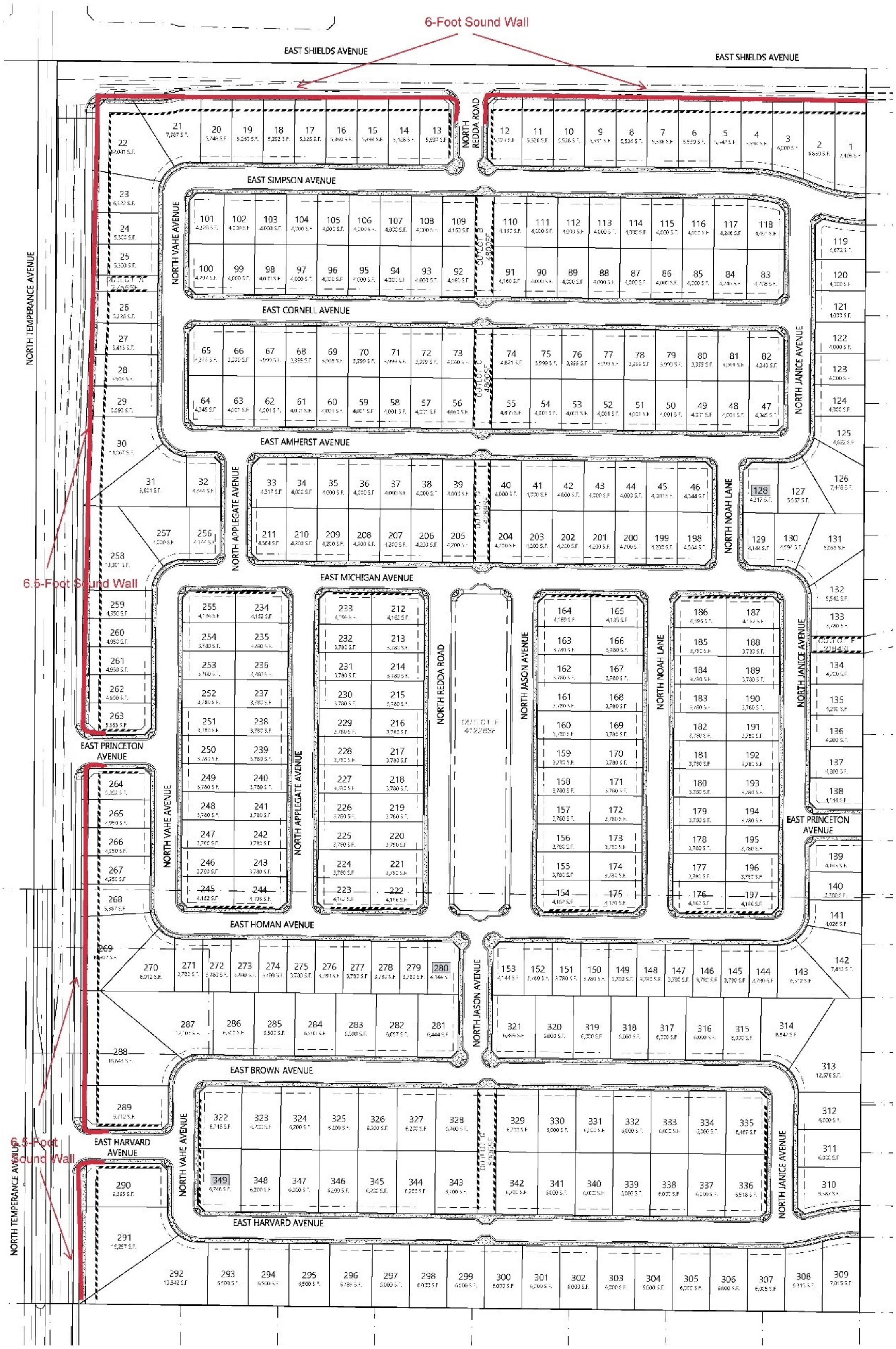
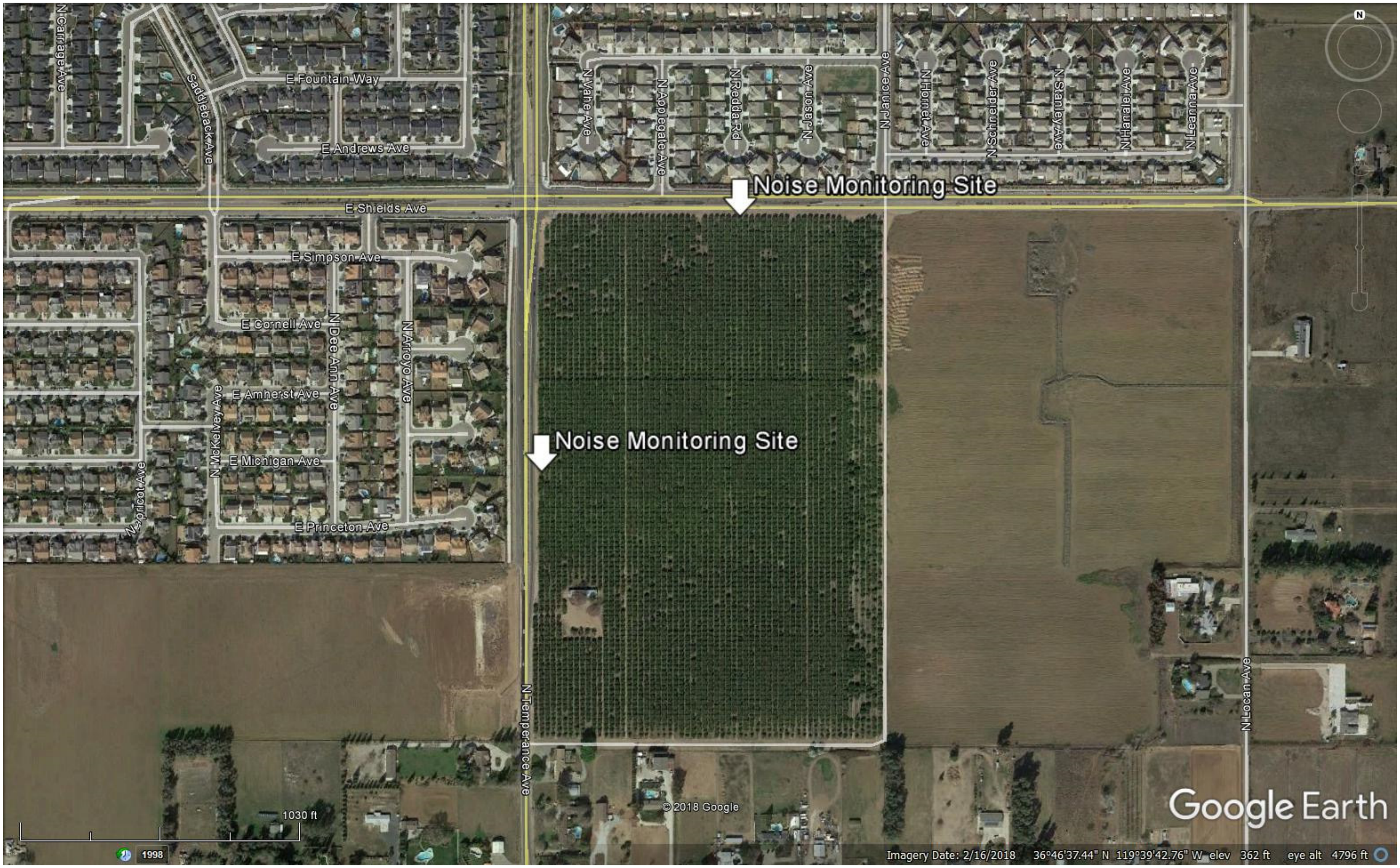


FIGURE 2: PROJECT SITE VICINITY AND NOISE MEASUREMENT LOCATIONS



APPENDIX A

ACOUSTICAL TERMINOLOGY

AMBIENT NOISE LEVEL: The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.

CNEL: Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

DECIBEL, dB: A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

DNL/L_{dn}: Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

L_{eq}: EquivaClent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.

NOTE: The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.

L_{max}: The maximum noise level recorded during a noise event.

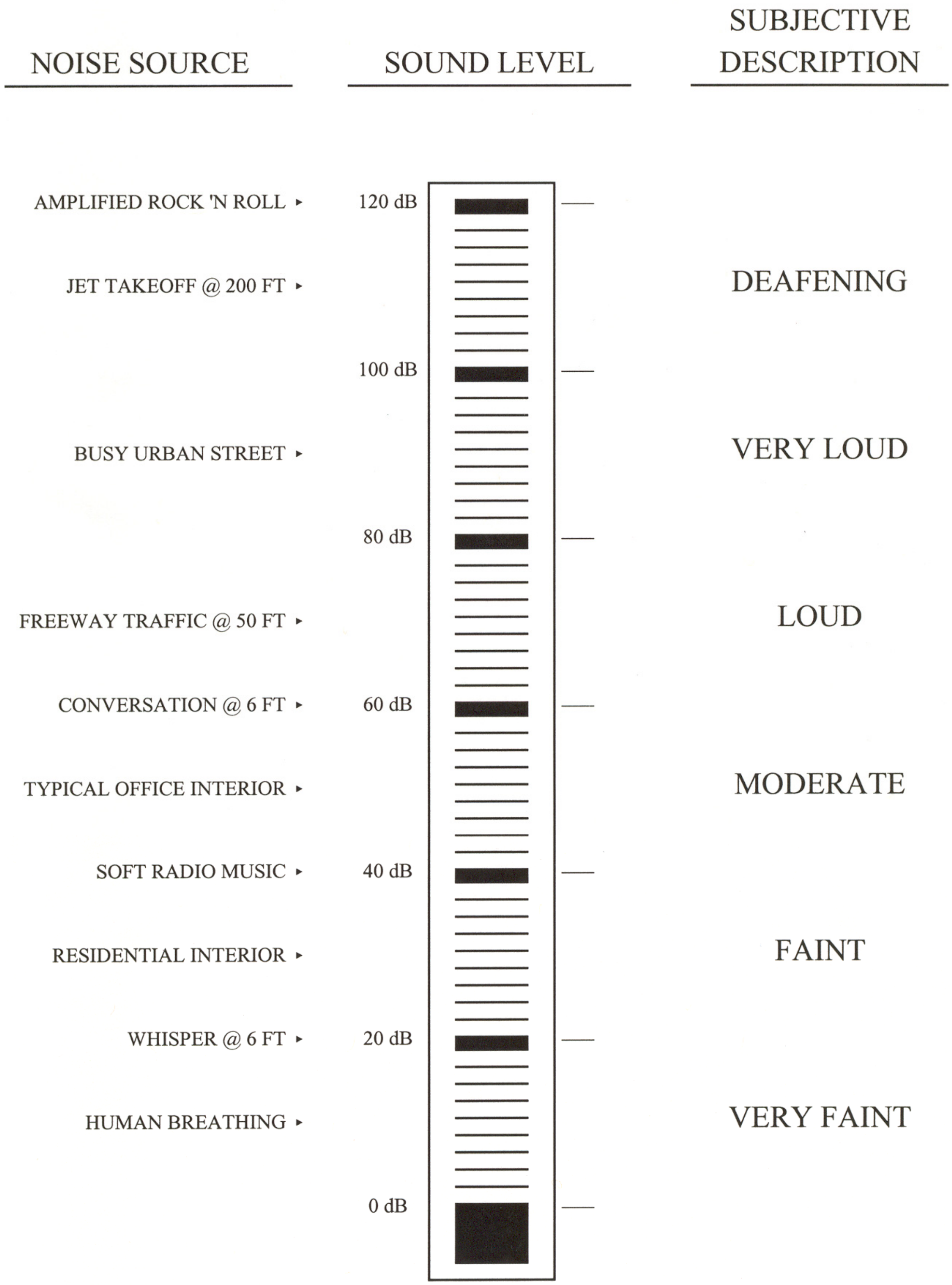
L_n: The sound level exceeded "n" percent of the time during a sample interval (L_{90}, L_{50}, L_{10}, etc.). For example, L_{10} equals the level exceeded 10 percent of the time.

A-2

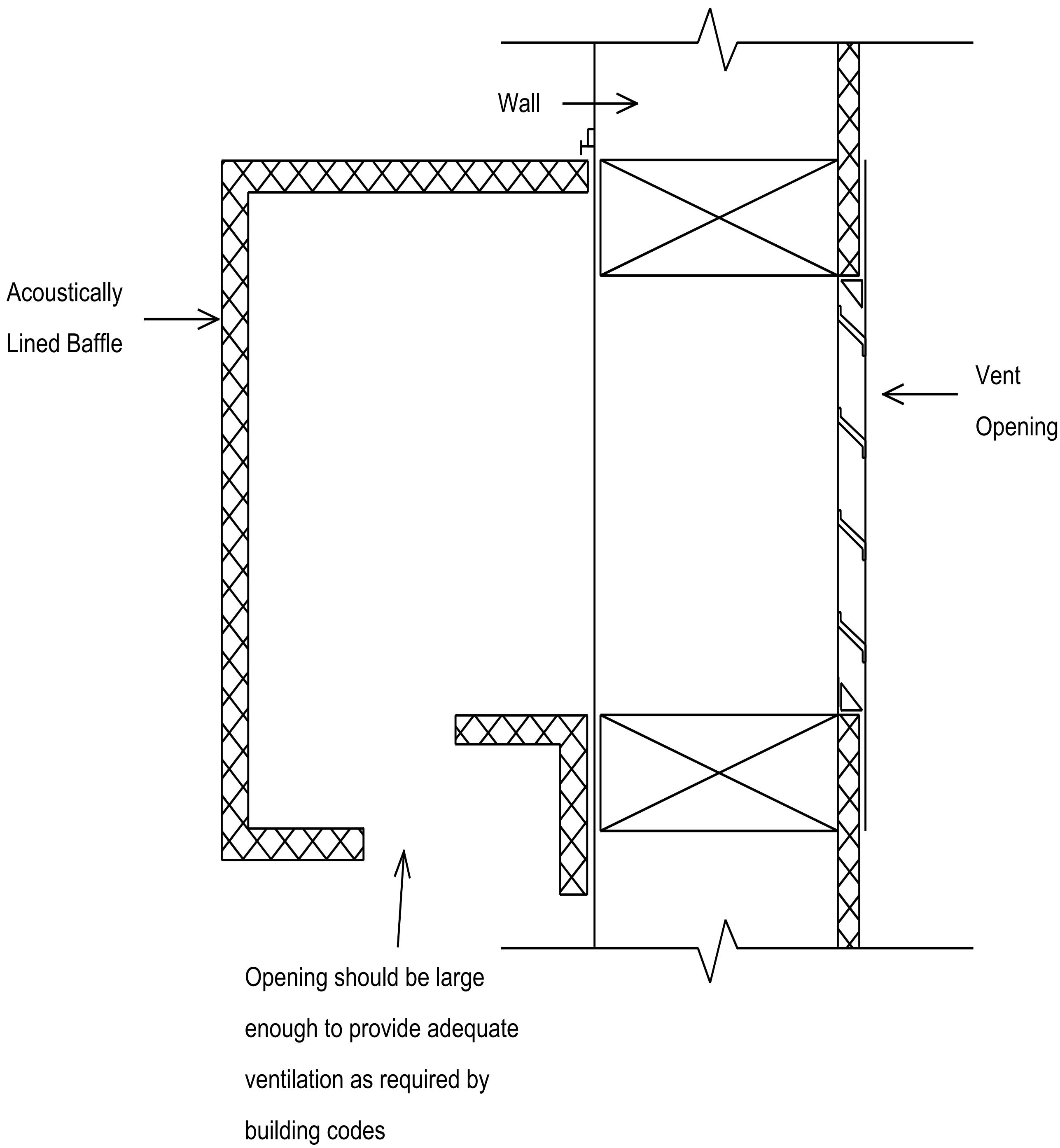
ACOUSTICAL TERMINOLOGY

NOISE EXPOSURE CONTOURS:	Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.
NOISE LEVEL REDUCTION (NLR):	The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of “noise level reduction” combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.
SEL or SENEL:	Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.
SOUND LEVEL:	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.
SOUND TRANSMISSION CLASS (STC):	The single-number rating of sound transmission loss for a construction element (window, door, etc.) over a frequency range where speech intelligibility largely occurs.

APPENDIX B
EXAMPLES OF SOUND LEVELS



Appendix C
Example of Attic Vent Baffle Treatment



Appendix C

Traffic Impact Study

JULY 2019

TRAFFIC IMPACT STUDY

TRACT 6224

City of Fresno, California

Headquarters: 6807 Leameadow Drive • Dallas • Texas 75248 • Phone: (972) 239-8995 • www.ndengpc.com

ND Engineering, PC

TRAFFIC IMPACT STUDY FOR

TRACT 6224

Fresno, California

Planner: Jose Valenzuela

Final: July 2019
Draft 3: April 2019
Draft 2: March 2019
Draft 1: February 2019

Prepared for
Mr. Brandon Broussard
Yamabe & Horn Engineering, Inc.
2985 North Burl Avenue, Ste 101
Fresno, CA 93727

Prepared by
ND Engineering, PC
N. Ruth Davis, PE, PTOE
F-11119
6807 Leameadow
Dallas, TX 75248
(972) 239-8995

Naomi Ruth Davis

REGISTERED PROFESSIONAL ENGINEER
Naomi Ruth Davis
No. C55461
EXPIRES 12/31/20
CIVIL
STATE OF CALIFORNIA

This Traffic Impact Study has been prepared under the direction of N. Ruth Davis. N. Ruth Davis attests to the technical information contained therein and has judged the qualifications of recommendations, conclusions, and decisions are based on City of Fresno guidelines, general engineering standards, and California/Federal laws.

In Association With

Sabine Johnson, Draftsperson/Graphics

Metro Traffic Data, Inc.
310 N. Irwin Street, Ste 20
Hanford, CA 93230

TABLE OF CONTENTS ***PAGE***

TRAFFIC IMPACT STUDY
FOR
TRACT 6224

EXECUTIVE SUMMARY/INTRODUCTION

This Traffic Impact Study (TIS) was prepared to assess the traffic impacts due to the development of an approximately 57 acre site (Project), which will consist of 349 single family dwelling units (dus). The Project is consistent with the currently adopted City of Fresno General Plan. It is located on the southeast corner of Temperance Avenue and Shields Avenue, in the County of Fresno within the City of Fresno sphere of influence. The Project site is currently in agricultural use with limited structures. Figure 1 shows the Project location.

The Project study area for the analysis of traffic impacts extends from Dakota Avenue (north) to Tulare Avenue (south) and from Armstrong Avenue (west) to DeWolf Avenue (east). This report analyzes 11 intersections for two (2) time periods, weekday AM and PM peak hour of the street. To analyze the traffic impacts resulting from the build out of the Project, seven (7) scenarios were evaluated. Time frames included in the seven (7) scenarios are: Existing (2018), Existing plus Approved/Pending/Proposed (approximately 2022), and 2035. Appendix A contains a description of the methodology used in this TIS.

<u>Impacts</u>

Table 1 shows a level of service summary for the study intersections for the various scenarios. Intersections operating or projected to operate below the adopted level of service standard are shown bolded in Table 1. The all-way stop controlled (AWSC) and signalized intersection levels of service shown in Table 1 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the AWSC and signalized level of service or delay shown in Table 1.

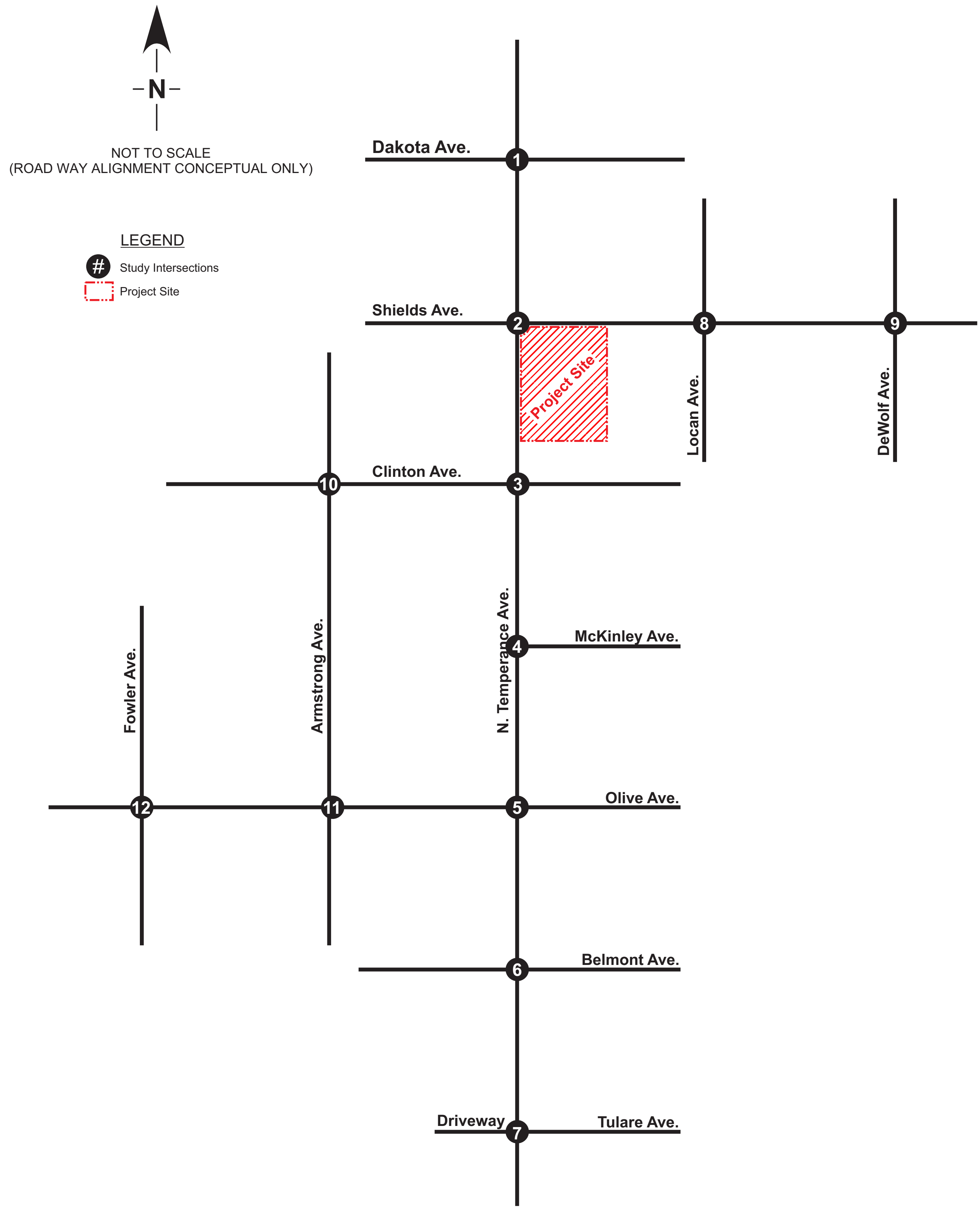
As shown in Table 1, the following intersections by scenario are projected to operate below, or are projected to have approaches that operate below the appropriate adopted level of service standard:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour



ND Engineering, PC

VICINITY MAP

City of Fresno, California

Figure 1

C:\NDEngineering2018\Shields@Temperance\Vicinity Map.cdr

TABLE 1:
WEEKDAY LEVELS OF SERVICE SUMMARY FOR THE STUDY INTERSECTIONS

	Existing (2018)		Existing (2018) + Project		Mitigated Existing (2018) + Project		Existing (2018) + A/P/P Projects		Existing (2018) + A/P/P + Project		Mitigated Existing (2018) + A/P/P + Project		2035 Project		Mitigated 2035 Project	
Intersection	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**	**LOS AM/PM**	**Delay[1] AM/PM (secs)**
Temperance Avenue at Dakota Avenue	**F**/B	**170.4**/14.8	**F**/C	**184.7**/17.1	C/D	30.2/37.4	**F/E**	**358.8/39.4**	**F/F**	**376.1/53.5**	D/B	36.1/19.4	D/C	39.6/33.6	D/D	39.6/54.9
Temperance Avenue at Shields Avenue	C/C	30.5/30.4	C/D	34.5/35.3	C/D	34.3/40.1	D/D	42.7/45.7	D/E	53.0/59.9	D/D	43.6/38.1	**F/F**	**145.0/142.3**	**F/F**	**166.8/85.8**
Temperance Avenue at Clinton Avenue	D/B	39.1/18.9	E/C	**57.5**/24.3	D/C	40.8/22.2	**F**/C	**147.5**/32.0	**F**/D	**192.0**/52.7	E/C	74.1/28.7	E/D	77.0/42.5	E/C	57.4/34.1
Temperance Avenue at McKinley Avenue											B/B	17.3/16.0	**F/F**	**176.9/138.7**	**F/F**	**102.6/103.4**
• **WB Approach**	C/C	23.2/20.5	D/C	25.4/23.4	D/C	25.4/23.4	**F**/E	**50.6/37.4**	**F**/E	**60.4**/46.2						
Temperance Avenue at Olive Avenue	**F/E**	**74.2/37.1**	**F/F**	**85.4/50.9**	C/C	26.3/25.3	**F/F**	**141.8/102.4**	**F/F**	**157.4/126.5**	D/C	35.1/26.1	D/**E**	48.2/**71.1**	D/C	38.5/30.3
Temperance Avenue at Belmont Avenue	**E/E**	**44.5/41.8**	**F/F**	**54.2/53.7**	C/C	24.1/24.3	**F/F**	**104.3**/113.5	**F/F**	**120.0/128.5**	C/C	28.5/26.9	D/**E**	51.4/**57.1**	D/D	43.8/53.0
Temperance Avenue at Tulare Avenue													B/**E**	17.7/**61.1**	B/C	18.0/22.3
• **WB Approach**	D/C	27.2/22.8	D/C	28.5/24.0	D/C	28.5/24.0	**E**/D	**36.0**/30.2	**E**/D	**38.0**/32.3	**E**/D	**38.0**/32.3				
Shields Avenue at Locan Avenue					C/B	21.1/18.9					D/C	49.6/21.9	**F/E**	**84.7/67.5**	D/D	46.0/50.9
• **NB Approach**	C/C	19.2/16.6	C/C	20.2/17.3			+/**E**	---/**49.6**	**+/F**	**---/55.3**						
• **SB Approach (Left-Through Movement)**	E/C	44.0/20.2	**E**/C	**48.7**/21.3			**F/F**	**$1065.1/54.4**	**F/F**	**$1345.5/60.2**						
Shields Avenue at DeWolf Avenue	**E**/B	**39.0**/11.0	**E**/B	**45.5**/11.3	C/C	30.8/20.4	**F**/C	**150.8**/20.9	**F**/C	**158.6**/23.0	D/C	54.5/21.4	**F/E**	**84.8/55.3**	D/D	42.7/43.9
Armstrong Avenue at Clinton Avenue	**E**/B	**38.4**/11.6	**E**/B	**47.7**/12.6	C/B	25.7/19.1	**F**/C	**92.8**/15.5	**F**/C	**114.9**/17.8	D/C	35.6/21.3	D/D	38.1/36.1	C/C	24.6/23.2
Armstrong Avenue at Olive Avenue	D/B	33.2/14.6	**E**/C	**36.4**/15.9	C/B	30.2/19.5	E/C	**39.0**/15.5	**E**/C	**42.0**/16.6	C/B	30.9/19.7	D/**F**	41.0/**87.1**	D/D	40.6/36.2

A/P/P = Approved/Pending/Proposed *[1] Delay per vehicle* *secs = seconds* *WB = westbound* *NB = northbound* *SB = southbound* *+ Computation not defined* *$ Delay exceeds 300 sec*

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

2035 Project (With the Project)

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – PM peak hour
- Temperance Avenue at Belmont Avenue – PM peak hour
- Temperance Avenue at Tulare Avenue – PM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – PM peak hours

Mitigated 2035 Project (With the Project)

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours

Rural peak hour volume signal warrants were also prepared for the unsignalized study intersections. Based on the rural peak hour volume signal warrant, the warrant is met at the following locations by time period and scenario:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour

- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Table 2 shows the 95th-percentile queue length exceedances for the various scenarios for the various study intersections. Movements with queue lengths that exceed or are projected to exceed their available storage lengths are shown bolded in Table 2. As shown in Table 2 the following locations by scenario are projected to have queue storage length exceedances:

Existing (2018) (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left-turn – AM peak hour
  - EB left-turn – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right-turn – AM peak hour

TABLE 2:
WEEKDAY 95TH-PERCENTILE QUEUE LENGTH SUMMARY

		95th Percentile Queue Length (ft) (AM/PM)							
Intersection	**Existing (2018) / Planned Queue Storage Length (ft)**	**Existing (2018)**	**Existing (2018) + Project**	**Mitigated Existing (2018) + Project**	**Existing (2018) + A/P/P Projects**	**Existing (2018) + A/P/P Projects + Project**	**Mitigated Existing (2018) + A/P/P Projects + Project**	**2035 Project**	**Mitigated 2035 Project**
Temperance Avenue at Dakota Avenue									
• **NB Left**	190/**250**	5/5	5/5	53/m/44	8/8	8/8	m51/53	#133/**m#470**	#133/**#570**
• NB Through	2,600[1]	73/88	88/103	150/190	150/213	178/230	325/256	46/72	83/412
• **NB Right**	201/250	28/35	33/38	0/m0	50/65	55/68	m0/0	0/m3	m0/m19
• **SB Left**	255/255	8/10	8/10	63/82	8/13	8/13	55/80	73/133	73/132
• SB Through-Right	2,600[1]	1,175/95	1,258/130	#829/326	2,133/348	2,215/460	na/na	na/na	na/na
• SB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	261/186	369/212	396/212
• SB Right	0/250	na/na	na/na	na/na	na/na	na/na	12/0	16/66	16/66
• EB Left-Through-Right	1,300[1]	25/15	28/18	na/na	38/28	38/28	na/na	na/na	na/na
• **EB Left**	0/**200**	na/na	na/na	#97/45	na/na	na/na	110/58	**#206**/76	**#206**/76
• EB Through-Right	1,300[1]	na/na	na/na	32/41	na/na	na/na	34/37	na/na	na/na
• EB Through	1,300[1]	na/na	na/na	na/na	na/na	na/na	na/na	46/38	46/38
• EB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	64/72	64/72
• WB Left	141/200	8/0	8/0	56/20	13/3	13/3	72/22	#197/#150	#197/#150
• WB Through-Right	600[1]	25/10	25/10	53/36	28/13	28/13	27/30	na/na	na/na
• WB Through	600[1]	na/na	na/na	na/na	na/na	na/na	na/na	24/17	24/17
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
Temperance Avenue at Shields Avenue									
• **NB Left**	241/**250**	50/40	#111/#74	#111/76	65/64	#147/#118	m104/**#104**	**m#310**/m73	**#333**/m#110
• NB Through	2,600[1]	252/319	277/339	280/351	376/425	406/449	m494/#537	279/m56	232/#486
• **NB Right**	100/250	0/35	4/63	5/30	32/64	46/96	m54/55	**m426/m#704**	134/47
• SB Left	229/250	44/#76	60/#146	61/#142	85/#118	#104/#189	#110/#154	m#114/m#187	m44/73
• SB Through	2,600[1]	156/82	157/87	160/23	218/124	221/130	59/140	296/216	296/283
• **SB Right**	228/250	53/0	53/0	53/0	106/14	122/14	11/0	134/m27	133/1
• EB Left	237/250	61/#110	61/#110	61/#100	81/#144	81/#144	88/110	85/120	88/118
• EB Through	1,100[1]	230/295	243/347	249/351	344/#603	359/#686	183/260	369/#766	160/269
• EB Right	138/250	10/0	13/0	14/0	37/16	40/26	0/26	97/134	77/158
• **WB Left**	235/**250**	#118/51	#156/#75	#147/#76	**#204/#79**	**#241**/#118	184/#105	**m#531/m#412**	**#794/#498**
• WB Through	1,200[1]	202/67	211/72	216/74	376/136	388/141	257/154	m243/m49	203/m144
• WB Right	113/250	0/0	0/0	0/0	1/0	12/0	m0/0	m0/m0	m1/m2
Temperance Avenue at Clinton Avenue									
• **NB Left**	251/**251**	54/30	54/30	60/31	62/61	62/61	m73/74	**#251**/m72	81/m99
• NB Through	900[1]	306/#572	#331/#654	315/#631	#506/#798	#530/#875	421/#816	83/m87	180/m#715
• NB Right	151/250	14/0	14/0	0/0	14/0	14/0	18/0	0/m11	0/m22
• **SB Left**	**151/250**	**#254**/35	**#269**/68	**#232**/69	#**356**/50	**#370**/81	**#363**/#105	**m#274**/m#193	**m#263**/m75
• SB Through-Right	2,600[1]	#576/#311	#703/#384	#646/#356	#880/#593	#1,005/#670	#951/533	na/na	na/na
• SB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	m#582/m422	m549/m292
• SB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	m13/m13	m24/m13
• **EB Left**	**51/200**	21/**62**	32/#**114**	35/#**124**	43/**93**	**52/#169**	**67/#224**	69/#**212**	33/96
• EB Through-Right	2,600[1]	71/41	71/41	86/43	84/48	84/48	127/65	na/na	na/na
• EB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	77/82	74/79

TABLE 2:
WEEKDAY 95TH-PERCENTILE QUEUE LENGTH SUMMARY

		95th Percentile Queue Length (ft) (AM/PM)							
Intersection	**Existing (2018) / Planned Queue Storage Length (ft)**	**Existing (2018)**	**Existing (2018) + Project**	**Mitigated Existing (2018) + Project**	**Existing (2018) + A/P/P Projects**	**Existing (2018) + A/P/P Projects + Project**	**Mitigated Existing (2018) + A/P/P Projects + Project**	**2035 Project**	**Mitigated 2035 Project**
• EB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	0/48	0/46
• **WB Left**	200/**200**	82/37	82/38	#93/38	82/38	82/38	#121/45	**#708/#526**	**#326/#244**
• WB Through-Right	700[1]	138/24	138/24	176/25	185/29	185/29	304/37	na/na	na/na
• WB Through	700[1]	na/na	na/na	na/na	na/na	na/na	na/na	84/52	91/50
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	56/52	61/54
Temperance Avenue at McKinley Avenue									
• **NB Left**	0/**250**	na/na	na/na	na/na	na/na	na/na	na/na	**m#723**/m#182	**#364**/m77
• NB Through-Right	1,300[1]	0/0	0/0	0/0	0/0	0/0	281/#767	na/na	na/na
• NB Through	1,300[1]	na/na	na/na	na/na	na/na	na/na	na/na	m431/m#913	290/m#912
• NB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	m138/m144	m80/m143
• **SB Left**	0/**250**	na/na	na/na	na/na	na/na	na/na	m37/81	m109/**m#392**	m77/m#184
• SB Left-Through	1,300[1]	0/0	5/5	5/5	8/8	8/8	na/na	na/na	na/na
• SB Through	1,300	na/na	na/na	38/89	na/na	na/na	m132/210	m#615/m#566	m#736/m552
• **SB Right**	0/**250**	na/na	na/na	na/na	na/na	na/na	na/na	m109/m65	**m251**/m71
• **EB Left**	0/**200**	na/na	na/na	na/na	na/na	na/na	na/na	77/**#643**	40/**#303**
• EB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	8/66	3/33
• **EB Right**	0/**200**	na/na	na/na	na/na	na/na	na/na	na/na	0/**219**	0/**262**
• WB Left-Right	5,200[1]	53/30	60/33	60/33	128/60	143/73	59/61	na/na	na/na
• **WB Left**	0/**200**	na/na	na/na	na/na	na/na	na/na	na/na	**#831/#204**	**#395**/89
• WB Through	5,200[1]	na/na	na/na	na/na	na/na	na/na	na/na	65/19	32/10
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	62/12	65/12
Temperance Avenue at Olive Avenue									
• NB Left-Through-Right	1,300[1]	315/375	343/485	na/na	500/818	528/963	na/na	na/na	na/na
• NB Left	0/250	na/na	na/na	27/20	na/na	na/na	27/24	m68/m25	m#88/m33
• NB Through-Right	1,300[1]	na/na	na/na	#389/#662	na/na	na/na	#473/#853	na/na	na/na
• NB Through	1,300[1]	na/na	na/na	na/na	na/na	na/na	na/na	m#611/m#908	m554/m#947
• NB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	m25/m24	m4/m15
• SB Left-Through	1,300[1]	358/95	428/105	na/na	653/203	723/230	na/na	na/na	na/na
• SB Left	0/250	na/na	na/na	16/35	na/na	na/na	22/53	m8/m41	m10/m49
• SB Through	1,300[1]	na/na	na/na	#440/238	na/na	na/na	#565/332	m#667/m#629	m#645/#665
• **SB Right**	**30**/250	25/8	28/10	21/0	**35**/10	**38**/13	**34**/10	m53/m48	m213/m65
• EB Left-Through-Right	2,600[1]	123/53	123/58	na/na	145/68	148/78	na/na	na/na	na/na
• **EB Left**	0/**200**	na/na	na/na	96/#147	na/na	na/na	#149/**#218**	**#498/#667**	**#226/#329**
• EB Through-Right	2,600[1]	na/na	na/na	96/94	na/na	na/na	89/117	na/na	na/na
• EB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	112/176	55/65
• EB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/39	0/0
• WB Left-Through-Right	700[1]	320/28	318/28	na/na	323/30	320/33	na/na	na/na	na/na
• **WB Left**	0/**200**	na/na	na/na	**#205**/75	na/na	na/na	**#237**/89	**#370/#211**	#175/93
• WB Through-Right	700[1]	na/na	na/na	178/61	na/na	na/na	174/79	na/na	na/na
• WB Through	700[1]	na/na	na/na	na/na	na/na	na/na	na/na	102/51	102/51
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0

TABLE 2:
WEEKDAY 95TH-PERCENTILE QUEUE LENGTH SUMMARY

		95th Percentile Queue Length (ft) (AM/PM)							
Intersection	**Existing (2018) / Planned Queue Storage Length (ft)**	**Existing (2018)**	**Existing (2018) + Project**	**Mitigated Existing (2018) + Project**	**Existing (2018) + A/P/P Projects**	**Existing (2018) + A/P/P Projects + Project**	**Mitigated Existing (2018) + A/P/P Projects + Project**	**2035 Project**	**Mitigated 2035 Project**
Temperance Avenue at Belmont Avenue									
• NB Left-Through-Right	1,200[1]	145/400	153/480	na/na	225/823	245/883	na/na	na/na	na/na
• NB Left	0/250	na/na	na/na	47/15	na/na	na/na	46/18	#202/38	73/19
• NB Through-Right	1,200[1]	na/na	na/na	258/#549	na/na	na/na	304/#701	na/na	na/na
• NB Through	1,200[1]	na/na	na/na	na/na	na/na	na/na	na/na	#495/#856	427/#811
• NB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	5/5	0/0
• SB Left-Through-Right	1,300[1]	408/143	478/173	na/na	790/315	880/360	na/na	na/na	na/na
• SB Left	0/250	na/na	na/na	42/63	na/na	na/na	47/82	m#165/m#212	m74/m79
• SB Through-Right	1,300[1]	na/na	na/na	#536/269	na/na	na/na	#676/358	na/na	na/na
• SB Through	1,300[1]	na/na	na/na	na/na	na/na	na/na	na/na	m#686/#642	#656/#615
• SB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	m7/m57	m114/97
• EB Left-Through	2,600[1]	35/50	40/60	na/na	48/65	53/78	na/na	na/na	na/na
• **EB Left**	0/250	na/na	na/na	76/18	na/na	na/na	#105/#129	**#380/#580**	#182/**#274**
• EB Through	2,600[1]	na/na	na/na	60/111	na/na	na/na	58/128	114/232	57/110
• EB Right	36/250	10/5	10/5	0/0	10/8	10/8	0/0	0/21	0/19
• WB Left-Through	700[1]	78/30	78/30	na/na	85/35	85/35	na/na	na/na	na/na
• WB Left	0/250	na/na	na/na	#150/63	na/na	na/na	#159/70	#203/#208	89/91
• WB Through	700[1]	na/na	na/na	104/73	na/na	na/na	99/88	166/128	160/123
• WB Right	23/250	8/5	8/8	0/0	10/8	10/8	0/0	54/51	**69/52**
Temperance Avenue at Tulare Avenue									
• NB Left-Through-Right	700[1]	0/0	0/0	0/0	0/0	0/0	0/0	na/na	na/na
• NB Left	0/250	na/na	na/na	na/na	na/na	na/na	na/na	7/7	7/7
• NB Through	700[1]	na/na	na/na	na/na	na/na	na/na	na/na	421/#697	421/#697
• NB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
• SB Left-Through-Right	1,200[1]	0/0	0/0	0/0	0/0	0/0	0/0	na/na	na/na
• **SB Left**	0/**250**	na/na	na/na	na/na	na/na	na/na	na/na	84/**#506**	84/**#506**
• SB Through	1,200[1]	na/na	na/na	na/na	na/na	na/na	na/na	#734/494	#734/494
• SB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
• EB Left-Through-Right	250[2]/250[2]	0/0	0/0	0/0	0/5	0/5	0/5	na/na	na/na
• EB Left	250[2]/250[2]	na/na	na/na	na/na	na/na	na/na	na/na	23/36	24/36
• EB Through-Right	250[2]/250[2]	na/na	na/na	na/na	na/na	na/na	na/na	23/0	23/0
• WB Left-Through-Right	2,600[2]	15/15	15/15	15/15	23/23	23/25	23/25	na/na	na/na
• **WB Left**	0/**200**	na/na	na/na	na/na	na/na	na/na	na/na	**#266**/49	**#266**/49
• WB Through	2,600[2]	na/na	na/na	na/na	na/na	na/na	na/na	13/0	36/0
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	13/0	0/0
Shields Avenue at Locan Avenue									
• NB Left-Through-Right	2,600[1]	38/15	40/15	na/na	+/73	+/80	na/na	na/na	na/na
• **NB Left**	0/**200**	na/na	na/na	6/5	na/na	na/na	27/17	**#237/#237**	163/**#206**
• NB Through-Right	2,600[1]	na/na	na/na	44/40	na/na	na/na	91/53	na/na	na/na
• NB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	188/#404	83/152
• NB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	61/48	55/42

TABLE 2:
WEEKDAY 95TH-PERCENTILE QUEUE LENGTH SUMMARY

		95th Percentile Queue Length (ft) (AM/PM)							
Intersection	**Existing (2018) / Planned Queue Storage Length (ft)**	**Existing (2018)**	**Existing (2018) + Project**	**Mitigated Existing (2018) + Project**	**Existing (2018) + A/P/P Projects**	**Existing (2018) + A/P/P Projects + Project**	**Mitigated Existing (2018) + A/P/P Projects + Project**	**2035 Project**	**Mitigated 2035 Project**
• **SB Left-Through**	**300[1]**	90/10	98/10	na/na	**398**/43	**418**/48	na/na	na/na	na/na
• SB Left	0/200	na/na	na/na	45/24	na/na	na/na	60/26	73/58	73/58
• **SB Through**	**300[1]**	na/na	na/na	94/21	na/na	na/na	125/33	**332**/245	153/106
• **SB Right**	**300[1]**	40/8	43/10	58/0	205/25	210/25	78/36	**#773**/76	97/36
• **EB Left**	**246/250**	5/13	5/13	84/**#245**	15/18	15/18	192/**#311**	**#370/m#492**	135/**#363**
• EB Through-Right	1,300[1]	0/0	0/0	212/191	0/0	0/0	215/153	na/na	na/na
• EB Through	1,300[1]	na/na	na/na	na/na	na/na	na/na	na/na	#672/m333	222/249
• EB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	20/m7	31/54
• WB Left-Through-Right	2,600[1]	3/0	3/0	na/na	5/0	5/0	na/na	na/na	na/na
• WB Left	0/250	na/na	na/na	65/8	na/na	na/na	m51/27	m113/m132	m97/m105
• WB Through-Right	2,600[1]	na/na	na/na	249/113	na/na	na/na	217/101	na/na	na/na
• WB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	m#775/m#693	154/64
• WB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	m0/m0	m1/m0
Shields Avenue at DeWolf Avenue									
• NB Left-Through-Right	5,200[1]	98/40	103/43	na/na	153/63	153/68	na/na	na/na	na/na
• NB Left	0/200	na/na	na/na	43/37	na/na	na/na	54/42	81/53	81/53
• NB Through-Right	5,200[1]	na/na	na/na	202/187	na/na	na/na	250/187	na/na	na/na
• NB Through	5,200[1]	na/na	na/na	na/na	na/na	na/na	na/na	362/#461	162/181
• NB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
• SB Left-Through-Right	1,800[1]	370/33	418/33	na/na	908/65	915/70	na/na	na/na	na/na
• SB Left	0/200	na/na	na/na	38/20	na/na	na/na	46/24	85/81	85/80
• SB Through-Right	1,800[1]	na/na	na/na	#535/157	na/na	na/na	na/na	na/na	na/na
• SB Through	1,800[1]	na/na	na/na	na/na	na/na	na/na	298/113	#660/313	238/136
• SB Right	0/200	na/na	na/na	na/na	na/na	na/na	52/25	178/39	75/39
• EB Left-Through-Right	2,600[1]	123/48	143/53	na/na	355/198	398/220	na/na	na/na	na/na
• **EB Left**	0/**250**	na/na	na/na	**#317**/#222	na/na	na/na	79/**#313**	**m#371/m#293**	165/94
• EB Through-Right	2,600[1]	na/na	na/na	79/88	na/na	na/na	40/186	na/na	na/na
• EB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	m451/247	87/169
• EB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	m0/m0	m0/m2
• WB Left-Through-Right	2,600[1]	25/8	28/10	na/na	120/40	123/45	na/na	na/na	na/na
• WB Left	0/250	na/na	na/na	0/4	na/na	na/na	11/9	27/31	30/33
• WB Through-Right	2,600[1]	na/na	na/na	108/47	na/na	na/na	307/129	na/na	na/na
• WB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	#1,006/#673	403/301
• WB Right	0/250	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
Armstrong Avenue at Clinton Avenue									
• NB Left-Through-Right	4,000[1]	58/73	65/85	na/na	83/105	93/128	na/na	na/na	na/na
• NB Left	0/200	na/na	na/na	28/22	na/na	na/na	31/23	#108/67	83/59
• NB Through-Right	4,000[1]	na/na	na/na	130/284	na/na	na/na	129/#302	na/na	na/na
• NB Through	4,000[1]	na/na	na/na	na/na	na/na	na/na	na/na	438/#1,031	197/383
• NB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
• SB Left-Through-Right	2,600[1]	383/25	443/25	na/na	703/40	770/45	na/na	na/na	na/na

TABLE 2:
WEEKDAY 95TH-PERCENTILE QUEUE LENGTH SUMMARY

		95th Percentile Queue Length (ft) (AM/PM)							
Intersection	**Existing (2018) / Planned Queue Storage Length (ft)**	**Existing (2018)**	**Existing (2018) + Project**	**Mitigated Existing (2018) + Project**	**Existing (2018) + A/P/P Projects**	**Existing (2018) + A/P/P Projects + Project**	**Mitigated Existing (2018) + A/P/P Projects + Project**	**2035 Project**	**Mitigated 2035 Project**
• SB Left	0/200	na/na	na/na	58/25	na/na	na/na	65/38	112/70	#103/63
• SB Through-Right	2,600[1]	na/na	na/na	#485/115	na/na	na/na	#512/137	na/na	na/na
• SB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	#1,158/472	#443/224
• SB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	14/0	6/0
• EB Left-Through-Right	2,600[1]	25/38	28/45	na/na	50/88	58/108	na/na	na/na	na/na
• EB Left	0/200	na/na	na/na	45/78	na/na	na/na	67/#105	91/#190	76/#145
• EB Through-Right	2,600[1]	na/na	na/na	64/108	na/na	na/na	87/149	na/na	na/na
• EB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	75/169	53/131
• EB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
• WB Left-Through-Right	2,600[1]	85/8	128/15	na/na	220/25	323/35	na/na	na/na	na/na
• **WB Left**	0/**200**	na/na	na/na	90/29	na/na	na/na	#153/41	**#290**/#131	**#235**/99
• WB Through-Right	2,600[1]	na/na	na/na	150/39	na/na	na/na	211/67	na/na	na/na
• WB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	152/93	106/73
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
Armstrong Avenue at Olive Avenue									
• NB Left-Through	1,300[1]	158/118	170/138	na/na	168/28	175/143	na/na	na/na	na/na
• NB Left	0/200	na/na	na/na	84/16	na/na	na/na	#90/16	#170/31	#161/31
• NB Through	1,300[1]	na/na	na/na	130/271	na/na	na/na	124/271	#514/#1,106	200/#485
• **NB Right**	**25**/200	**38**/10	**40**/13	17/0	**43**/13	**43**/13	17/0	69/55	53/63
• SB Left-Through	1,300[1]	128/20	143/23	na/na	143/23	160/25	na/na	na/na	na/na
• SB Left	0/200	na/na	na/na	42/24	na/na	na/na	43/26	74/69	71/67
• SB Through	1,300[1]	na/na	na/na	209/96	na/na	na/na	197/96	#689/593	246/288
• SB Right	424/424	285/15	310/18	55/17	318/18	348/18	80/17	266/54	#400/67
• **EB Left**	150/**200**	13/33	13/38	67/**#196**	13/35	13/40	65/**#196**	170/**#676**	#222/**#560**
• EB Through-Right	2,600[1]	33/30	35/33	99/117	40/35	40/38	102/128	na/na	na/na
• EB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	92/207	79/183
• EB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	0/0	0/0
• **WB Left**	132/**200**	0/0	33/3	#122/31	35/3	33/3	#141/33	**#379**/74	**#442**/98
• WB Through-Right	2,600[1]	150/28	160/30	208/109	200/33	200/38	218/120	na/na	na/na
• WB Through	2,600[1]	na/na	na/na	na/na	na/na	na/na	na/na	181/136	155/167
• WB Right	0/200	na/na	na/na	na/na	na/na	na/na	na/na	21/0	16/0

95th percentile queue length - is minimum amount of storage needed for each movement   ft = feet   A/P/P = Approved/Pending/Proposed   NB = northbound   SB = southbound   WB = westbound   EB = eastbound
--- = exceeds software capacity   # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles   m = volume for 95th percentile queue is metered by upstream signal   Bolded Text = 95th percentile queues exceed the available storage capacity   n/a = not analyzed in this scenario   [1] = Distance to next intersection   [2] = Driveway or local street of unknown length, assumed 250 ft   + = No capacity for that movement

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left-turn – AM peak hour
  - EB left-turn – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right-turn – AM peak hour

Mitigated Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
  - EB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
  - SB right – AM peak hour
- Shields Avenue at Locan Avenue
  - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Shields Avenue
  - WB left – AM peak hour
- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
  - SB right – AM peak hour
- Shields Avenue at Locan Avenue
  - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Mitigated Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours

- Temperance Avenue at Olive Avenue
    - EB left – PM peak hour
    - WB left – AM peak hour
- Shields Avenue at Locan Avenue
    - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
    - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
    - EB left – PM peak hour

2035 Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - NB left – PM peak hour
    - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
    - NB left – AM peak hour
    - NB right – AM/PM peak hours
    - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
    - NB left – AM peak hour
    - SB left – AM peak hour
    - EB left – PM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
    - NB left – AM peak hour
    - SB left – PM peak hour
    - EB left – PM peak hour
    - EB right – PM peak hour
    - WB left – AM/PM peak hour
- Temperance Avenue at Olive Avenue
    - EB left – AM/PM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
    - EB left – AM/PM peak hours
- Temperance Avenue at Tulare Avenue
    - SB left – PM peak hour
    - WB left – AM peak hour
- Shields Avenue at Locan Avenue
    - NB left – AM/PM peak hours
    - SB through – AM peak hour
    - SB right – AM peak hour
    - EB left – AM/PM peak hours
- Shields Avenue at DeWolf Avenue
    - EB left – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue
    - WB left – AM peak hour
- Armstrong Avenue at Olive Avenue
    - EB left – PM peak hour

- WB left – AM peak hour

Mitigated 2035 Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - NB left – PM peak hour
    - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
    - NB left – AM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
    - NB left – AM peak hour
    - SB right – AM peak hour
    - EB left – PM peak hour
    - EB right – PM peak hour
    - WB left – AM peak hour
- Temperance Avenue at Olive Avenue
    - EB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
    - EB left – PM peak hour
- Temperance Avenue at Tulare Avenue
    - SB left – PM peak hour
    - WB left – AM peak hour
- Shields Avenue at Locan Avenue
    - NB left – PM peak hour
    - EB left – PM peak hour
- Armstrong Avenue at Clinton Avenue
    - WB left – AM peak
- Armstrong Avenue at Olive Avenue
    - EB left – PM peak hour
    - WB left – AM peak hour

Recommendations

To mitigate the intersections that are projected to operate below the appropriate adopted LOS standard as identified in Table 1, meet the rural peak hour volume signal warrant, or exceed the available/planned storage lengths with the 95th percentile queue lengths as identified in Table 2, the following improvements by scenario are recommended:

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the eastbound left-through-right turn lane to a separate left-turn and shared through-right lane
    - Construct the eastbound left-turn lane to a length of 200 feet

- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn to 250 feet
    - Lengthen the eastbound left-turn to 200 feet
- Temperance Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left and shared through-right lane
    - Construct the northbound left-turn lane to a length of 250 feet
    - Construct the eastbound left-turn lane to a length of 200 feet
    - Construct the westbound left-turn lane to a length of 225 feet
    - Change the southbound shared left-through lane to a separate left-turn and a separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to 200 feet
- Temperance Avenue at Belmont Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through-right lanes to a separate left-turn lane and shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 250 feet
    - Change the eastbound and westbound shared left-through lanes to a separate left-turn and a separate through lane
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
    - Lengthen the eastbound and westbound right-turn lanes to 250 feet
- Shields Avenue at Locan Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound left-turn lane to a length of 200 feet
    - Construct the westbound left-turn lane to a length of 250 feet
    - Change the southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the southbound left-turn lane to a length of 200 feet
    - Lengthen the eastbound left-turn lane to 275 feet
- Shields Avenue at DeWolf Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Construct the eastbound left-turn lane to a length of 325 feet
    - Construct the westbound left-turn lane to a length of 250 feet

- Armstrong Avenue at Clinton Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound, southbound, eastbound, and westbound left-turn lanes to a length of 200 feet
- Armstrong Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Lengthen the northbound right-turn lane to a length of 200 feet
    - Lengthen the eastbound left-turn lane to 225 feet
    - Lengthen the westbound left-turn lane to 200 feet

The Temperance Avenue at McKinley Avenue intersection is projected to operate at or above the adopted level of service standard in both the Existing (2018) and Existing (2018) Plus Project scenarios. The Temperance Avenue at McKinley Avenue intersection is also showing that it operates above the basic average accident rate in both fatal + injury and total accidents. Some of these types of accidents, such as broadside, can be reduced by installation of a signal but other types of accidents, such as rear end, can be increased by installation of a signal. Therefore, even though it is projected to meet the peak hour signal warrant in both the Existing (2018) and Existing (2018) Plus Projects scenarios, no mitigations are recommended in the Mitigated Existing (2018) Plus Project scenario. The City of Fresno should monitor the Temperance Avenue at McKinley Avenue intersection and determine when best to signalize this intersection based on level of service analyses, accident rate analyses, as well as additional signal warrant analyses utilizing the following warrants:

- Eight-hour vehicular volume
- Four-hour vehicular volume
- Peak hour
- Crash experience
- Coordinated signal system
- Roadway Network

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the southbound through-right lane to two (2) throughs and a separate right-turn lane
    - Construct the southbound right-turn lane to a length of 250 feet
    - Change the eastbound left-through-right turn lane to a separate left-turn and shared through-right lane
    - Construct the eastbound left-turn lane to a length of 200 feet
- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
    - Construct a second eastbound through lane

    - Lengthen the left- and right-turn lanes on all approaches to 250 feet
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn to 375 feet
    - Lengthen the eastbound left-turn to 250 feet
- Temperance Avenue at McKinley Avenue
    - Signalize (Actuated)
    - Optimize cycle length and offsets
    - Change the southbound left-through lane to a separate left-turn and separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
- Temperance Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left and shared through-right lane
    - Construct the northbound left-turn lane to a length of 250 feet
    - Construct the eastbound left-turn lane to a length of 225 feet
    - Construct the westbound left-turn lane to a length of 250 feet
    - Change the southbound shared left-through lane to a separate left-turn and a separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to 200 feet
- Temperance Avenue at Belmont Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through-right lanes to a separate left-turn lane and shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 250 feet
    - Change the eastbound, and westbound shared left-through lanes to a separate left-turn and a separate through lane
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
    - Lengthen the eastbound and westbound right-turn lanes to 250 feet
- Shields Avenue at Locan Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound shared left-through-right lane to a separate left-turn lane and a shared through-right lane
    - Construct the northbound left-turn lane to a length of 200 feet
    - Change the southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the southbound left-turn lane to a length of 200 feet
    - Construct a second eastbound through lane
    - Lengthen the eastbound left-turn lane to 325 feet
    - Change the westbound shared left-through-right lane to a separate left-turn lane, one (1) through lane, and a shared through-right lane
    - Construct the westbound left-turn lane to a length of 250 feet

- Shields Avenue at DeWolf Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound left-turn lane to a length of 200 feet
    - Construct the eastbound left-turn lane to a length of 325 feet
    - Construct the westbound left-turn lane to a length of 250 feet
    - Change the southbound shared left-through-right lanes to a separate left-turn, one (1) through, and a separate right-turn lane
    - Construct the southbound left- and right-turn lanes to a length of 200 feet
- Armstrong Avenue at Clinton Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound, southbound, eastbound, and westbound left-turn lanes to a length of 200 feet
- Armstrong Avenue at Olive Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Lengthen the northbound right-turn lane to 200 feet
    - Lengthen the eastbound left-turn lane to 225 feet
    - Lengthen the westbound left-turn lane to 200 feet

The Temperance Avenue at Tulare Avenue intersection is projected to operate below the adopted level of service standard in both the Existing (2018) Plus Approved/Pending/Proposed Projects and the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenarios but does not meet the peak hour volume signal warrant. It will also not likely meet the other volume warrants either. Due to the low volumes on Tulare Avenue, it will also not meet the AWSC warrant. Since there is only a two (2) second increase in delay between the Existing (2018) Plus Approved/Pending/Proposed Projects and the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project, the Project's impact to this intersection is not considered significant.

2035 Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 575 feet or convert to dual (2) left turns
    - Lengthen the eastbound left-turn lane to 225 feet
- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 350 feet
    - Construct a second northbound right-turn lane to a length of 250 feet
    - Construct a second southbound left-turn lane to a length of 250 feet

    - Construct a second eastbound and westbound through lane
    - Lengthen the westbound left-turn lane to 800 feet
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn lane to 275 feet
    - Construct a second southbound left-turn lane to a length of 275 feet
    - Construct a second eastbound left-turn lane to a length of 200 feet
    - Lengthen the westbound left-turn lane to 350 feet
    - Construct a second westbound left-turn lane to a length of 350 feet
- Temperance Avenue at McKinley Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 375 feet
    - Construct a second northbound left-turn lane to a length of 375 feet
    - Construct a second southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to 275 feet
    - Lengthen the eastbound left-turn lane to 325 feet
    - Construct a second eastbound left-turn lane to a length of 325 feet
    - Lengthen the eastbound right-turn lane to 275 feet
    - Lengthen the westbound left-turn lane to 400 feet
    - Construct a second westbound left-turn lane to a length of 400 feet
    - Construct a second eastbound and westbound through lane
- Temperance Avenue at Olive Avenue
    - Optimize cycle length and offsets
    - Lengthen the eastbound left-turn lane to 350 feet
    - Construct a second eastbound left-turn lane to a length of 350 feet
    - Construct a second westbound left-turn lane to a length of 200 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Belmont Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound, southbound, and westbound left-turn lane to a length of 250 feet
    - Lengthen the eastbound left-turn lane to 300 feet
    - Construct a second eastbound left-turn lane to a length of 300 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Tulare Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn lane to 525 feet or convert to dual (2) left-turns
    - Lengthen the westbound left-turn lane to 275 feet
- Shields Avenue at Locan Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 225 feet
    - Construct a second northbound, southbound, eastbound, and westbound through lane
    - Construct a second southbound right-turn lane to a length of 273 feet
    - Lengthen the eastbound left-turn lane to 375 feet
    - Construct a second eastbound left-turn lane to a length of 375 feet
- Shields Avenue at DeWolf Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound, southbound, eastbound, and westbound through lane

- Armstrong Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound and southbound through lane
    - Lengthen the westbound left-turn lane to 250 feet
- Armstrong Avenue at Olive Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound and southbound through lane
    - Lengthen the eastbound left-turn lane to 575 feet or convert to dual (2) left-turn lanes
    - Lengthen the westbound left-turn lane to 450 feet or convert to dual (2) left-turn lanes

As stated in Appendix A, the Temperance Avenue at Shields Avenue intersection is an end point of a road segment designated as being evaluated using a peak hour LOS “F” and a second segment designated as being evaluated using a peak hour LOS “E”. As such, this intersection may operate at a LOS “F” without further mitigations and be considered as operating at the adopted level of service standard. Further mitigation of this intersection would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Temperance Avenue at McKinley Avenue is located in the road segment designated as being evaluated using a peak hour LOS “E” standard. It should be noted that a roadway segment projected to operate at designated level of service threshold can have intersections that may operate below the segment level of service depending on the amount of turning movement conflicts. As such, it is possible that the Temperance Avenue at McKinley Avenue intersection could operate at a LOS “F” while the overall segment could operate at a LOS “E”. Again, to potentially mitigate this intersection it would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Conclusions

Based on the results of this TIS, the majority of the impacts are caused by the planned growth in the area. Even with the ultimate build out lane configurations, two intersections are projected to operate with a level of service “F” in the Mitigated 2035 Project scenario. As discussed in Appendix A, the Temperance Avenue at Shields Avenue intersection is an end point of a road segment designated as being evaluated using a peak hour LOS “F” and a second segment designated as being evaluated using a peak hour LOS “E”. As such, this intersection may operate at a LOS “F” without further mitigations and be considered as operating at the adopted level of service standard. Further mitigation of this intersection would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Temperance Avenue at McKinley Avenue is located in the road segment designated as being evaluated using a peak hour LOS “E” standard. It should be noted that a roadway segment projected to operate at designated level of service threshold can have intersections that may operate below the segment level of service depending on the amount of turning movement conflicts. As such, it is possible that the Temperance Avenue at McKinley Avenue intersection could operate at a LOS “F” while the overall segment could operate at a LOS “E”. Again, to potentially mitigate the intersection it would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

All turn pocket length extensions shown in this document are a representative snap shot based on the level of service analysis results that are generated by the optimization of the intersection signals. These lengths are subject to change based on reoptimization of signals and ultimately on changes in volumes. Therefore, final decisions on extension of the various turn pockets beyond the City of Fresno standard should be made at the time of intersection modifications based on current volumes and traffic patterns.

In addition, the overall system of study intersections is optimized to generate the lowest overall delay to all vehicles in the system. As such some movements and intersections are "sacrificed" to operate at a lower level of service (increased vehicle delay) so that the majority of the vehicles and intersections in the system can operate at the highest level of service (decreased vehicle delay) possible.

Mitigation Impact Fees

Assuming the site develops consistent with this TIS, the Project would pay the following Traffic Signal Mitigation Impact Fee (TSMI), New Growth Area Street Fee (FMSI), and Regional Transportation Mitigation Fee (RTMF):

TSMI = 349 dus X $475 (fee rate per latest City of Fresno fee schedule) = $165,775
FMSI = 55.1 acres X $28,585 (fee rate per latest City of Fresno fee schedule) = $1,575,033.50
RTMF = 349 dus X $1,637 (fee rate per latest Fresno COG fee schedule) = $571,313

The TSMI fee would at a minimum include the following signals:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at Shields Avenue – signal appears to be complete
- Temperance Avenue at Clinton Avenue – signal appears to be complete
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue – This signal was removed from the TSMI fee program because of its location in the Southeast Growth Area (SEGA) which is currently not allowed for development. However, this signal is a Fresno County requirement for the school development at the northeast corner of Shields Avenue and Locan Avenue
- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

In addition, the New Growth Area FMSI fee would at a minimum include the following improvements:

- Travel lanes
- Medians and median landscaping
- Parking lanes
- Bike lanes
- Curb and gutter
- Bus bays
- Irrigation pipes and canals
- Railroad crossings
- Soft costs (engineering, plan check, and inspection costs)

The streets that are included in the FMSI include:

- Temperance Avenue – 6-lane super arterial – Jensen Avenue to north of Dakota Avenue
- Shields Avenue – 4-lane arterial – west of Fowler Avenue to Locan Avenue
- Belmont Avenue – 4-lane arterial – west of Clovis Avenue to Temperance Avenue
- Dakota Avenue – 3-lane/5-lane collector – Fowler Avenue to Temperance Avenue
- Clinton Avenue – 3-lane collector – west of Sunnyside Avenue to Locan Avenue

- McKinley Avenue – 3-lane collector – Clovis Avenue to Locan Avenue
- Olive Avenue – 5-lane collector – west of Clovis Avenue to Temperance Avenue
- Tulare Avenue – 3-lane collector – Fancher Creek to Fowler Avenue
- Locan Avenue – 3-lane collector – Clinton Avenue to north of Shields Avenue
- Armstrong Avenue – 3-lane/5-lane collector – Jensen Avenue to north of Dakota Avenue

Again, DeWolf Avenue is located in the SEGA and therefore not allowed for development.

Finally, the Regional RTMF fee is intended to ensure that future development contributes to its fair share towards the cost of infrastructure to mitigate the cumulative, indirect regional transportation impacts of new growth in a manner consistent with the provisions of the State of California Mitigation Fee Act. The fees will help fund improvements needed to maintain the target level of service in the face of higher traffic volumes brought on by new developments.

Therefore, any improvements that the Project makes to any of these facilities should be credited towards their impact fees.

<u>Fair Share Percentage</u>

In addition to the analyses requested by the City of Fresno, Fresno County requested a Fair Share Percentage be calculated for the Fowler Avenue at Olive Avenue intersection. The Fair Share Percentage for the Fowler Avenue at Olive Avenue intersections was calculated by using the following formula:

$$\frac{\text{Project Trips}}{\text{20-year Cumulative + Project Volumes}}$$

The Fair Share Percentage for the Fowler Avenue at Olive Avenue intersection using the AM peak hour volumes would be 0.58% and using the PM peak hour volumes would be 0.66%.

EXISTING (2018) CONDITIONS

<u>Transit</u>

Currently there are no Fresno Area Express or Fresno County Rural Transit options available in the study area.

<u>Bike/Pedestrian</u>

Bike

In the study area, there is a Class I bike path that extends along Temperance Avenue north of Shields Avenue for approximately 1,300 feet on the west side of the roadway. Ultimately this path will extend to north of Dakota Avenue as vacant lands are developed. Class I, shared use paths, are non-motorized facilities, paved or unpaved, physically separated from motorized vehicular traffic by an open space or barrier.

There are also two (2) Class II bike lanes in the study area: They are:

- Shields Avenue – Fowler Avenue (west) to Temperance Avenue (east) – both sides of the roadway
- Shields Avenue – Temperance Avenue (west) to Locan Avenue (east) – north side of the roadway

- Belmont Avenue – North Sunnyside Avenue (west) to Fowler Avenue (east) – south side of the roadway
- Belmont Avenue – Fowler Avenue (west) to City of Fresno Sphere of Influence (east) – both sides of the roadway
  This bike lane actually extends west to Clovis Avenue on the south side of the roadway but there is a an approximately 1,000-foot gap between North Manila Avenue and North Sunnyside Avenue.

Class II, bike lanes, provides striped lanes for one-way bike travel on a street or highway. Class III, bike routes, is a signed shared roadway with vehicular traffic with no additional markings or barriers. This information was taken from the City of Fresno Active Transportation Plan.

Pedestrian

In the study area, there are sidewalks located in the neighborhoods on the northeast, northwest, and southwest corners of the Temperance Avenue at Shields Avenue intersection. Likewise, there are sidewalks located in the neighborhood on the northwest corner of the Shields Avenue at Locan Avenue intersection. This information was taken from the City of Fresno Active Transportation Plan.

Roadways

Table 3 describes the Existing (2018) street system in the study area including the street classification, number of lanes, and the posted speed limits.

TABLE 3:
DESCRIPTION OF EXISTING (2018) STREET SYSTEM

Street	Classification	No. of Lanes (2-dir)	Posted Speed Limit (mph)
Temperance Avenue	Super Arterial	2 - 4	45 – 50
Dakota Avenue	Collector	2 - 4	25 – 40
Shields Avenue	Arterial	2 – 4	45 – 50
Clinton Avenue	Collector	2	40 - 45
McKinley Avenue	Collector	2	50
Olive Avenue	Collector	2	40 – 45
Belmont Avenue	Arterial (east of Temperance); Collector (west of Temperance)	2	45
Tulare Avenue	Collector	2	50
Locan Avenue	Collector	2	40 – 45
DeWolf Avenue	Collector	2	45
Armstrong Avenue	Collector	2	45

Table 4 lists the study intersections and their associated intersection control.

TABLE 4:
EXISTING (2018) INTERSECTION CONTROL

Intersection	Signalized/Unsignalized	Type
Temperance Avenue at Dakota Avenue	Unsignalized	AWSC
Temperance Avenue at Shields Avenue	Signalized	AU
Temperance Avenue at Clinton Avenue	Signalized	AU
Temperance Avenue at McKinley Avenue	Unsignalized	TWSC
Temperance Avenue at Olive Avenue	Unsignalized	AWSC
Temperance Avenue at Belmont Avenue	Unsignalized	AWSC
Temperance Avenue at Tulare Avenue	Unsignalized	TWSC
Shields Avenue at Locan Avenue	Unsignalized	TWSC
Shields Avenue at DeWolf Avenue	Unsignalized	AWSC
Armstrong Avenue at Clinton Avenue	Unsignalized	AWSC
Armstrong Avenue at Olive Avenue	Unsignalized	AWSC

AWSC = all-way stop-controlled *AU = Actuated Uncoordinated* *TWSC = two-way stop-controlled*

Collision History

A review was made of the 2013 to 2017 accidents and accident rates for the following locations:

- Temperance Avenue and Dakota Avenue
- Temperance Avenue and Shields Avenue
- Temperance Avenue and Clinton Avenue
- Temperance Avenue and McKinley Avenue
- Temperance Avenue and Olive Avenue
- Temperance Avenue and Belmont Avenue
- Temperance Avenue and Tulare Avenue
- Shields Avenue and Locan Avenue
- Shields Avenue and DeWolf Avenue
- Armstrong Avenue and Clinton Avenue
- Armstrong Avenue and Olive Avenue

The number and type of accidents and actual accident rates were based on information derived from the Statewide Integrated Traffic Records System (SWITRS) database for the five-year period shown previously. Table 5 shows the number of collisions by type of accident, the type of collisions, and the parties involved.

TABLE 5:
2013 TO 2017 ACCIDENT SUMMARY

Type of Accidents	No. of Accidents by Type	Accident #	Collision Type	Parties Involved (Pedestrian, Bike, Vehicle)
Temperance Avenue at Dakota Avenue				
• Total	4			
• PDO	1	1 of 1	Broadside	Vehicle vs Vehicle
• Injury	3	1 of 3	Head On	Vehicle vs Vehicle

TABLE 5:
2013 TO 2017 ACCIDENT SUMMARY

Type of Accidents	No. of Accidents by Type	Accident #	Collision Type	Parties Involved (Pedestrian, Bike, Vehicle)
		2 of 3	Broadside	Vehicle vs Vehicle
		3 of 3	Broadside	Vehicle vs Vehicle
• Fatal	0			
Temperance Avenue at Shields Avenue				
• Total	3			
• PDO	3	1 of 3	Broadside	Vehicle vs Vehicle
		2 of 3	Broadside	Vehicle vs Vehicle
		3 of 3	Rear End	Vehicle vs Vehicle
• Injury	0			
• Fatal	0			
Temperance Avenue at Clinton Avenue				
• Total	5			
• PDO	1	1 of 1	Hit Object	Vehicle vs Fixed Object
• Injury	4	1 of 4	Broadside	Vehicle vs Vehicle
		2 of 4	Broadside	Vehicle vs Vehicle
		3 of 4	Broadside	Vehicle vs Vehicle
		4 of 4	Sideswipe	Vehicle vs Vehicle
• Fatal	0			
Temperance Avenue at McKinley Avenue				
• Total	11			
• PDO	5	1 of 5	Broadside	Vehicle vs Vehicle
		2 of 5	Hit Object	Vehicle vs Fixed Object
		3 of 5	Overturned	Vehicle Non-Collision
		4 of 5	Rear End	Vehicle vs Vehicle
		5 of 5	Rear End	Vehicle vs Vehicle
• Injury	6	1 of 6	Broadside	Vehicle vs Vehicle
		2 of 6	Rear End	Vehicle vs Vehicle
		3 of 6	Broadside	Vehicle vs Vehicle
		4 of 6	Hit Object	Vehicle vs Fixed Object
		5 of 6	Sideswipe	Vehicle vs Vehicle
		6 of 6	Broadside	Vehicle vs Vehicle
• Fatal	0			
Temperance Avenue at Olive Avenue				
• Total	6			
• PDO	4	1 of 4	Sideswipe	Vehicle vs Vehicle
		2 of 4	Broadside	Vehicle vs Vehicle
		3 of 4	Sideswipe	Vehicle vs Vehicle
		4 of 4	Head On	Vehicle vs Vehicle
• Injury	2	1 of 2	Sideswipe	Vehicle vs Vehicle
		2 of 2	Broadside	Vehicle vs Vehicle
• Fatal	0			
Temperance Avenue at Belmont Avenue				

TABLE 5:
2013 TO 2017 ACCIDENT SUMMARY

Type of Accidents	No. of Accidents by Type	Accident #	Collision Type	Parties Involved (Pedestrian, Bike, Vehicle)
• Total	13			
• PDO	7	1 of 7	Hit Object	Vehicle vs Fixed Object
		2 of 7	Sideswipe	Vehicle vs Vehicle
		3 of 7	Broadside	Vehicle vs Vehicle
		4 of 7	Hit Object	Vehicle vs Fixed Object
		5 of 7	Broadside	Vehicle vs Vehicle
		6 of 7	Head On	Vehicle vs Vehicle
		7 of 7	Rear End	Vehicle vs Vehicle
• Injury	6	1 of 6	Broadside	Vehicle vs Vehicle
		2 of 6	Broadside	Vehicle vs Vehicle
		3 of 6	Broadside	Vehicle vs Vehicle
		4 of 6	Hit Object	Vehicle vs Fixed Object
		5 of 6	Broadside	Vehicle vs Vehicle
		6 of 6	Hit Object	Vehicle vs Fixed Object
• Fatal	0			
Temperance Avenue at Tulare Avenue				
• Total	4			
• PDO	4	1 of 4	Hit Object	Vehicle vs Fixed Object
		2 of 4	Hit Object	Vehicle vs Fixed Object
		3 of 4	Broadside	Vehicle vs Vehicle
		4 of 4	Hit Object	Vehicle vs Fixed Object
• Injury	0			
• Fatal	0			
Shields Avenue at Locan Avenue				
• Total	8			
• PDO	4	1 of 4	Broadside	Vehicle vs Vehicle
		2 of 4	Broadside	Vehicle vs Vehicle
		3 of 4	Broadside	Vehicle vs Vehicle
		4 of 4	Broadside	Vehicle vs Vehicle
• Injury	4	1 of 4	Broadside	Vehicle vs Vehicle
		2 of 4	Head On	Vehicle vs Vehicle
		3 of 4	Broadside	Vehicle vs Vehicle
		4 of 4	Broadside	Vehicle vs Vehicle
• Fatal	0			
Shields Avenue at DeWolf Avenue				
• Total	0			
• PDO	0			
• Injury	0			
• Fatal	0			
Armstrong Avenue at Clinton Avenue				
• Total	0			
• PDO	0			

TABLE 5: 2013 TO 2017 ACCIDENT SUMMARY				
Type of Accidents	**No. of Accidents by Type**	**Accident #**	**Collision Type**	**Parties Involved (Pedestrian, Bike, Vehicle)**
• Injury	0			
• Fatal	0			
Armstrong Avenue at Olive Avenue				
• Total	1			
• PDO	1	1 of 1	Broadside	Vehicle vs Vehicle
• Injury	0			
• Fatal	0			

PDO = property damage only

The actual accident rates were calculated and then compared to basic average accident rates developed from Caltrans formulas for city/county facilities. Table 6 shows the results of this comparison.

TABLE 6: COMPARISON OF ACTUAL TO BASIC AVERAGE ACCIDENT RATES			
Location	**Type of Collision (Severity)**	**Actual Accident Rates[1]**	**Basic Average Accident Rates[1]**
Temperance Avenue and Dakota Avenue	Fatal	0.00	0.00
	Fatal + Injury	0.13	0.18
	Total	0.17	0.55
Temperance Avenue and Shields Avenue	Fatal	0.00	0.01
	Fatal + Injury	0.00	0.23
	Total	0.08	0.58
Temperance Avenue and Clinton Avenue	Fatal	0.00	0.01
	Fatal + Injury	0.17	0.23
	Total	0.21	0.58
Temperance Avenue and McKinley Avenue	Fatal	0.00	0.00
	Fatal + Injury	**0.30**	**0.07**
	Total	**0.55**	**0.16**
Temperance Avenue and Olive Avenue	Fatal	0.00	0.00
	Fatal + Injury	0.08	0.18
	Total	0.23	0.55
Temperance Avenue and Belmont Avenue	Fatal	0.00	0.00
	Fatal + Injury	**0.24**	**0.18**
	Total	0.53	0.55
Temperance Avenue and Tulare Avenue	Fatal	0.00	0.00
	Fatal + Injury	0.00	0.07
	Total	**0.20**	**0.16**
Shields Avenue at Locan Avenue	Fatal	0.00	0.01
	Fatal + Injury	**0.23**	**0.10**
	Total	**0.46**	**0.22**
Shields Avenue and DeWolf Avenue	Fatal	0.00	0.00
	Fatal + Injury	0.00	0.18

TABLE 6:
COMPARISON OF ACTUAL TO BASIC AVERAGE ACCIDENT RATES

Location	Type of Collision (Severity)	Actual Accident Rates[1]	Basic Average Accident Rates[1]
	Total	0.00	0.55
Armstrong Avenue and Clinton Avenue	Fatal	0.00	0.00
	Fatal + Injury	0.00	0.18
	Total	0.00	0.55
Armstrong Avenue and Olive Avenue	Fatal	0.00	0.00
	Fatal + Injury	0.00	0.18
	Total	0.04	0.55

[1] Accident rates for intersections it is accidents per million vehicles entering the intersection

As seen in Table 6, the following intersections are operating above the basic average accident rate in fatal + injury accidents:

- Temperance Avenue and McKinley Avenue
- Temperance Avenue and Belmont Avenue
- Shields Avenue and Locan Avenue

All remaining intersections are operating below the basic average accident rate in fatal + injury accidents.

In addition, the following intersections are operating above the basic average accident rate in total accidents:

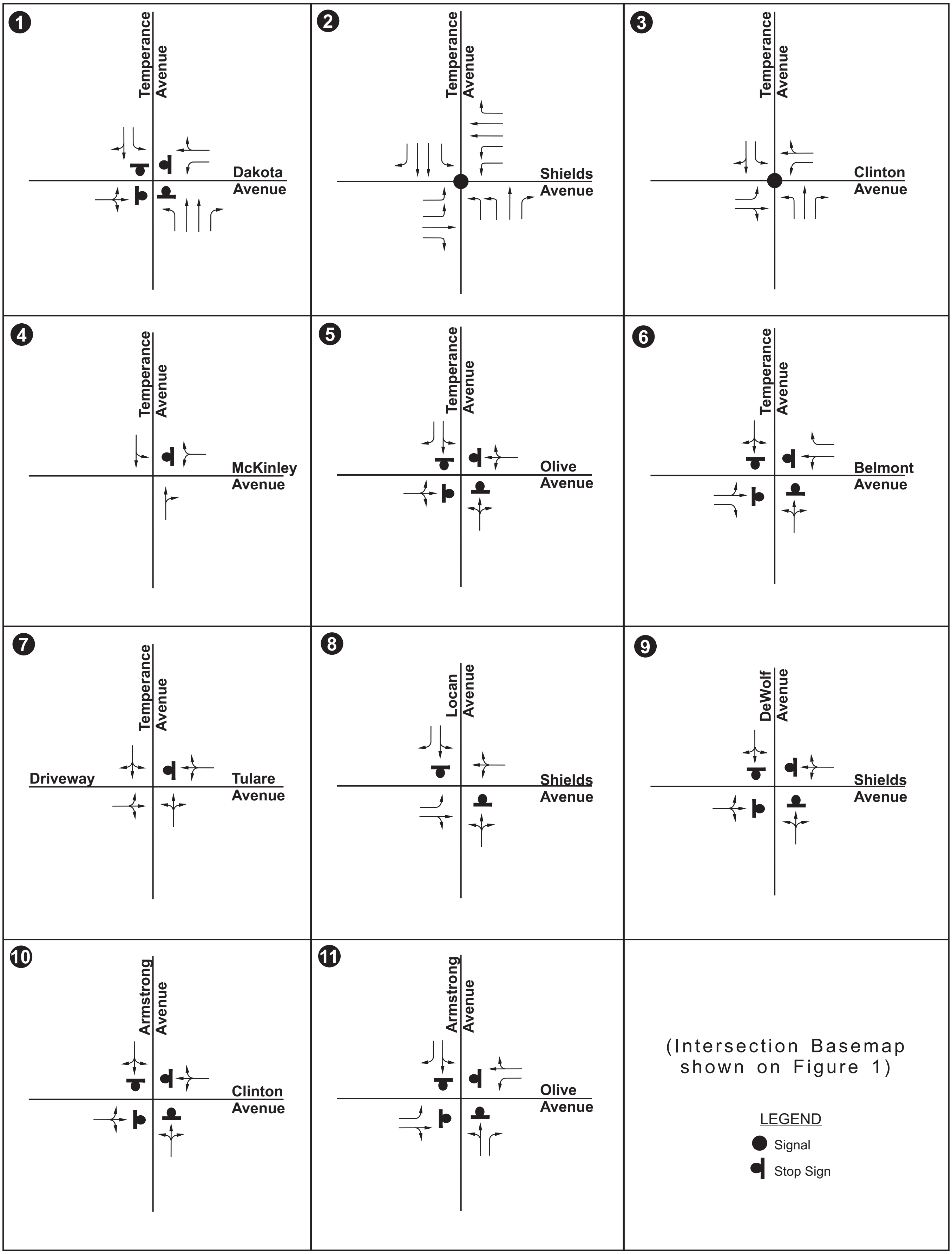
- Temperance Avenue and McKinley Avenue
- Temperance Avenue and Tulare Avenue
- Shields Avenue and Locan Avenue

All remaining intersections are operating below the basic average accident rate in total accidents.

All intersections are operating below the basic average accident rate in fatal accidents. Copies of the intersection accident rate analyses are provided in Appendix B.

Intersection Level of Service Analysis

The Existing (2018) intersection lane configurations and intersection controls are shown on Figure 2. The Existing (2018) intersection peak hour traffic volumes are shown on Figure 3. Using the lane configurations shown on Figure 2 and the volumes shown on Figure 3, the intersections were analyzed for Existing (2018) levels of service. Please note that the Temperance Avenue at Dakota Avenue northbound approach could not be analyzed as a left-turn, two (2) throughs, and a separate right-turn since AWSC intersections can only be analyzed as three (3) lanes per approach. In order to allow for analysis, the northbound approach was converted to a left-turn, one through, and a shared through right-turn lane in the Existing (2018) scenario. This would result in a worse case analysis. Figure 4 and Table 7 show the Existing (2018) levels of service for the study intersections. The two-way stop-controlled (TWSC) levels of service shown on Figure 4 are the levels of service for the worst movement at that intersection. The AWSC and signalized intersection levels of service shown in Figure 4 and in Table 7 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the AWSC and signalized level of service or delay shown on Figure 4 and in Table 7. The Existing (2018) intersection levels of service calculations are included in Appendix C.



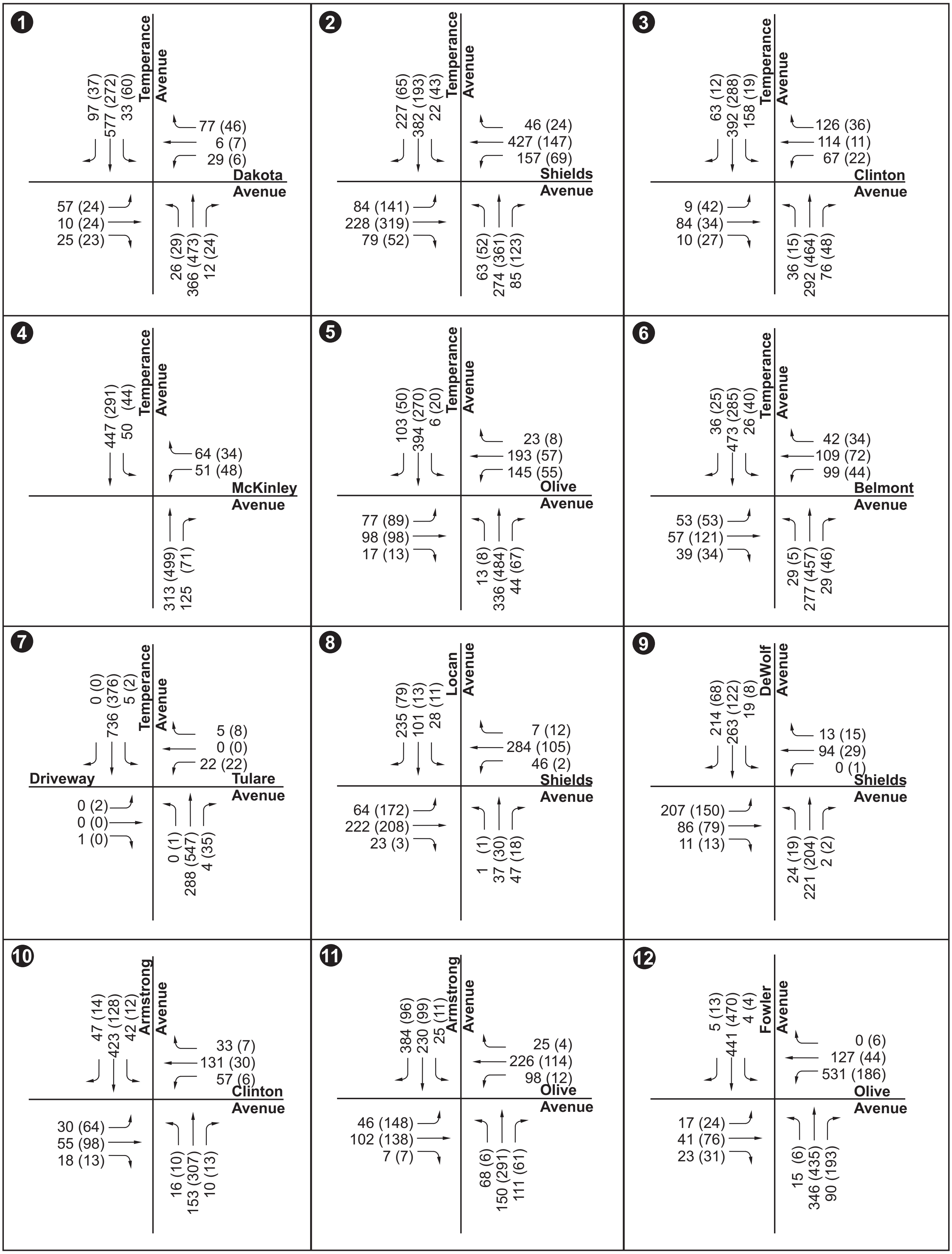
ND Engineering, PC

LANE CONFIGURATIONS
AND INTERSECTION CONTROL
Existing (2018)

City of Fresno, California

Figure 2

C:\NDEngineering2018\Lemoore Project\Fig3.cdr



ND Engineering, PC

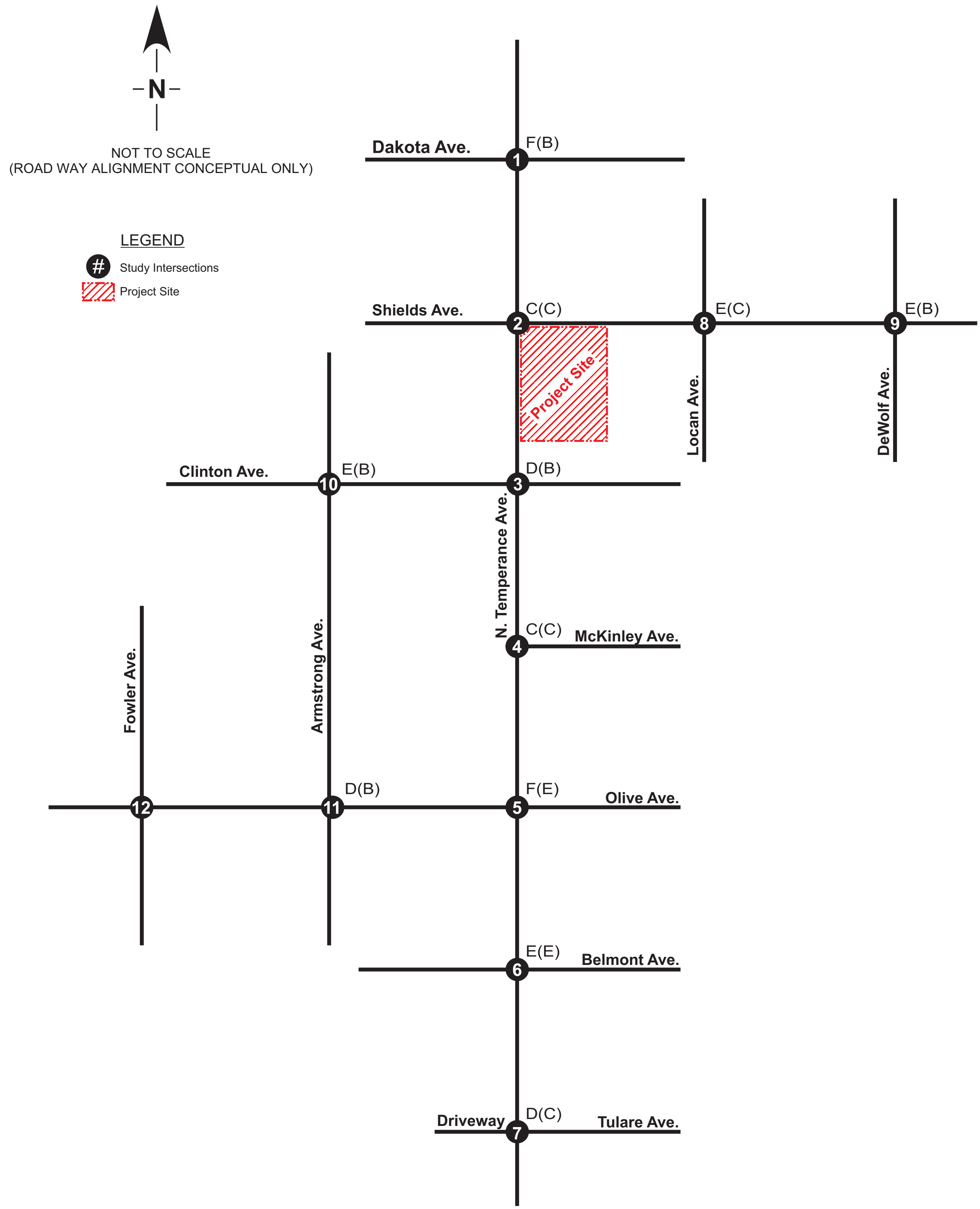
INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Existing (2018)

(Intersection Basemap shown on Figure 1)

City of Fresno, California

Figure 3



ND Engineering, PC

INTERSECTION LEVELS OF SERVICE

Existing (2018)

City of Fresno, California

Figure 4

TABLE 7: EXISTING (2018) CONDITIONS ANALYSIS INTERSECTION WEEKDAY LEVEL OF SERVICE				
	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	**F**	**170.4**	B	14.8
Temperance Avenue at Shields Avenue	C	30.5	C	30.4
Temperance Avenue at Clinton Avenue	D	39.1	B	18.9
Temperance Avenue at McKinley Avenue				
• WB Approach	C	23.2	C	20.5
Temperance Avenue at Olive Avenue	**F**	**74.2**	**E**	**37.1**
Temperance Avenue at Belmont Avenue	**E**	**44.5**	**E**	**41.8**
Temperance Avenue at Tulare Avenue				
• WB Approach	D	27.2	C	22.8
Shields Avenue at Locan Avenue				
• NB Approach	C	19.2	C	16.6
• **SB Approach (Left-Through Movement)**	**E**	**44.0**	C	20.2
Shields Avenue at DeWolf Avenue	**E**	**39.0**	B	11.0
Armstrong Avenue at Clinton Avenue	**E**	**38.4**	B	11.6
Armstrong Avenue at Olive Avenue	D	33.2	B	14.6

[1] Delay per vehicle secs = seconds WB = westbound NB = northbound SB = southbound

Intersections that are currently operating below the adopted level of service standards are shown bolded in Table 7. As shown in Figure 4 and Table 7, the following study intersections by time period are operating below the adopted level of service standard in the Existing (2018) conditions scenario:

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour

Signal Warrant Analysis

Rural peak hour volume signal warrants were prepared for the following unsignalized intersections:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue
- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

Based on the rural peak hour volume warrant, the warrants are met at the following intersections by time period in the Existing (2018) scenario:

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Copies of the warrant analyses are included in Appendix D.

Queue Lengths

Table 8 shows the estimated Existing (2018) intersection queue lengths developed from the level of service analyses. It should be noted that the Temperance at Olive Avenue southbound approach and the Armstrong at Olive northbound approach does not have striped right-turn lanes but there are approximately 25 to 30 feet that acts as a defacto right turn lane.

TABLE 8:
EXISTING (2018) TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Dakota Avenue		
• NB Left	190	5/5
• NB Through	2,600[1]	73/88
• NB Right	201	28/35
• SB Left	255	8/10
• SB Through-Right	2,600[1]	1175/95
• EB Left-Through-Right	1,300[1]	25/15
• WB Left	141	8/0
• WB Through-Right	600[1]	25/10
Temperance Avenue at Shields Avenue		
• NB Left	241	50/40
• NB Through	2,600[1]	252/319
• NB Right	100	0/35
• SB Left	229	44/#76
• SB Through	2,600[1]	156/82
• SB Right	228	53/0
• EB Left	237	61/#110
• EB Through	1,100[1]	230/295
• EB Right	138	10/0
• WB Left	235	#118/51

TABLE 8:
EXISTING (2018) TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Through	1,200[1]	202/67
• WB Right	113	0/0
Temperance Avenue at Clinton Avenue		
• NB Left	251	54/30
• NB Through	900[1]	#306/#572
• NB Right	151	14/0
• **SB Left**	**151**	**#254**/35
• SB Through-Right	2,600[1]	#576/#311
• **EB Left**	**51**	21/**62**
• EB Through-Right	2,600[1]	71/41
• WB Left	200	82/37
• WB Through-Right	700[1]	138/24
Temperance Avenue at McKinley Avenue		
• NB Through-Right	1,300[1]	0/0
• SB Left-Through	1,300[1]	0/0
• WB Left-Right	5,200[1]	53/30
Temperance Avenue at Olive Avenue		
• NB Left-Through-Right	1,300[1]	315/375
• SB Left-Through	1,300[1]	358/95
• SB Right	30	25/8
• EB Left-Through-Right	2,600[1]	123/53
• WB Left-Through-Right	700[1]	320/28
Temperance Avenue at Belmont Avenue		
• NB Left-Through-Right	1,200[1]	145/400
• SB Left-Through-Right	1,300[1]	408/143
• EB Left-Through	2,600[1]	35/50
• EB Right	36	10/5
• WB Left-Through	700[1]	78/30
• WB Right	23	8/5
Temperance Avenue at Tulare Avenue		
• NB Left-Through-Right	700[1]	0/0
• SB Left-Through-Right	1,200[1]	0/0
• EB Left Through Right	250[2]	0/0
• WB Left-Through-Right	2,600[1]	15/15
Shields Avenue at Locan Avenue		
• NB Left-Through-Right	2,600[1]	38/15
• SB Left-Through	300[1]	90/10
• SB Right	300[1]	40/8
• EB Left	246	5/13
• EB Through-Right	1,300[1]	0/0

TABLE 8: EXISTING (2018) TRAFFIC CONDITIONS ANALYSIS INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH		
Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Left-Through-Right	2,600[1]	3/0
Shields Avenue at DeWolf Avenue		
• NB Left-Through-Right	5,200[1]	98/40
• SB Left-Through-Right	1,800[1]	370/33
• EB Left-Through-Right	2,600[1]	123/48
• WB Left-Through-Right	2,600[1]	25/8
Armstrong Avenue at Clinton Avenue		
• NB Left-Through-Right	4,000[1]	58/73
• SB Left-Through-Right	2,600[1]	383/25
• EB Left-Through-Right	2,600[1]	25/38
• WB Left-Through-Right	2,600[1]	85/8
Armstrong Avenue at Olive Avenue		
• NB Left-Through	1,300[1]	158/118
• **NB Right**	**25**	**38**/10
• SB Left-Through	1,300[1]	128/20
• SB Right	424	285/15
• EB Left	150	13/33
• EB Through-Right	2,600[1]	33/30
• WB Left	132	0/0
• WB Through-Right	2,600[1]	150/28

ft = feet *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *[1] = Approximate distance to next intersection*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
[2]= Driveway or local street of unknown length, assumed 250 ft

Intersection queue lengths projected to exceed the available storage lengths are shown bolded in Table 8. As shown in Table 8, the following intersection queue lengths, by time period, are projected to exceed the available storage lengths in the Existing (2018) conditions scenario:

- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
    - NB right – AM peak hour

The remaining analyzed intersection queue lengths are not projected to exceed the Existing (2018) storage lengths in the 95th percentile condition in the Existing (2018) scenario.

PROJECT

The Project, located in the County of Fresno but within the City of Fresno sphere of influence, consists of 349 single-family dwelling units located on approximately 57 acres. The Project is consistent with the currently adopted City of Fresno General Plan. It is located on the southeast corner of Temperance Avenue and Shields Avenue. The site is currently in agricultural use with limited structures. Figure 1 shows the Project location. Figure 5 shows the sight plan.

According to the ITE ***Trip Generation*** manual[1], the use analyzed in this report is defined as follows:

- Single-family Detached Housing – "includes all single-family detached homes on individual lots."

The trip generation and trip distribution data used in the various Project analyses are described and quantified in the Methodology section.

Review of On-Site Circulation

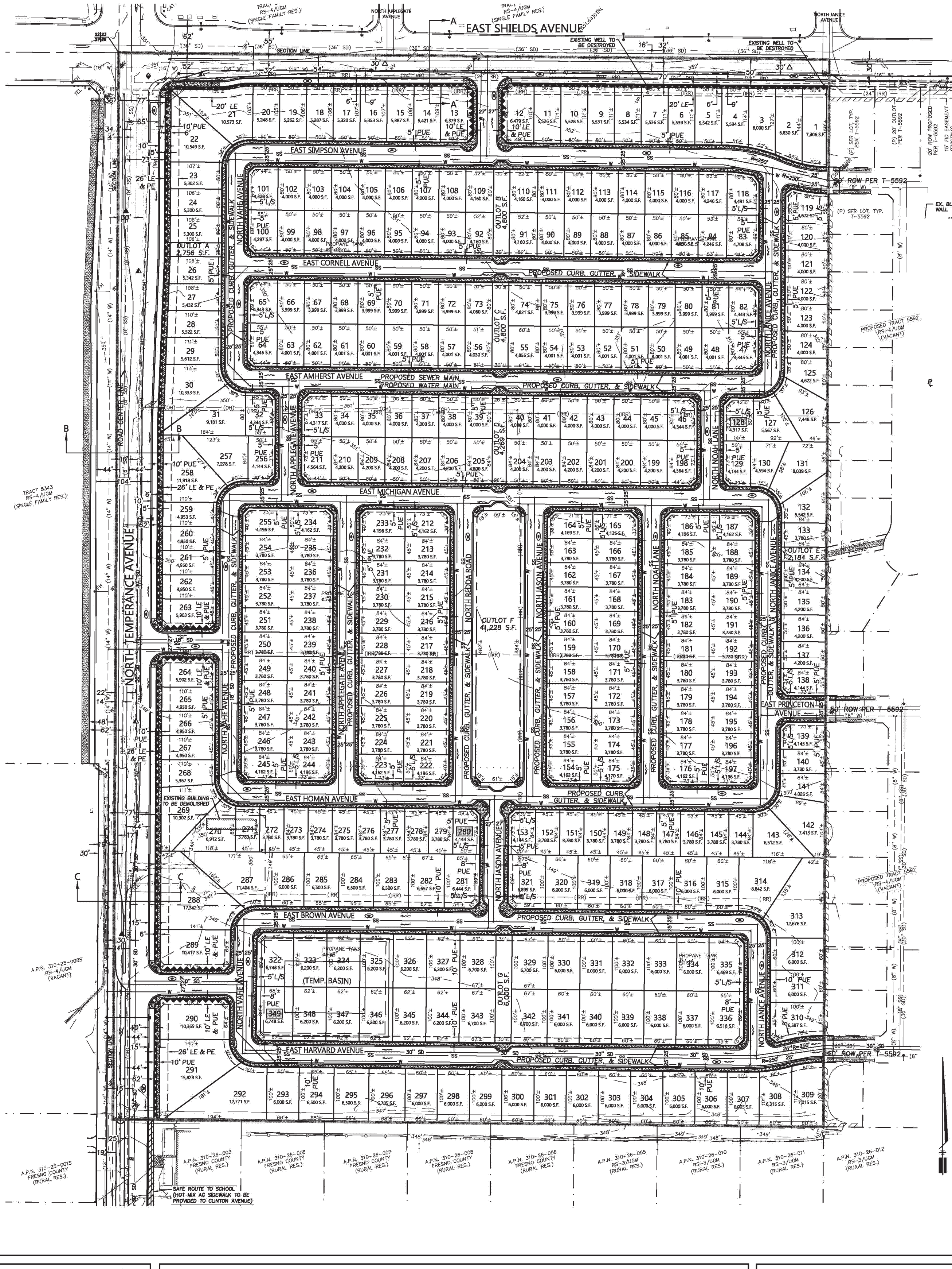
A review was made of the onsite roadway system to ensure that the Project provides for a "livable residential neighborhood". The roadway system is designed with discontinuous streets with the longest street segment at approximately 1,000 feet. However, this approximately 1,000 foot segment is broken into two (2) segments of approximately 500 feet each by a bulb out in the midblock. There are no street segments in the neighborhood that exceed the City of Fresno maximum 600 foot block length requirement without a midblock bulb out. The discontinuous street network along with the less than approximately 500 feet block lengths discourage both cut through and speeding traffic. All internal roadways are two (2) lanes wide with parking allowed on both sides of the roadway and widths ranging from 50 to 54 feet. These roadway widths conform to the City of Fresno standard drawings for local streets. Another safety feature built into the neighborhood is the use of T or 3 leg intersections. The use of T-intersections will reduce the number of potential accidents when compared to four-leg intersections. Sidewalks are provided along all streets in the neighborhood to promote pedestrian travel.

EXISTING (2018) PLUS PROJECT CONDITIONS

Intersection Level of Service Analysis

The Existing (2018) Plus Project intersection peak hour traffic volumes are shown on Figure 6. Using the Existing (2018) lane configurations shown on Figure 2 and the volumes shown on Figure 6, the intersections were analyzed for Existing (2018) Plus Project levels of service. Please note that the Temperance Avenue at Dakota Avenue northbound approach could not be analyzed as a left-turn, two (2) throughs, and a separate right-turn since AWSC intersections can only be analyzed as three (3) lanes per approach. In order to allow for analysis, the northbound approach was converted to a left-turn, one through, and a shared through right-turn lane in the Existing (2018) Plus Project scenario. This would result in a worse case analysis. Figure 7 and Table 9 show the Existing (2018) Plus Project levels of service for the study intersections. The TWSC levels of service shown on Figure 7 are the levels of service for the worst movement at that intersection. The AWSC and signalized intersection levels of service shown on Figure 7 and in Table 9 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the AWSC and signalized level of service or delay shown on Figure 7 and in Table 9. The Existing (2018) Plus Project intersection levels of service calculations are included in Appendix E.

[1] *Trip Generation*, 10th edition, Volume 2, ITE, 2017, pages 249 to 276

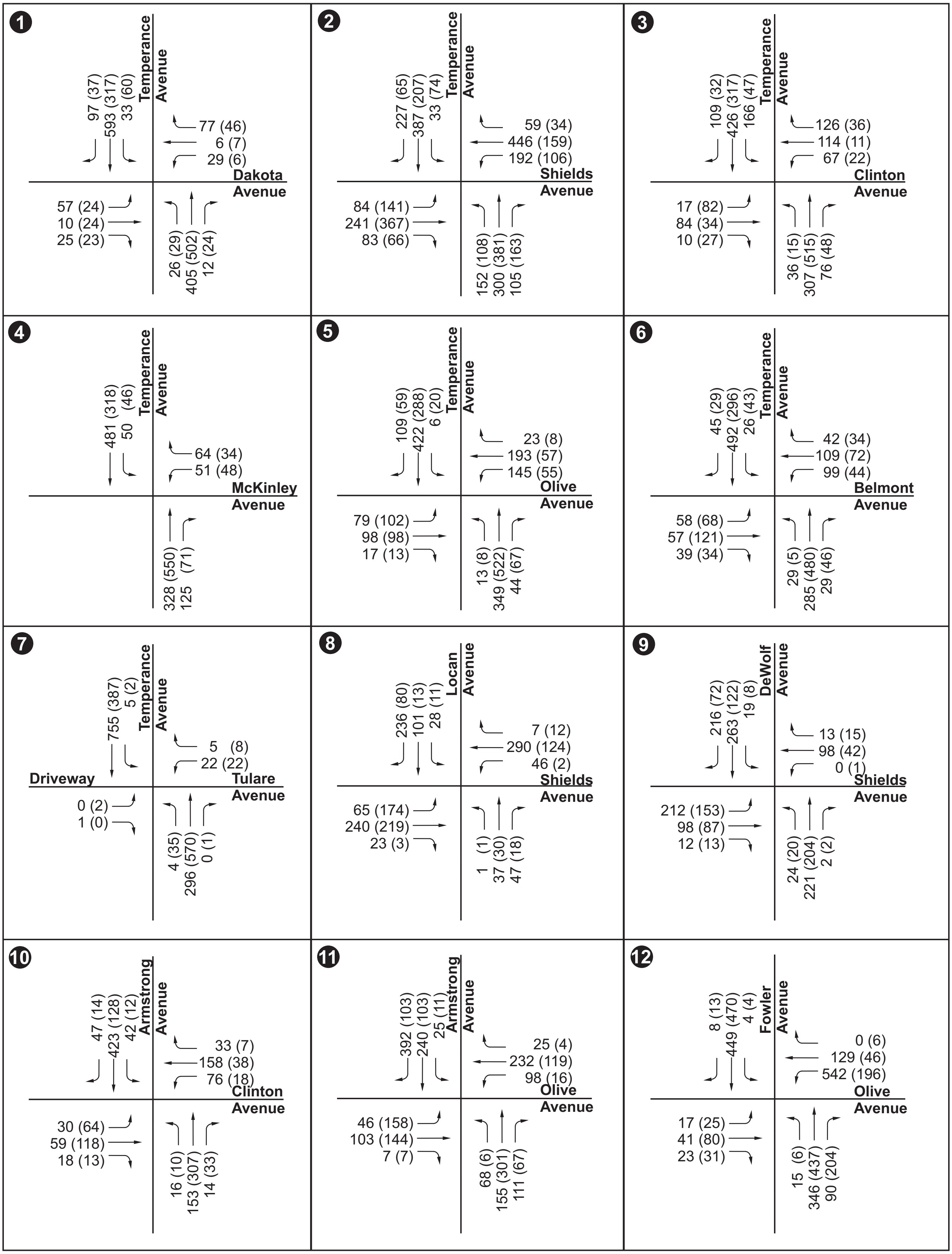


Engineering, PC

SITE PLAN

City of Fresno, California

Figure 5



ND Engineering, PC

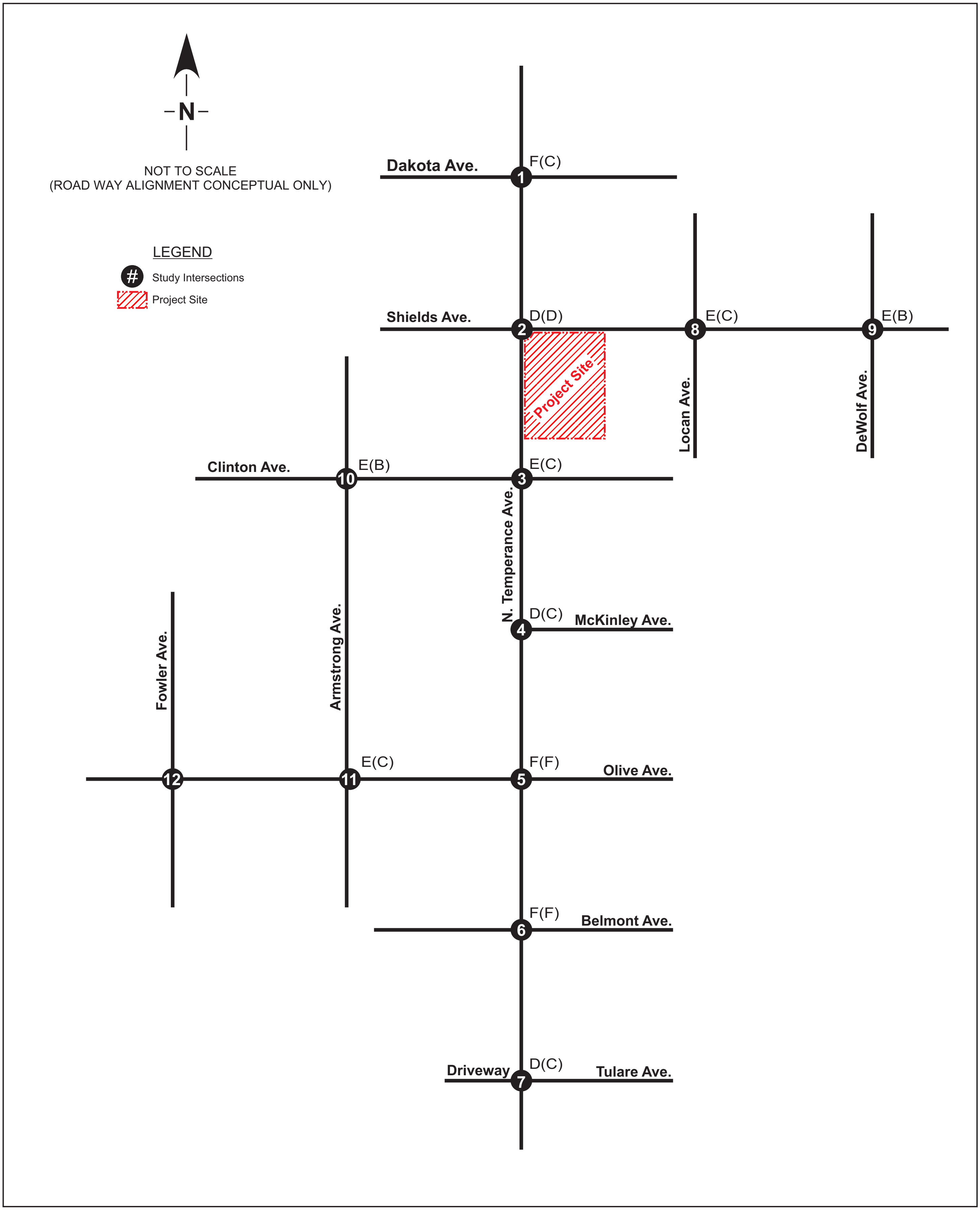
INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Existing (2018) + Project

(Intersection Basemap shown on Figure 1)

City of Lemoore, California

Figure 6



Engineering, PC

INTERSECTION LEVELS OF SERVICE
Existing (2018) + Project

City of Fresno, California

Figure 7

TABLE 9:
EXISTING (2018) PLUS PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	**F**	**184.7**	C	17.1
Temperance Avenue at Shields Avenue	C	34.5	D	35.3
Temperance Avenue at Clinton Avenue	E	57.5	C	24.3
Temperance Avenue at McKinley Avenue				
• WB Approach	D	25.4	C	23.4
Temperance Avenue at Olive Avenue	**F**	**85.4**	**F**	**50.9**
Temperance Avenue at Belmont Avenue	**F**	**54.2**	**F**	**53.7**
Temperance Avenue at Tulare Avenue				
• WB Approach	D	28.5	C	24.0
Shields Avenue at Locan Avenue				
• NB Approach	C	20.2	C	17.3
• **SB Approach (Left-Through Movement)**	**E**	**48.7**	C	21.3
Shields Avenue at DeWolf Avenue	**E**	**45.5**	B	11.3
Armstrong Avenue at Clinton Avenue	**E**	**47.7**	B	12.6
Armstrong Avenue at Olive Avenue	**E**	**36.4**	C	15.9

[1] Delay per vehicle   secs = seconds   WB = westbound   NB = northbound   SB = southbound

Intersections projected to operate below the adopted level of service standard are shown bolded in Table 9. As shown in Figure 7 and Table 9, the following study intersections, by time period, are projected to operate below the appropriate adopted level of service standard in the Existing (2018) Plus Project scenario:

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

The remaining study intersections are projected to operate at or above the appropriate adopted level of service standards in the Existing (2018) Plus Project conditions scenario.

<u>Signal Warrant Analysis</u>

Rural peak hour volume signal warrants were prepared for the following unsignalized intersections:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue

- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

Based on the rural peak hour volume warrant, the warrants are met at the following intersections by time period in the Existing (2018) Plus Project scenario:

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Copies of the warrant analyses are included in Appendix F.

Queue Lengths

Table 10 shows the estimated Existing (2018) Plus Project intersection queue lengths developed from the level of service analyses. It should be noted that the Temperance at Olive Avenue southbound approach and the Armstrong at Olive northbound approach does not have striped right-turn lanes but there are approximately 25 to 30 feet that acts as a defacto right turn lane.

TABLE 10:
EXISTING (2018) PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Dakota Avenue		
• NB Left	190	5/5
• NB Through	2,600[1]	88/103
• NB Right	201	33/38
• SB Left	255	8/10
• SB Through-Right	2,600[1]	1,258/130
• EB Left-Through-Right	1,300[1]	28/18
• WB Left	141	8/0
• WB Through-Right	600[1]	25/10
Temperance Avenue at Shields Avenue		
• NB Left	241	#111/#74
• NB Through	2,600[1]	277/339
• NB Right	100	4/63
• SB Left	229	60/#146
• SB Through	2,600[1]	157/87
• SB Right	228	53/0
• EB Left	237	61/#110
• EB Through	1,100[1]	243/347

TABLE 10:
EXISTING (2018) PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• EB Right	138	13/0
• WB Left	235	#156/#75
• WB Through	1,200[1]	211/72
• WB Right	113	0/0
Temperance Avenue at Clinton Avenue		
• NB Left	251	54/30
• NB Through	900[1]	#331/#654
• NB Right	151	14/0
• **SB Left**	**151**	**#269**/68
• SB Through-Right	2,600[1]	#703/#384
• **EB Left**	**51**	32/**#114**
• EB Through-Right	2,600[1]	71/41
• WB Left	200	82/38
• WB Through-Right	700[1]	138/24
Temperance Avenue at McKinley Avenue		
• NB Through-Right	1,300[1]	0/0
• SB Left-Through	1,300[1]	5/5
• WB Left-Right	5,200[1]	60/33
Temperance Avenue at Olive Avenue		
• NB Left-Through-Right	1,300[1]	343/485
• SB Left-Through	1,300[1]	428/105
• SB Right	30	28/10
• EB Left-Through-Right	2,600[1]	123/58
• WB Left-Through-Right	700[1]	318/28
Temperance Avenue at Belmont Avenue		
• NB Left-Through-Right	1,200[1]	153/480
• SB Left-Through-Right	1,300[1]	478/173
• EB Left-Through	2,600[1]	40/60
• EB Right	36	10/5
• WB Left-Through	700[1]	78/30
• WB Right	23	8/8
Temperance Avenue at Tulare Avenue		
• NB Left-Through-Right	700[1]	0/0
• SB Left-Through-Right	1,200[1]	0/0
• EB Left Through Right	250[2]	0/0
• WB Left-Through-Right	2,600[1]	15/15
Shields Avenue at Locan Avenue		
• NB Left-Through-Right	2,600[1]	40/15
• SB Left-Through	300[1]	98/10
• SB Right	300[1]	43/10

TABLE 10:
EXISTING (2018) PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• EB Left	246	5/13
• EB Through-Right	1,300[1]	0/0
• WB Left-Through-Right	2,600[1]	3/0
Shields Avenue at DeWolf Avenue		
• NB Left-Through-Right	5,200[1]	103/43
• SB Left-Through-Right	1,800[1]	418/33
• EB Left-Through-Right	2,600[1]	143/53
• WB Left-Through-Right	2,600[1]	28/10
Armstrong Avenue at Clinton Avenue		
• NB Left-Through-Right	4,000[1]	65/85
• SB Left-Through-Right	2,600[1]	443/25
• EB Left-Through-Right	2,600[1]	28/45
• WB Left-Through-Right	2,600[1]	128/15
Armstrong Avenue at Olive Avenue		
• NB Left-Through	1,300[1]	170/138
• **NB Right**	**25**	**40**/13
• SB Left-Through	1,300[1]	143/23
• SB Right	424	310/18
• EB Left	150	13/38
• EB Through-Right	2,600[1]	35/33
• WB Left	132	33/3
• WB Through-Right	2,600[1]	160/30

ft = feet *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[1] = Approximate distance to next intersection *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *[2]= Driveway or local street of unknown length, assumed 250 ft*

Intersection queue lengths projected to exceed the available storage lengths are shown bolded in Table10. As shown in Table 10, the following intersection queue lengths, by time period, are projected to exceed the available storage lengths in the Existing (2018) Plus Project conditions scenario:

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

The remaining analyzed intersection queue lengths are not projected to exceed the Existing (2018) storage lengths in the 95th percentile condition in the Existing (2018) Plus Project scenario.

MITIGATED EXISTING (2018) PLUS PROJECT CONDITIONS

Based on the information provided in the previous sections, the following locations, by scenario and time period, are projected to operate below the appropriate adopted level of service standard:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

In addition, the following locations by scenario and time period are projected to meet the rural peak hour volume signal warrant:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

The following locations by scenario and time period are also projected to have queue storage length exceedances:

Existing (2018) (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

To mitigate the intersections that are projected to operate below the appropriate adopted level of service standard, meet the rural peak hour volume signal warrant, or exceed the available storage lengths in the 95th percentile condition, the following improvements are recommended in the Existing (2018) Plus Project scenario:

- Temperance Avenue at Dakota Avenue
  - Signalize (actuated) with protected left-turns
  - Optimize cycle length and offsets
  - Change the eastbound left-through-right turn lane to a separate left-turn and shared through-right lane
  - Construct the eastbound left-turn lane to a length of 200 feet
- Temperance Avenue at Shields Avenue
  - Optimize cycle length and offsets
- Temperance Avenue at Clinton Avenue
  - Optimize cycle length and offsets
- Temperance Avenue at Olive Avenue
  - Signalize (actuated) with protected left-turns
  - Optimize cycle length and offsets
  - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left and shared through-right lane
  - Construct the northbound left-turn lane to a length of 250 feet
  - Construct the eastbound and westbound left-turn lanes to a length of 200 feet
  - Change the southbound shared left-through lane to a separate left-turn and a separate through lane
  - Construct the southbound left-turn lane to a length of 250 feet
  - Lengthen the southbound right-turn lane to a length of 200 feet
- Temperance Avenue at Belmont Avenue
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound and southbound shared left-through-right lanes to a separate left-turn lane and shared through-right lane
  - Construct the northbound and southbound left-turn lanes to a length of 250 feet

- Change the eastbound, and westbound shared left-through lanes to a separate left-turn and a separate through lane
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
    - Lengthen the eastbound and westbound right-turn lanes to a length of 250 feet
- Shields Avenue at Locan Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound left-turn lane to a length of 200 feet
    - Construct the westbound left-turn lane to a length of 250 feet
    - Change the southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the southbound left-turn lane to a length of 200 feet
- Shields Avenue at DeWolf Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
- Armstrong Avenue at Clinton Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound, southbound, eastbound, and westbound left-turn lanes to a length of 200 feet
- Armstrong Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Lengthen the northbound right-turn lane to a length of 200 feet
    - Lengthen the eastbound and westbound left-turn lanes to a length of 200 feet

The Temperance Avenue at McKinley Avenue intersection is projected to operate at or above the adopted level of service standard in both the Existing (2018) and Existing (2018) Plus Project scenarios. The Temperance Avenue at McKinley Avenue intersection is also showing that it operates above the basic average accident rate in both fatal + injury and total accidents. Some of these types of accidents, such as broadside, can be reduced by installation of a signal but other types of accidents, such as rear end, can be increased by installation of a signal. Therefore, even though it is projected to meet the peak hour signal warrant in both the Existing (2018) and Existing (2018) Plus Projects scenarios, no mitigations are recommended in the Mitigated Existing (2018) Plus Project scenario. The City of Fresno should monitor the Temperance Avenue at McKinley Avenue intersection and determine when best to signalize this intersection based on level of service analyses, accident rate analyses, as well as additional signal warrant analyses utilizing the following warrants:

- Eight-hour vehicular volume
- Four-hour vehicular volume
- Peak hour
- Crash experience
- Coordinated signal system
- Roadway Network

Intersection Level of Service Analysis

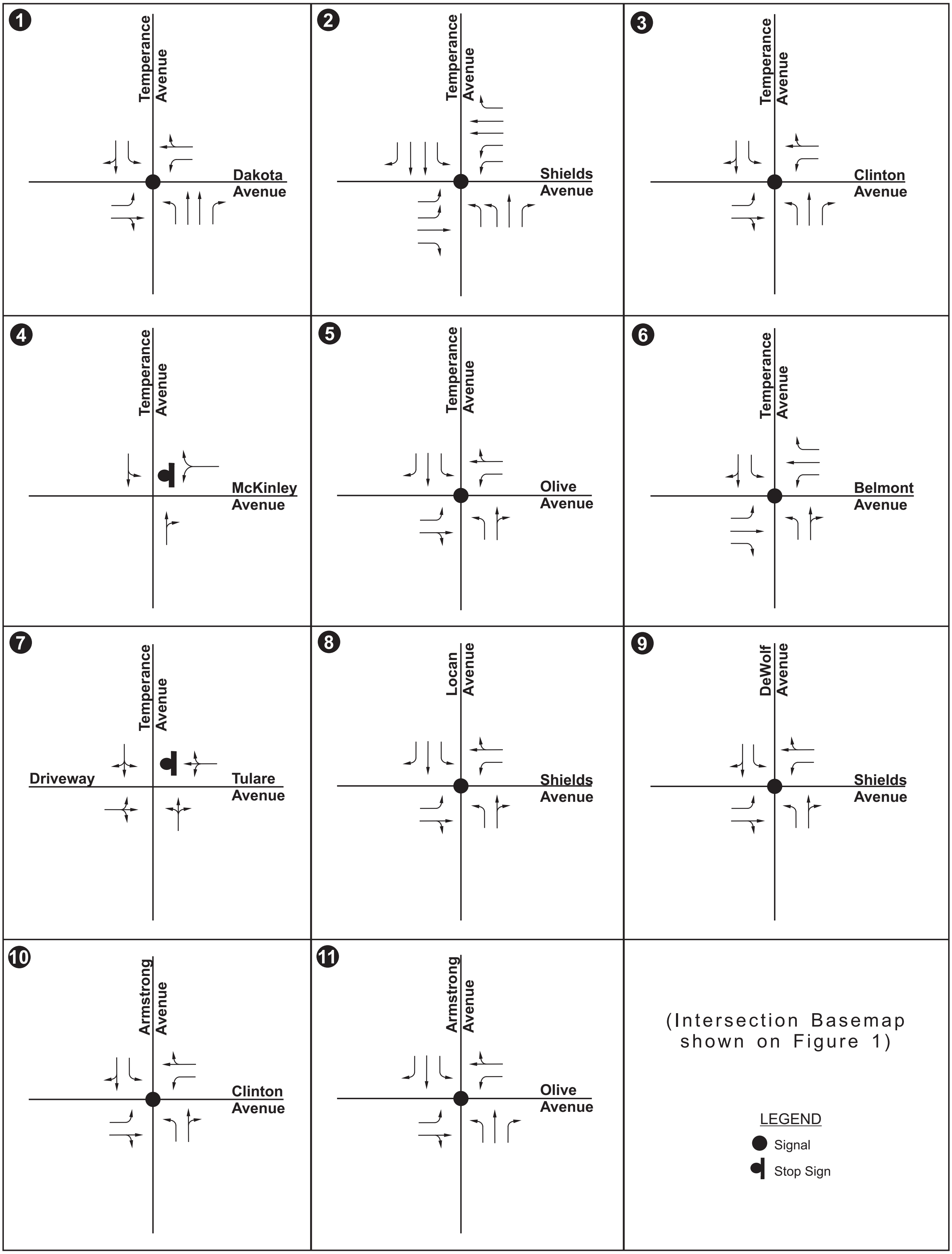
The Mitigated Existing (2018) Plus Project lane configurations and intersection control are shown on Figure 8. Using the lane configurations shown on Figure 8 and the volumes shown on Figure 6, the study intersections were analyzed for Mitigated Existing (2018) Plus Project levels of service. Figure 9 and Table 11 show the Mitigated Existing (2018) Plus Project levels of service for the study intersections. The TWSC levels of service shown on Figure 9 are the levels of service for the worst approach at that intersection. The signalized intersection levels of service shown on Figure 9 and in Table 11 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 9 and in Table 11. The Mitigated Existing (2018) Plus Project intersection levels of service calculations are included in Appendix G.

TABLE 11:
MITIGATED EXISTING (2018) PLUS PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	C	30.2	D	37.4
Temperance Avenue at Shields Avenue	C	34.3	D	40.1
Temperance Avenue at Clinton Avenue	D	40.8	C	22.2
Temperance Avenue at McKinley Avenue				
• WB Approach	D	25.4	C	23.4
Temperance Avenue at Olive Avenue	C	26.3	C	25.3
Temperance Avenue at Belmont Avenue	C	24.1	C	24.3
Temperance Avenue at Tulare Avenue				
• WB Approach	D	28.5	C	24.0
Shields Avenue at Locan Avenue	C	21.1	B	18.9
Shields Avenue at DeWolf Avenue	C	30.8	C	20.4
Armstrong Avenue at Clinton Avenue	C	25.7	B	19.1
Armstrong Avenue at Olive Avenue	C	30.2	B	19.5

[1] Delay per vehicle *secs = seconds* *WB = westbound*

As shown in Figure 9 and Table 11, all study intersections are projected to operate at or above the adopted level of service standard with proposed mitigations in the Mitigated Existing (2018) Plus Project scenario.



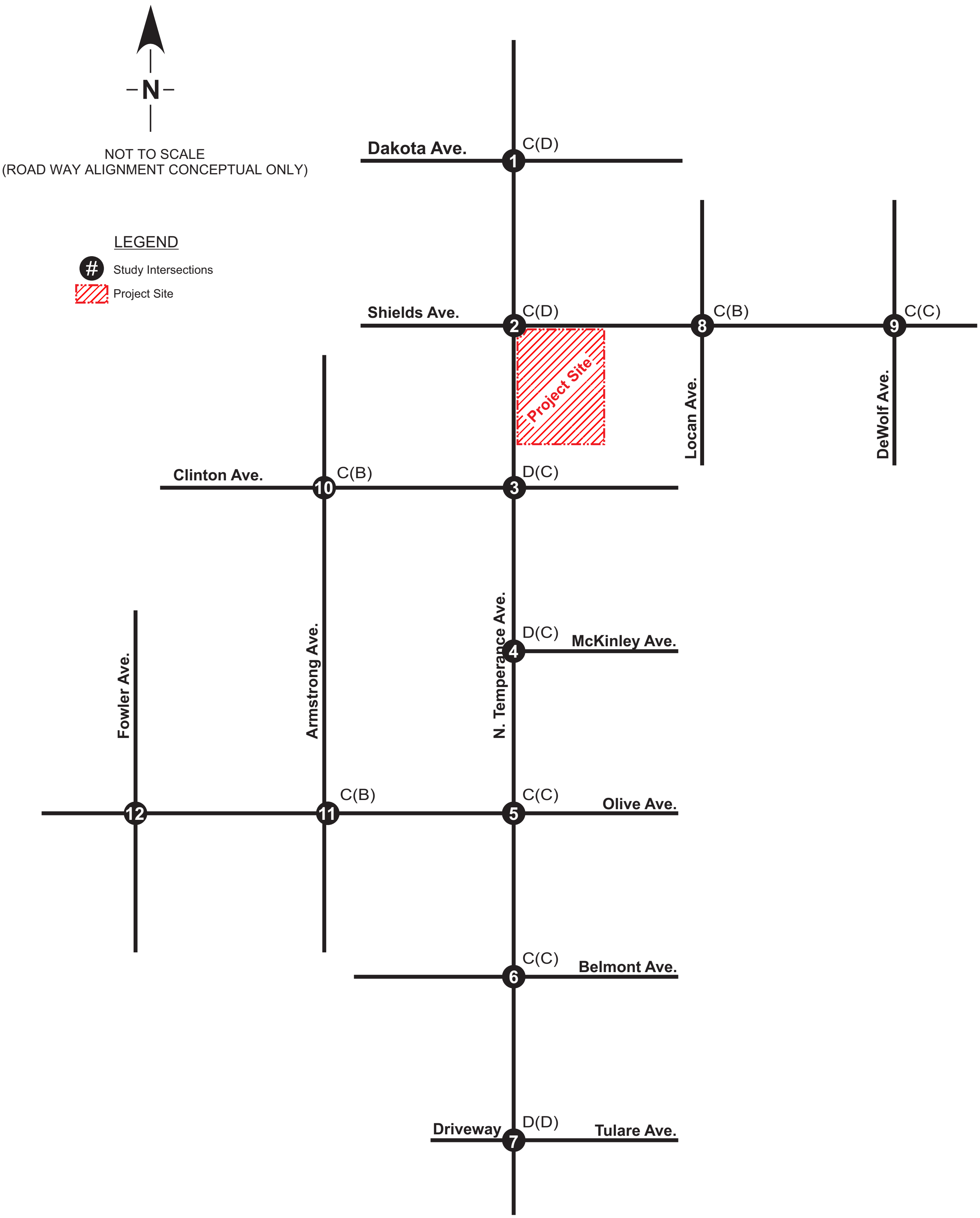
Engineering, PC

MITIGATED LANE CONFIGURATIONS AND INTERSECTION CONTROL

Existing (2018) + Project

City of Fresno, California

Figure 8



ND Engineering, PC

MITIGATED INTERSECTION LEVELS OF SERVICE

Existing (2018) + Project

City of Fresno, California

Figure 9

Queue Lengths

Table 12 shows the estimated Mitigated Existing (2018) Plus Project intersection queue lengths developed from the level of service analyses.

TABLE 12:
MITIGATED EXISTING (2018) PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
Temperance Avenue at Dakota Avenue		
• NB Left	190	53/m34
• NB Through	2,600[1]	150/190
• NB Right	201	0/m0
• SB Left	255	63/82
• SB Through-Right	2,600[1]	#829/326
• EB Left	200	#97/45
• EB Through-Right	1,300[1]	32/41
• WB Left	141	56/20
• WB Through-Right	600[1]	53/36
Temperance Avenue at Shields Avenue		
• NB Left	241	#111/#76
• NB Through	2,600[1]	280/351
• NB Right	100	5/30
• SB Left	229	61/#142
• SB Through	2,600[1]	160/23
• SB Right	228	53/0
• EB Left	237	61/#100
• EB Through	1,100[1]	249/351
• EB Right	138	14/0
• WB Left	235	#147/#76
• WB Through	1,200[1]	216/74
• WB Right	113	0/0
Temperance Avenue at Clinton Avenue		
• NB Left	251	60/31
• NB Through	900[1]	315/#631
• NB Right	151	0/0
• **SB Left**	**151**	**#232**/69
• SB Through-Right	2,600[1]	#646/#356
• **EB Left**	**51**	35/**#124**
• EB Through-Right	2,600[1]	86/43
• WB Left	200	#93/38
• WB Through-Right	700[1]	176/25
Temperance Avenue at McKinley Avenue		
• NB Through-Right	1,300[1]	0/0

TABLE 12:
MITIGATED EXISTING (2018) PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
• SB Left-Through	1,300[1]	5/5
• WB Left-Right	5,200[1]	60/33
Temperance Avenue at Olive Avenue		
• NB Left	250	27/20
• NB Through-Right	1,300[1]	#389/#662
• SB Left	250	16/35
• SB Through	1,300[1]	#440/238
• SB Right	200	21/0
• EB Left	200	96/#147
• EB Through-Right	2,600[1]	96/94
• **WB Left**	**200**	**#205**/75
• WB Through-Right	700[1]	178/61
Temperance Avenue at Belmont Avenue		
• NB Left	250	47/15
• NB Through-Right	1,200[1]	258/#549
• SB Left	250	42/63
• SB Through-Right	1,300[1]	#536/269
• EB Left	250	76/88
• EB Through	2,600[1]	60/111
• EB Right	250	0/0
• WB Left	250	#150/63
• WB Through	700[1]	104/73
• WB Right	250	0/0
Temperance Avenue at Tulare Avenue		
• NB Left-Through-Right	700[1]	0/0
• SB Left-Through-Right	1,200[1]	0/0
• EB Left Through Right	250[2]	0/0
• WB Left-Through-Right	2,600[1]	15/15
Shields Avenue at Locan Avenue		
• NB Left	200	6/5
• NB Through-Right	2,600[1]	44/40
• SB Left	200	45/24
• SB Through	300[1]	94/21
• SB Right	300[1]	58/0
• **EB Left**	246	84/**#245**
• EB Through-Right	1,300[1]	212/191
• WB Left	250	65/8
• WB Through-Right	2,600[1]	249/113
Shields Avenue at DeWolf Avenue		
• NB Left	200	43/37

TABLE 12:
MITIGATED EXISTING (2018) PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• NB Through-Right	5,200[1]	202/187
• SB Left	200	38/20
• SB Through-Right	1,800[1]	#535/157
• **EB Left**	**250**	**#317**/#222
• EB Through-Right	2,600[1]	79/88
• WB Left	250	0/4
• WB Through-Right	2,600[1]	108/47
Armstrong Avenue at Clinton Avenue		
• NB Left	200	28/22
• NB Through-Right	4,000[1]	130/284
• SB Left	200	58/25
• SB Through-Right	2,600[1]	#485/115
• EB Left	200	45/78
• EB Through-Right	2,600[1]	64/108
• WB Left	200	90/29
• WB Through Right	2,600[1]	150/39
Armstrong Avenue at Olive Avenue		
• NB Left	200	84/16
• NB Through	1,300[1]	130/271
• NB Right	200	17/0
• SB Left	200	42/24
• SB Through	1,300[1]	209/96
• SB Right	424	55/17
• **EB Left**	**200**	67/**#196**
• EB Through-Right	2,600[1]	99/117
• WB Left	200	#122/31
• WB Through-Right	2,600[1]	208/109

ft = feet NB = northbound SB = southbound WB = westbound EB = eastbound
[1] = Approximate distance to next intersection
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[2]= Driveway or local street of unknown length, assumed 250 ft

Intersection queue lengths projected to exceed the available storage lengths are shown bolded in Table 12. As shown in Table 12, the following intersection queue lengths, by time period, are projected to exceed the available storage lengths in the Mitigated Existing (2018) Plus Project scenario:

- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
    - WB left – AM peak hour

- Shields Avenue at Locan Avenue
  - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
  - EB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour

To mitigate these queuing exceedances, the following locations would need to be lengthened as shown:

- Temperance Avenue at Clinton Avenue
  - SB left – 250 feet
  - EB left – 200 feet
- Temperance Avenue at Olive Avenue
  - WB left – 225 feet
- Shields Avenue at Locan Avenue
  - EB left – 275 feet
- Shields Avenue at DeWolf Avenue
  - EB left – 325 feet
- Armstrong Avenue at Olive Avenue
  - EB left – 225 feet

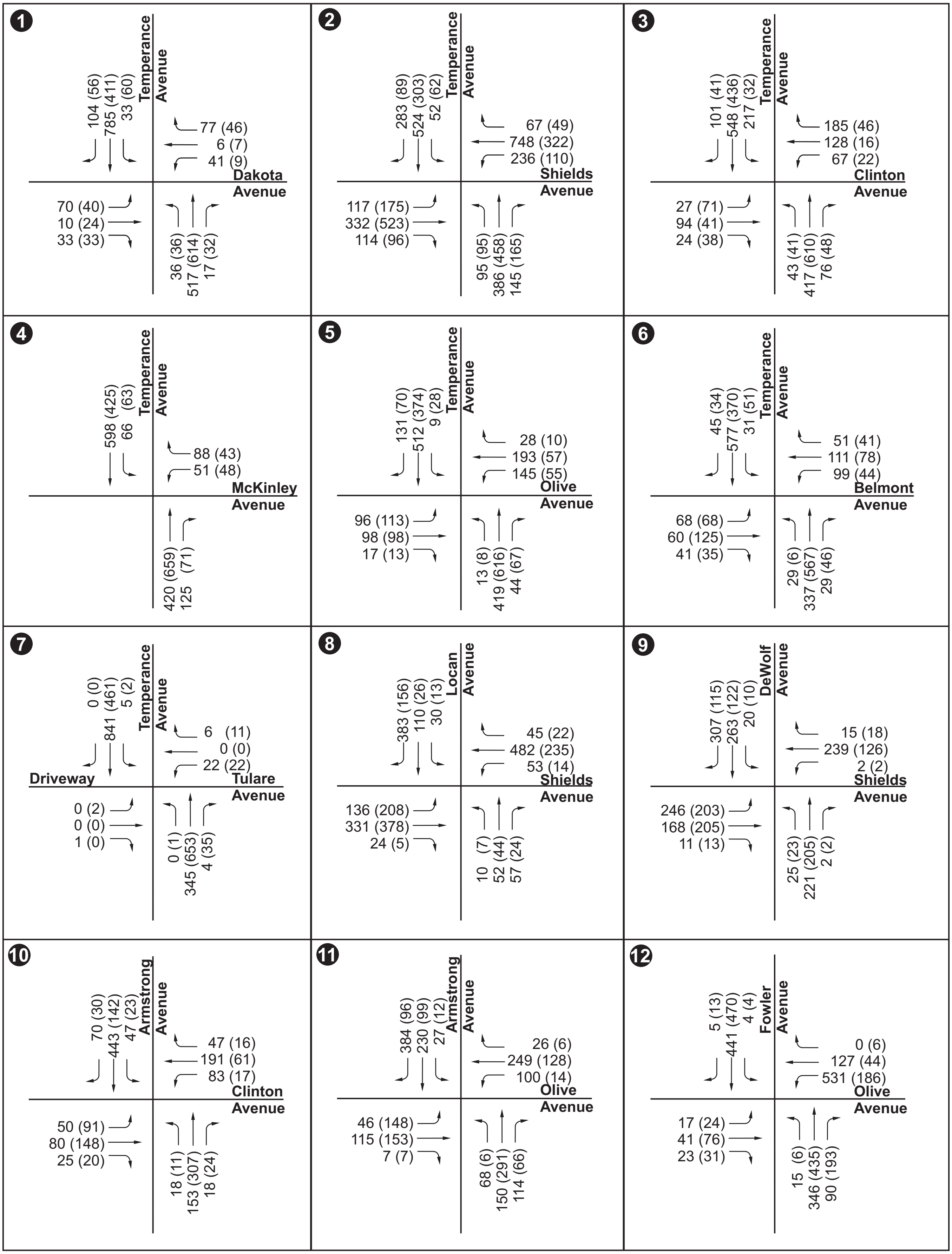
With the lengthening of these turn pockets, all intersections are not projected to exceed the planned storage lengths in the 95th percentile condition in the Mitigated Existing (2018) Plus Project scenario.

All turn pocket length extensions shown in this scenario are a representative snap shot based on the level of service analysis results that are generated by the optimization of the intersection signals. These lengths are subject to change based on reoptimization of signals and ultimately on changes in volumes. Therefore, final decisions on extension of the various turn pockets beyond the City of Fresno standard should be made at the time of intersection modifications based on current volumes and traffic patterns.

EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS CONDITIONS

Intersection Level of Service Analysis

The Existing (2018) Plus Approved/Pending/Proposed Projects intersection peak hour traffic volumes are shown on Figure 10. Using the Existing (2018) lane configurations shown on Figure 2 and the volumes shown on Figure 10, the intersections were analyzed for Existing (2018) Plus Approved/Pending/Proposed Projects levels of service. Please note that the Temperance Avenue at Dakota Avenue northbound approach could not be analyzed as a left-turn, two (2) throughs, and a separate right-turn since AWSC intersections can only be analyzed as three (3) lanes per approach. In order to allow for analysis, the northbound approach was converted to a left-turn, one through, and a shared through right-turn lane in the Existing (2018) Plus Approved/Pending/Proposed Projects scenario. This would result in a worse case analysis. Figure 11 and Table 13 show the Existing (2018) Plus Approved/Pending/Proposed Projects levels of service for the study intersections. The TWSC levels of service shown on Figure 11 are the levels of service for the worst movement at that intersection. The AWSC and signalized intersection levels of service shown on Figure 11 and in Table 13 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the AWSC and signalized level of service or delay shown on Figure 11 and in Table 13. The Existing (2018) Plus Approved/Pending/Proposed Projects intersection levels of service calculations are included in Appendix H.



JD Engineering, PC

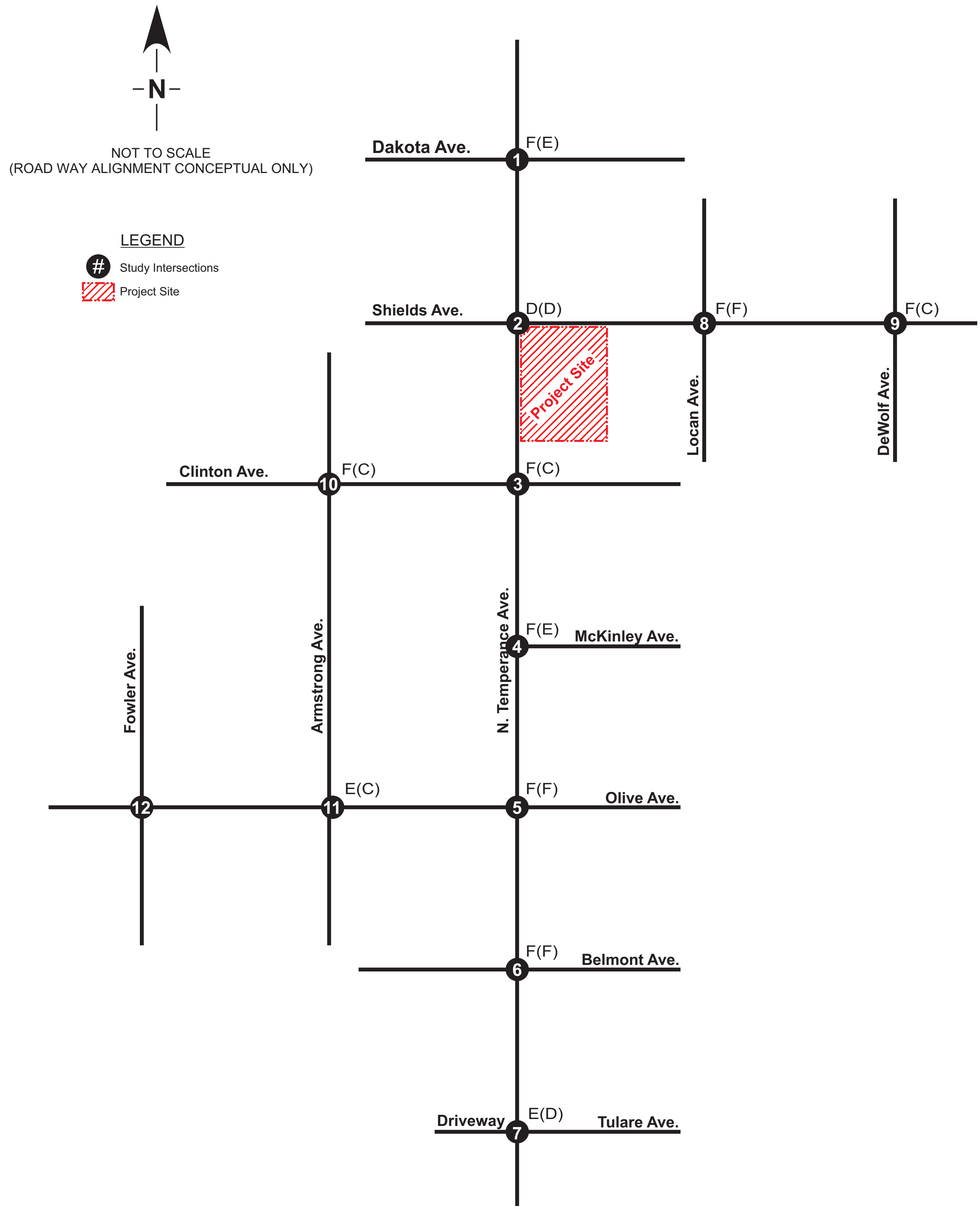
INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Existing (2018) + Approved/Pending/Proposed Projects

(Intersection Basemap shown on Figure 1)

City of Fresno, California

Figure 10



ND Engineering, PC

INTERSECTION LEVELS OF SERVICE

Existing (2018) + Approved/Pending/Proposed Projects

City of Fresno, California

Figure 11

TABLE 13:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		**PM Peak Hour**	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	**F**	**358.8**	**E**	**39.4**
Temperance Avenue at Shields Avenue	D	42.7	D	45.7
Temperance Avenue at Clinton Avenue	**F**	**147.5**	C	32.0
Temperance Avenue at McKinley Avenue				
• **WB Approach**	**F**	**50.6**	E	37.4
Temperance Avenue at Olive Avenue	**F**	**141.8**	**F**	**102.4**
Temperance Avenue at Belmont Avenue	**F**	**104.3**	**F**	**113.5**
Temperance Avenue at Tulare Avenue				
• **WB Approach**	**E**	**36.0**	D	30.2
Shields Avenue at Locan Avenue				
• **NB Approach**	+	**---**	**E**	**49.6**
• **SB Approach (Left-Through Movement)**	**F**	**$1065.1**	**F**	**54.4**
Shields Avenue at DeWolf Avenue	**F**	**150.8**	C	20.9
Armstrong Avenue at Clinton Avenue	**F**	**92.8**	C	15.5
Armstrong Avenue at Olive Avenue	**E**	**39.0**	C	15.5

[1] Delay per vehicle secs = seconds WB = westbound NB = northbound
SB = southbound + Computation not defined $ Delay exceeds 300 secs

Study intersections projected to operate below the adopted level of service standard are shown bolded in Table 13. As shown in Figure 11 and Table 13, the following study intersections, by time period, are projected to operate below the appropriate adopted level of service standard in the Existing (2018) Plus Approved/Pending/Proposed Projects scenario:

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

The remaining study intersections are projected to operate at or above the appropriate adopted level of service standards in the Existing (2018) Plus Approved/Pending/Proposed Projects scenario.

<u>Signal Warrant Analysis</u>

Rural peak hour volume signal warrants were prepared for the following unsignalized intersection:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at McKinley Avenue

- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue
- Clinton Avenue at Armstrong Avenue
- Olive Avenue at Armstrong Avenue

Based on the rural peak hour volume warrant, the warrants are met at the following intersections by time period in the Existing (2018) Plus Approved/Pending/Proposed Projects scenario:

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Copies of the warrant analyses are included in Appendix I.

<u>Queue Lengths</u>

Table 14 shows the estimated Existing (2018) Plus Approved/Pending/Proposed Projects intersection queue lengths developed from the level of service analyses. It should be noted that the Temperance at Olive Avenue southbound approach and the Armstrong at Olive northbound approach does not have striped right-turn lanes but there are approximately 25 to 30 feet that acts as a defacto right turn lane.

TABLE 14:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Dakota Avenue		
• NB Left	190	8/8
• NB Through	2,600[1]	150/213
• NB Right	201	50/65
• SB Left	255	8/13
• SB Through-Right	2,600[1]	2,133/348
• EB Left-Through-Right	1,300[1]	38/28
• WB Left	141	13/3
• WB Through-Right	600[1]	28/13
Temperance Avenue at Shields Avenue		
• NB Left	241	69/64
• NB Through	2,600[1]	376/425

TABLE 14:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• NB Right	100	32/64
• SB Left	229	85/#118
• SB Through	2,600[1]	218/124
• SB Right	228	106/14
• EB Left	237	81/#144
• EB Through	1,100[1]	344/#603
• EB Right	138	37/16
• WB Left	235	#204/#79
• WB Through	1,200[1]	376/136
• WB Right	113	1/0
Temperance Avenue at Clinton Avenue		
• NB Left	251	62/61
• NB Through	900[1]	#506/#798
• NB Right	151	14/0
• **SB Left**	**151**	**#356**/50
• SB Through-Right	2,600[1]	#880/#593
• **EB Left**	51	43/**93**
• EB Through-Right	2,600[1]	84/48
• WB Left	200	82/38
• WB Through-Right	700[1]	185/29
Temperance Avenue at McKinley Avenue		
• NB Through-Right	1,300[1]	0/0
• SB Left-Through	1,300[1]	8/8
• WB Left-Right	5,200[1]	128/60
Temperance Avenue at Olive Avenue		
• NB Left-Through-Right	1,300[1]	500/818
• SB Left-Through	1,300[1]	653/203
• **SB Right**	**30**	**35**/10
• EB Left-Through-Right	2,600[1]	145/68
• WB Left-Through-Right	700[1]	323/30
Temperance Avenue at Belmont Avenue		
• NB Left-Through-Right	1,200[1]	225/823
• SB Left-Through-Right	1,300[1]	790/315
• EB Left-Through	2,600[1]	48/65
• EB Right	36	10/8
• WB Left-Through	700[1]	85/35
• WB Right	23	10/8
Temperance Avenue at Tulare Avenue		
• NB Left-Through-Right	700[1]	0/0

TABLE 14:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• SB Left-Through-Right	1,200[1]	0/0
• EB Left Through Right	250[2]	0/5
• WB Left-Through-Right	2,600[1]	23/23
Shields Avenue at Locan Avenue		
• NB Left-Through-Right	2,600[1]	+/73
• **SB Left-Through**	**300[1]**	**398**/43
• SB Right	300[1]	205/25
• EB Left	246	15/18
• EB Through-Right	1,300[1]	0/0
• WB Left-Through-Right	2,600[1]	5/0
Shields Avenue at DeWolf Avenue		
• NB Left-Through-Right	5,200[1]	153/63
• SB Left-Through-Right	1,800[1]	908/65
• EB Left-Through-Right	2,600[1]	355/198
• WB Left-Through-Right	2,600[1]	120/40
Armstrong Avenue at Clinton Avenue		
• NB Left-Through-Right	4,000[1]	83/105
• SB Left-Through-Right	2,600[1]	703/40
• EB Left-Through-Right	2,600[1]	50/88
• WB Left-Through-Right	2,600[1]	220/25
Armstrong Avenue at Olive Avenue		
• NB Left-Through	1,300[1]	168/28
• **NB Right**	**25**	**43**/13
• SB Left-Through	1,300[1]	143/23
• SB Right	424	318/18
• EB Left	150	13/35
• EB Through-Right	2,600[1]	40/35
• WB Left	132	35/3
• WB Through-Right	2,600[1]	200/33

ft = feet NB = northbound SB = southbound WB = westbound EB = eastbound
[1] = Approximate distance to next intersection
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
[2]= Driveway or local street of unknown length, assumed 250 ft
+= No Capacity for that Movement

Intersection queue lengths projected to exceed the available storage lengths are shown bolded in Table 14. As shown in Table 14, the following intersection queue lengths, by time period, are projected to exceed the available storage lengths in the Existing (2018) Plus Approved/Pending/Proposed Projects conditions scenario:

- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour

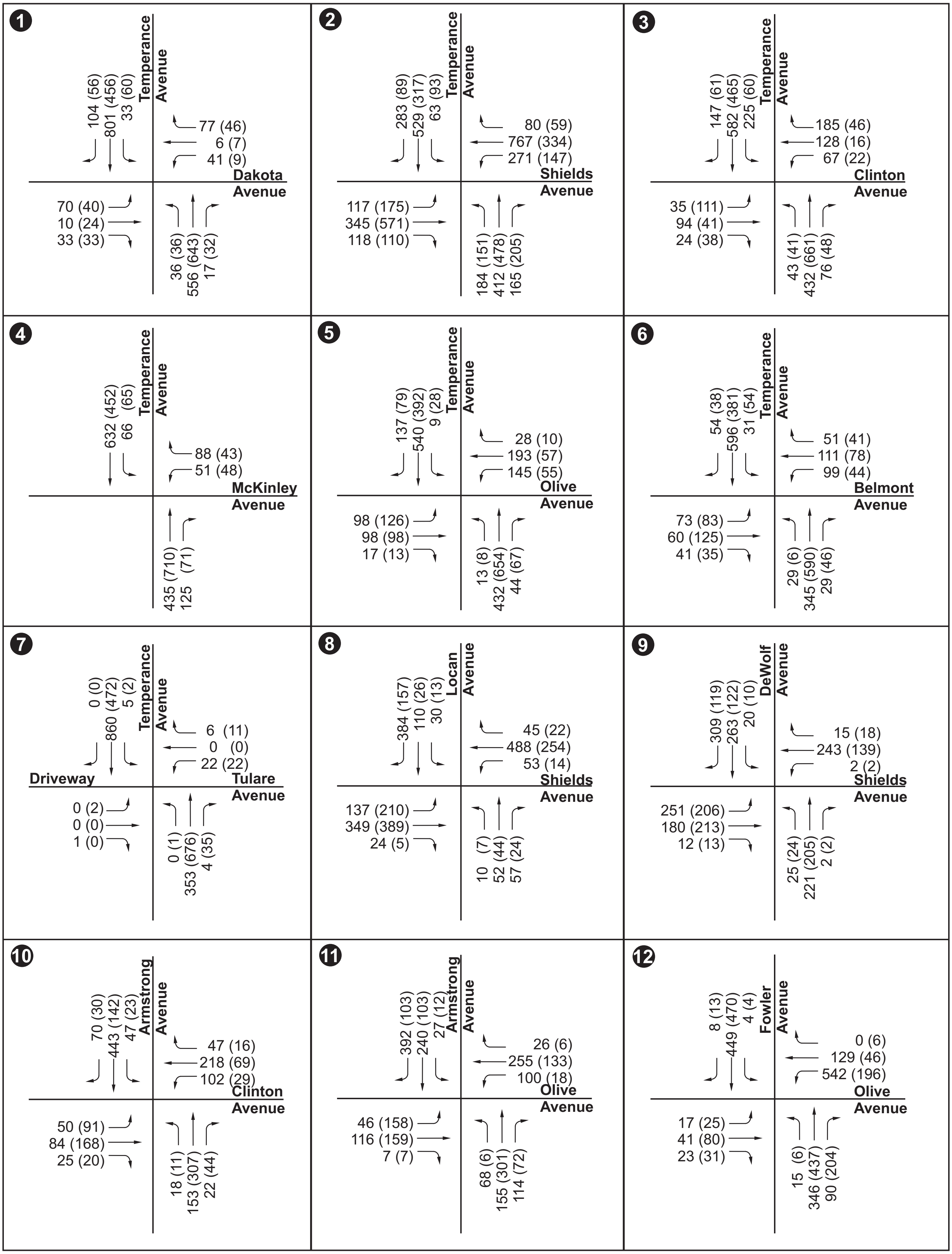
    - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
    - SB right – AM peak hour
- Shields Avenue at Locan Avenue
    - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
    - NB right – AM peak hour

The remaining analyzed intersection queue lengths are not projected to exceed the Existing (2018) storage lengths in the 95th percentile condition in the Existing (2018) Plus Approved/Pending/Proposed Project scenario.

EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT CONDITIONS

Intersection Level of Service Analysis

The Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project intersection peak hour traffic volumes are shown on Figure 12. Using the Existing (2018) lane configurations shown on Figure 2 and the volumes shown on Figure 12, the intersections were analyzed for Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project levels of service. Please note that the Temperance Avenue at Dakota Avenue northbound approach could not be analyzed as a left-turn, two (2) throughs, and a separate right-turn since AWSC intersections can only be analyzed as three (3) lanes per approach. In order to allow for analysis, the northbound approach was converted to a left-turn, one through, and a shared through right-turn lane in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario. This would result in a worse case analysis. Figure 13 and Table 15 show the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project levels of service for the study intersections. The TWSC levels of service shown on Figure 13 are the levels of service for the worst movement at that intersection. The AWSC and signalized intersection levels of service shown on Figure 13 and in Table 15 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the AWSC and signalized level of service or delay shown on Figure 15 and in Table 15. The Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project intersection levels of service calculations are included in Appendix J.



ND Engineering, PC

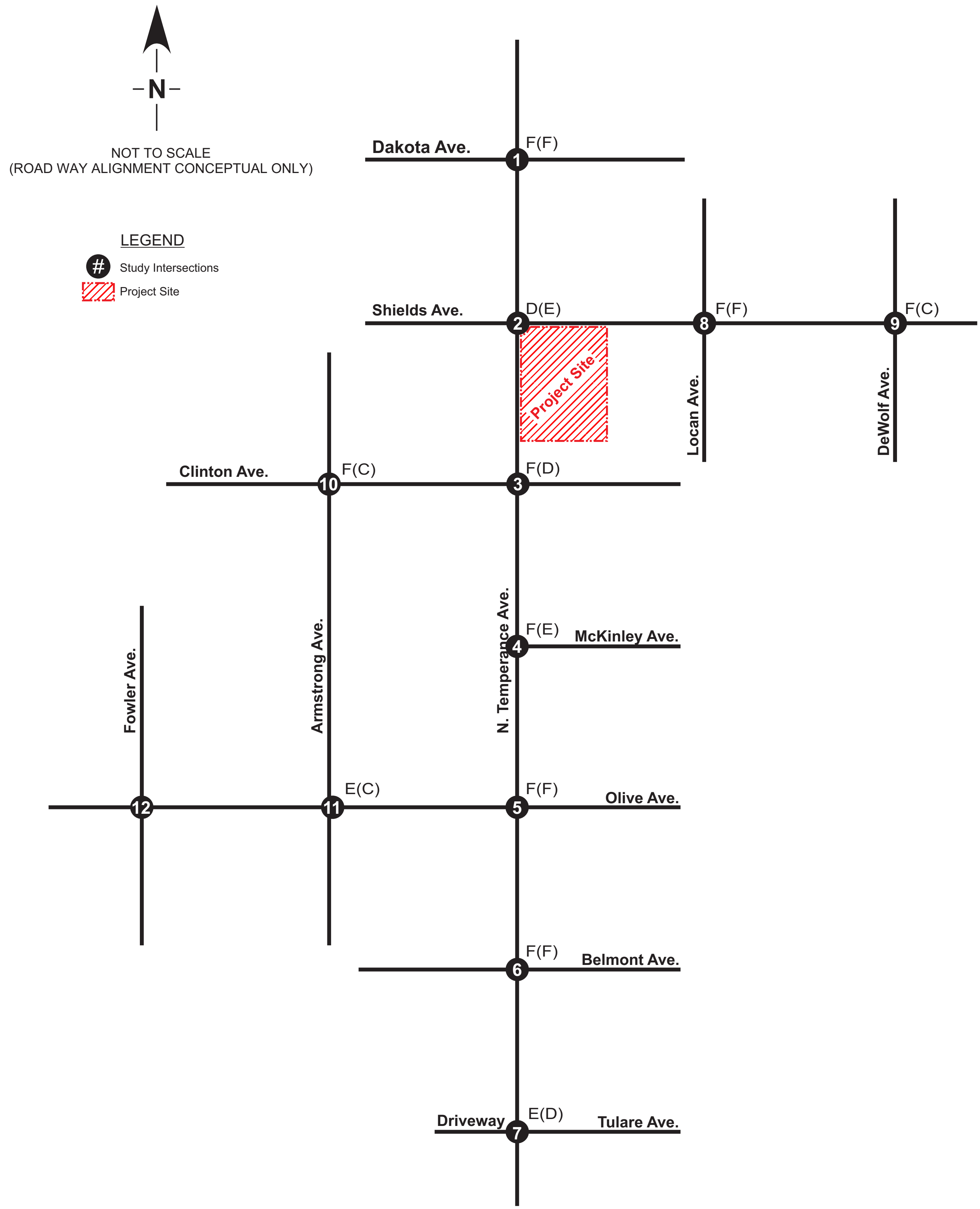
INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Existing (2018) + Approved/Pending/Proposed Projects + Project

(Intersection Basemap shown on Figure 1)

City of Fresno, California

Figure 12



ND Engineering, PC

INTERSECTION LEVELS OF SERVICE

Existing (2018) + Approved/Pending/Proposed Project + Projects

City of Fresno, California

Figure 13

TABLE 15:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	**F**	**376.1**	**F**	**53.5**
Temperance Avenue at Shields Avenue	D	53.0	E	59.9
Temperance Avenue at Clinton Avenue	**F**	**192.0**	D	52.7
Temperance Avenue at McKinley Avenue				
• **WB Approach**	**F**	**60.4**	E	46.2
Temperance Avenue at Olive Avenue	**F**	**157.4**	**F**	**126.5**
Temperance Avenue at Belmont Avenue	**F**	**120.6**	**F**	**128.5**
Temperance Avenue at Tulare Avenue				
• **WB Approach**	**E**	**38.0**	D	32.3
Shields Avenue at Locan Avenue				
• **NB Approach**	**+**	**---**	**F**	**55.3**
• **SB Approach (Left-Through Movement)**	**F**	**$1345.5**	**F**	**60.2**
Shields Avenue at DeWolf Avenue	**F**	**158.6**	C	23.0
Armstrong Avenue at Clinton Avenue	**F**	**114.6**	C	17.8
Armstrong Avenue at Olive Avenue	**E**	**42.0**	C	16.6

[1] Delay per vehicle secs = seconds WB = westbound NB = northbound SB = southbound
+ Computation not defined $ Delay exceeds 300 sec

Intersections projected to operate below the adopted level of service standard are shown bolded in Table 15. As shown in Figure 13 and Table 15, the following study intersections, by time period, are projected to operate below the appropriate adopted level of service standard in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario:

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

The remaining study intersections are projected to operate at or above the appropriate adopted level of service standards in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project conditions scenario.

Signal Warrant Analysis

Rural peak hour volume signal warrants were prepared for the following unsignalized intersections:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue
- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

Based on the rural peak hour volume warrant, the warrants are met at the following intersections by time period in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario:

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Copies of the warrant analyses are included in Appendix K.

Queue Lengths

Table 16 shows the estimated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project intersection queue lengths developed from the level of service analyses. It should be noted that the Temperance at Olive Avenue southbound approach and the Armstrong at Olive northbound approach does not have striped right-turn lanes but there are approximately 25 to 30 feet that acts as a defacto right turn lane.

TABLE 16:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Dakota Avenue		
• NB Left	190	8/8
• NB Through	2,600[1]	178/230
• NB Right	201	55/68
• SB Left	255	8/13
• SB Through-Right	2,600[1]	2,215/460
• EB Left-Through-Right	1,300[1]	38/28
• WB Left	141	13/3
• WB Through-Right	600[1]	28/13

TABLE 16:
EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Shields Avenue		
• NB Left	241	#147/#118
• NB Through	2,600[1]	406/449
• NB Right	100	46/96
• SB Left	229	#104/#189
• SB Through	2,600[1]	221/130
• SB Right	228	122/14
• EB Left	237	81/#144
• EB Through	1,100[1]	359/#687
• EB Right	138	40/26
• **WB Left**	**235**	**#241**/#118
• WB Through	1,200[1]	388/141
• WB Right	113	12/0
Temperance Avenue at Clinton Avenue		
• NB Left	251	62/61
• NB Through	900[1]	#530/#875
• NB Right	151	14/0
• **SB Left**	**151**	**#370**/81
• SB Through-Right	2,600[1]	#1,005/#670
• **EB Left**	**51**	**52/#169**
• EB Through-Right	2,600[1]	84/48
• WB Left	200	82/38
• WB Through-Right	700[1]	185/29
Temperance Avenue at McKinley Avenue		
• NB Through-Right	1,300[1]	0/0
• SB Left-Through	1,300[1]	8/8
• WB Left-Right	5,200[1]	143/73
Temperance Avenue at Olive Avenue		
• NB Left-Through-Right	1,300[1]	528/963
• SB Left-Through	1,300[1]	723/230
• **SB Right**	**30**	**38**/13
• EB Left-Through-Right	2,600[1]	148/78
• WB Left-Through-Right	700[1]	320/33
Temperance Avenue at Belmont Avenue		
• NB Left-Through-Right	1,200[1]	245/883
• SB Left-Through-Right	1,300[1]	880/360
• EB Left-Through	2,600[1]	53/78
• EB Right	36	10/8
• WB Left-Through	700[1]	85/35

TABLE 16: EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH		
Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Right	23	10/8
Temperance Avenue at Tulare Avenue		
• NB Left-Through-Right	700[1]	0/0
• SB Left-Through-Right	1,200[1]	0/0
• EB Left Through Right	250[2]	0/5
• WB Left-Through-Right	2,600[1]	23/25
Shields Avenue at Locan Avenue		
• NB Left-Through-Right	2,600[1]	+/80
• **SB Left-Through**	**300[1]**	**418**/48
• SB Right	300[1]	210/25
• EB Left	246	15/18
• EB Through-Right	1,300[1]	0/0
• WB Left-Through-Right	2,600[1]	5/0
Shields Avenue at DeWolf Avenue		
• NB Left-Through-Right	5,200[1]	153/68
• SB Left-Through-Right	1,800[1]	915/70
• EB Left-Through-Right	2,600[1]	398/220
• WB Left-Through-Right	2,600[1]	123/45
Armstrong Avenue at Clinton Avenue		
• NB Left-Through-Right	4,000[1]	93/128
• SB Left-Through-Right	2,600[1]	770/45
• EB Left-Through-Right	2,600[1]	58/108
• WB Left-Through-Right	2,600[1]	323/35
Armstrong Avenue at Olive Avenue		
• NB Left-Through	1,300[1]	175/143
• **NB Right**	**25**	**43**/13
• SB Left-Through	1,300[1]	160/25
• SB Right	424	348/18
• EB Left	150	13/40
• EB Through-Right	2,600[1]	40/38
• WB Left	132	33/3
• WB Through-Right	2,600[1]	200/38

ft = feet *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[1] = Approximate distance to next intersection *# = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles* *+= No Capacity for that Movement*

Intersection queue lengths projected to exceed the available storage lengths are shown bolded in Table 16. As shown in Table 16, the following intersection queue lengths, by time period, are projected to exceed the available storage lengths in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario:

- Temperance Avenue at Shields Avenue
  - WB left – AM peak hour
- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
  - SB right – AM peak hour
- Shields Avenue at Locan Avenue
  - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

The remaining analyzed intersection queue lengths are not projected to exceed the Existing (2018) storage lengths in the 95th percentile condition in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario.

MITIGATED EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT CONDITIONS

Based on the information provided in the previous section, the following locations by scenario and time period, are projected to operate below the appropriate adopted level of service standard:

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

In addition, the following locations by scenario and time period are projected to meet the rural peak hour volume signal warrant:

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

The following locations by scenario and time period are also projected to have queue storage length exceedances:

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
    - SB right – AM peak hour
- Shields Avenue at Locan Avenue
    - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
    - NB right – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project (With the Project)

- Temperance Avenue at Shields Avenue
    - WB left – AM peak hour
- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
    - SB right – AM peak hour
- Shields Avenue at Locan Avenue
    - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
    - NB right – AM peak hour

To mitigate the intersections that are projected to operate below the appropriate adopted level of service standard, meet the rural peak hour volume signal warrant, or exceed the available storage lengths in the 95th percentile condition, the following improvements are recommended in the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario:

- Temperance Avenue at Dakota Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the southbound through-right lane to two (2) throughs and a separate right-turn lane
    - Construct the southbound right-turn lane to a length of 250 feet
    - Change the eastbound left-through-right turn lane to a separate left-turn and shared through-right lane
    - Construct the eastbound left-turn lane to a length of 200 feet
- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
    - Construct a second eastbound through lane
    - Lengthen the left- and right-turn lanes on all approaches to 250 feet
- Temperance Avenue at Clinton Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Optimize cycle length and offsets
- Temperance Avenue at McKinley Avenue
    - Signalize (Actuated)
    - Optimize cycle length and offsets
    - Change the southbound left-through lane to a separate left-turn and separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
- Temperance Avenue at Olive Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left and shared through-right lane
    - Construct the northbound left-turn lane to a length of 250 feet
    - Construct the eastbound and westbound left-turn lanes to a length of 200 feet
    - Change the southbound shared left-through lane to a separate left-turn and a separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to a length of 200 feet
- Temperance Avenue at Belmont Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through-right lanes to a separate left-turn lane and shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 250 feet
    - Change the eastbound, and westbound shared left-through lanes to a separate left-turn and a separate through lane
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet

  - Lengthen the eastbound and westbound right-turn lanes to a length of 250 feet
- Shields Avenue at Locan Avenue
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound shared left-through-right lane to a separate left-turn lane and a shared through-right lane
  - Construct the northbound left-turn lane to a length of 200 feet
  - Change the southbound shared left-through lane to a separate left-turn lane and a separate through lane
  - Construct the southbound left-turn lane to a length of 200 feet
  - Construct a second eastbound through lane
  - Lengthen the eastbound left-turn lane to a length of 250 feet
  - Change the westbound shared left-through-right lane to a separate left-turn lane, one (1) through lane, and a shared through-right lane
  - Construct the westbound left-turn lane to a length of 250 feet
- Shields Avenue at DeWolf Avenue
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
  - Construct the northbound left-turn lane to a length of 200 feet
  - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
  - Change the southbound shared left-through-right lanes to a separate left-turn, one (1) through, and a separate right-turn lane
  - Construct the southbound left- and right-turn lanes to a length of 200 feet
- Armstrong Avenue at Clinton Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
  - Construct the northbound, southbound, eastbound, and westbound left-turn lanes to a length of 200 feet
- Armstrong Avenue at Olive Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound and southbound shared left-through lane to a separate left-turn lane and a separate through lane
  - Construct the northbound and southbound left-turn lanes to a length of 200 feet
  - Lengthen the northbound right-turn lane to a length of 200 feet
  - Lengthen the eastbound and westbound left-turn lanes to a length of 200 feet

The Temperance Avenue at Tulare Avenue intersection is projected to operate below the adopted level of service standard in both the Existing (2018) Plus Approved/Pending/Proposed Projects and the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenarios but does not meet the peak hour volume signal warrant. It will also not likely meet the other volume warrants either. Due to the low volumes on Tulare Avenue, it will also not meet the AWSC warrant. Since there is only a two (2) second increase in delay between the Existing (2018) Plus Approved/Pending/Proposed Projects and the Existing (2018)

Plus Approved/Pending/Proposed Projects Plus Project, the Project's impact to this intersection is not considered significant.

Intersection Level of Service Analysis

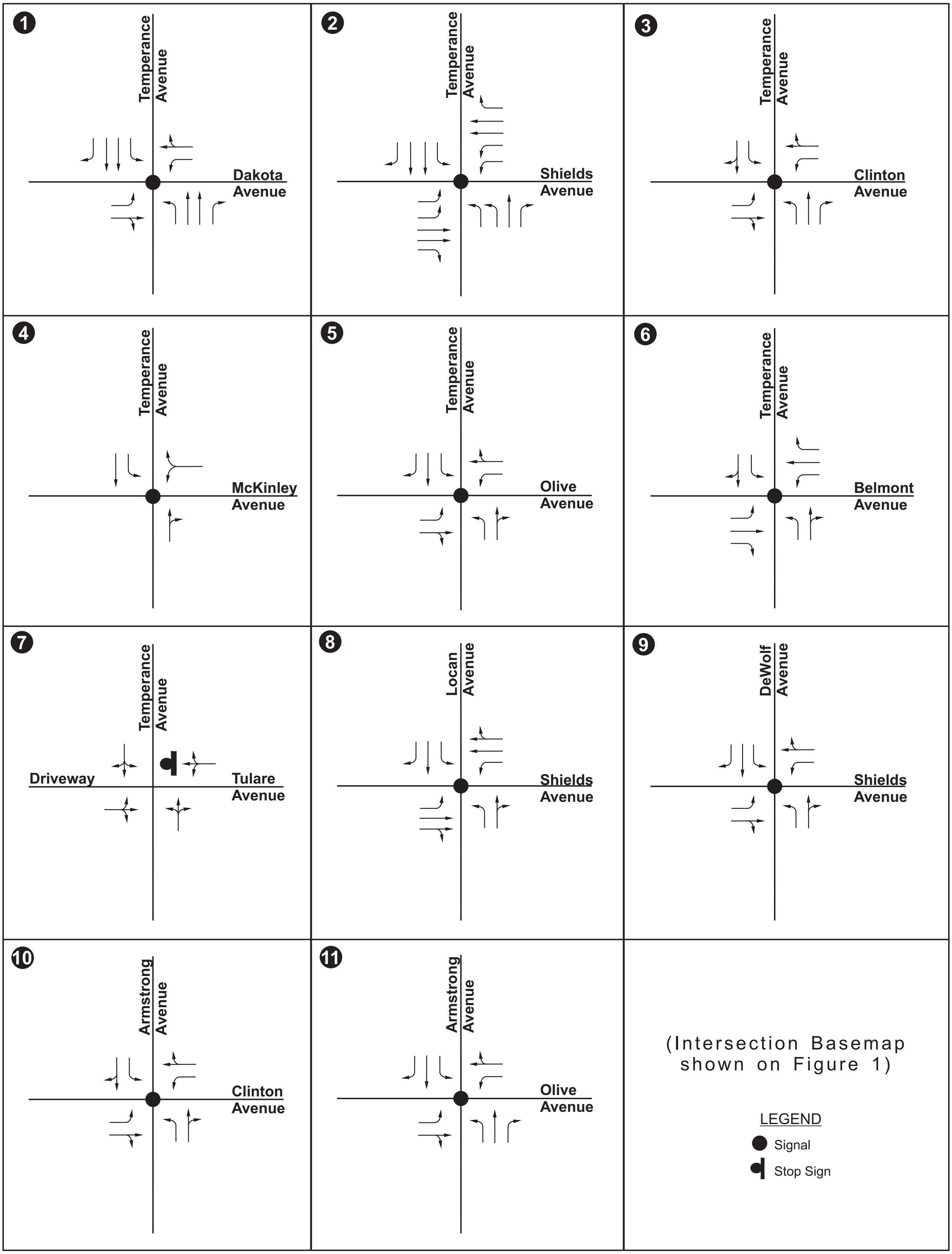
The Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project lane configurations and intersection control are shown on Figure 14. Using the lane configurations shown on Figure 14 and the volumes shown on Figure 12, the intersections were analyzed for Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project levels of service. Figure 15 and Table 17 show the Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project levels of service for the study intersections. The TWSC levels of service shown on Figure 15 are the levels of service for the worst approach at that intersection. The signalized intersection levels of service shown on Figure 15 and in Table 17 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 15 and in Table 17. The Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project intersection levels of service calculations are included in Appendix L.

TABLE 17:
MITIGATED EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECT PLUS PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	D	36.1	B	19.4
Temperance Avenue at Shields Avenue	D	43.6	D	38.1
Temperance Avenue at Clinton Avenue	E	74.1	C	28.7
Temperance Avenue at McKinley Avenue	B	17.3	B	16.0
Temperance Avenue at Olive Avenue	D	35.1	C	26.1
Temperance Avenue at Belmont Avenue	C	28.5	C	26.9
Temperance Avenue at Tulare Avenue				
• **WB Approach**	**E**	**38.0**	D	32.3
Shields Avenue at Locan Avenue	D	49.6	C	21.9
Shields Avenue at DeWolf Avenue	D	54.5	C	21.4
Armstrong Avenue at Clinton Avenue	D	35.6	C	21.3
Armstrong Avenue at Olive Avenue	C	30.9	B	19.7

[1] Delay per vehicle *secs = seconds* *WB = westbound*

As shown in Figure 15 and Table 17, the majority of the study intersections are projected to operate at or above the appropriate level of service standard in the Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario. The Temperance Avenue at Tulare Avenue westbound approach is projected to operate at a LOS E in the AM peak hour which is below the adopted level of service standard.



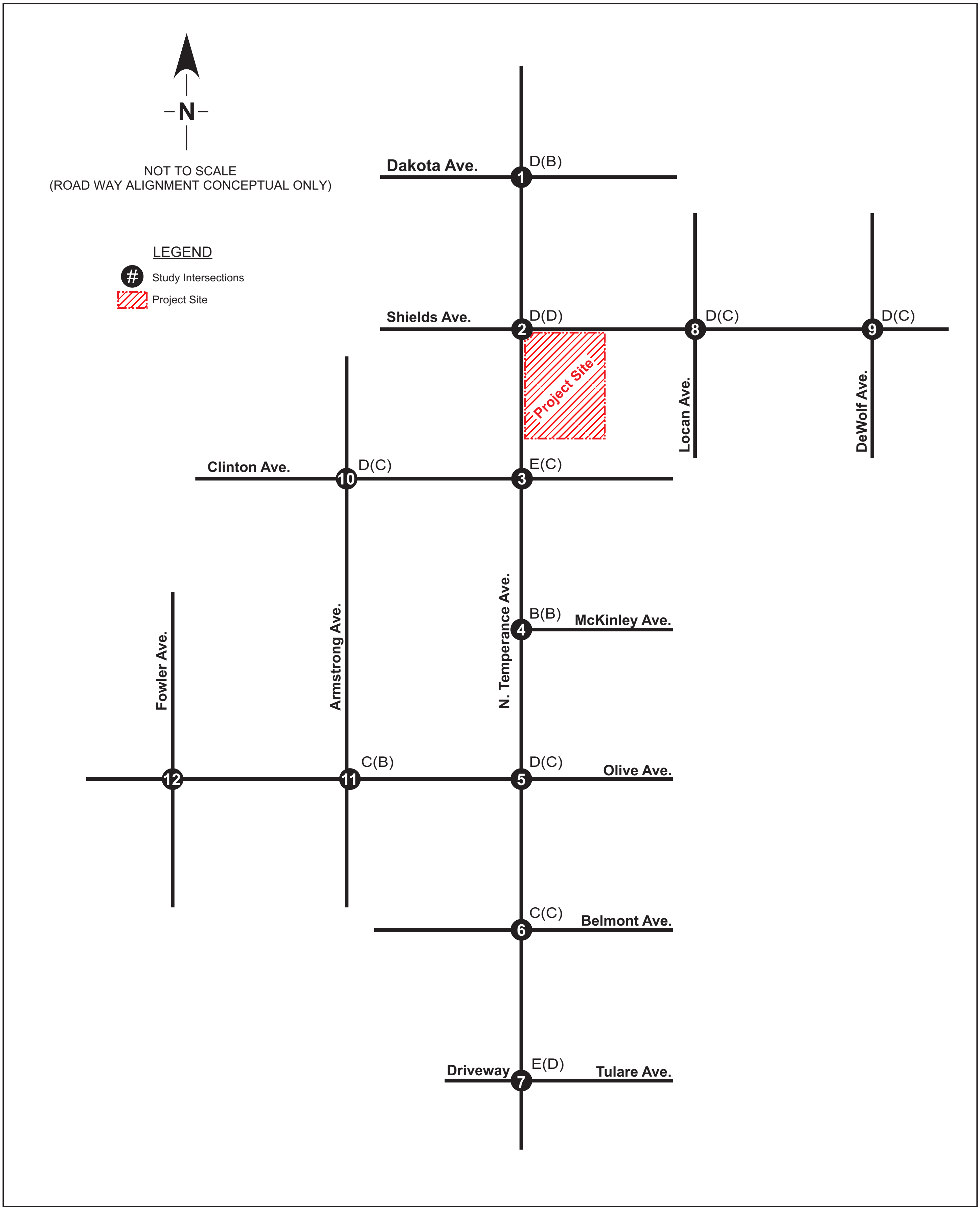
ND Engineering, PC

MITIGATED LANE CONFIGURATIONS
AND INTERSECTION CONTROL

Existing (2018) + Approved/Peding/Proposed Projects + Project

City of Fresno, California

Figure 14



Engineering, PC

MITIGATED INTERSECTION LEVELS OF SERVICE

Existing (2018) + Approved/Pending/Proposed Projects + Project

City of Fresno, California

Figure 15

Queue Lengths

Table 18 shows the estimated Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project intersection queue lengths developed from the level of service analyses.

TABLE 18:
MITIGATED EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECT PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Existing Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Dakota Avenue		
• NB Left	190	m51/53
• NB Through	2,600[1]	325/256
• NB Right	201	m0/0
• SB Left	255	55/80
• SB Through	2,600[1]	261/186
• SB Right	250	12/0
• EB Left	200	110/58
• EB Through-Right	1,300[1]	34/37
• WB Left	141	72/22
• WB Through-Right	600[1]	27/30
Temperance Avenue at Shields Avenue		
• NB Left	250	m104/#104
• NB Through	2,600[1]	m494/#537
• NB Right	250	m54/55
• SB Left	250	#110/#154
• SB Through	2,600[1]	59/140
• SB Right	250	11/0
• EB Left	250	88/110
• EB Through	1,100[1]	183/260
• EB Right	250	0/26
• WB Left	250	184/#105
• WB Through	1,200[1]	257/154
• WB Right	250	m0/0
Temperance Avenue at Clinton Avenue		
• NB Left	251	m73/74
• NB Through	900[1]	421/#816
• NB Right	151	18/0
• **SB Left**	**151**	**#363**/#105
• SB Through-Right	2,600[1]	#951/533
• **EB Left**	**51**	**67/#224**
• EB Through-Right	2,600[1]	127/65
• WB Left	200	#121/45

TABLE 18:
MITIGATED EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECT PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Through-Right	700[1]	304/37
Temperance Avenue at McKinley Avenue		
• NB Through-Right	1,300[1]	281/#767
• SB Left	250	m37/81
• SB Through	1,300[1]	m132/210
• WB Left-Right	5,200[1]	59/61
Temperance Avenue at Olive Avenue		
• NB Left	250	27/24
• NB Through-Right	1,300[1]	#473/#853
• SB Left	250	22/53
• SB Through	1,300[1]	#565/332
• SB Right	200	34/10
• **EB Left**	**200**	#149/**#218**
• EB Through-Right	2,600[1]	89/117
• **WB Left**	**200**	**#237**/89
• WB Through-Right	700[1]	174/79
Temperance Avenue at Belmont Avenue		
• NB Left	250	46/18
• NB Through-Right	1,200[1]	304/#701
• SB Left	250	47/82
• SB Through-Right	1,300[1]	#676/358
• EB Left	250	#105/#129
• EB Through	2,600[1]	58/128
• EB Right	250	0/0
• WB Left	250	#159/70
• WB Through	700[1]	99/88
• WB Right	250	0/0
Temperance Avenue at Tulare Avenue		
• NB Left-Through-Right	700[1]	0/0
• SB Left-Through-Right	1,200[1]	0/0
• EB Left-Through-Right	250[2]	0/5
• WB Left-Through-Right	2,600[1]	23/25
Shields Avenue at Locan Avenue		
• NB Left	200	27/17
• NB Through-Right	2,600[1]	91/53
• SB Left	200	60/26
• SB Through	300[1]	125/33
• SB Right	300[1]	78/36
• **EB Left**	**250**	192/**#311**

TABLE 18: MITIGATED EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECT PLUS PROJECT TRAFFIC CONDITIONS ANALYSIS INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH		
Intersection Approach	**Existing Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• EB Through-Right	1,300[1]	215/153
• WB Left	250	m51/27
• WB Through-Right	2,600[1]	217/101
Shields Avenue at DeWolf Avenue		
• NB Left	200	54/42
• NB Through-Right	5,200[1]	250/187
• SB Left	200	46/24
• SB Through	1,800[1]	298/113
• SB Right	200	52/25
• **EB Left**	250	79/#**313**
• EB Through-Right	2,600[1]	40/186
• WB Left	250	11/9
• WB Through-Right	2,600[1]	307/129
Armstrong Avenue at Clinton Avenue		
• NB Left	200	31/23
• NB Through-Right	4,000[1]	129/#302
• SB Left	200	65/38
• SB Through-Right	2,600[1]	#512/137
• EB Left	200	67/#105
• EB Through-Right	2,600[1]	87/149
• WB Left	200	#153/41
• WB Through-Right	2,600[1]	211/67
Armstrong Avenue at Olive Avenue		
• NB Left	200	#90/16
• NB Through	1,300[1]	124/271
• NB Right	200	17/0
• SB Left	200	43/26
• SB Through	1,300[1]	197/96
• SB Right	424	80/17
• **EB Left**	**200**	65/#**196**
• EB Through-Right	2,600[1]	102/128
• WB Left	200	#141/33
• WB Through-Right	2,600[1]	218/120

ft = feet *NB = northbound* *SB = southbound* *WB = westbound* *EB = eastbound*
[1] = Approximate distance to next intersection *[2]= Driveway or local street of unknown length, assumed 250 ft*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal

Intersection queue lengths projected to exceed the available storage lengths are shown bolded in Table 18. As shown in Table 18, the following intersection queue lengths, by time period, are projected to exceed the available storage lengths in the Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario:

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
  - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour

To mitigate these queuing exceedances, the following locations would need to be lengthened as shown:

- Temperance Avenue at Clinton Avenue
  - SB left – 375 feet
  - EB left – 250 feet
- Temperance Avenue at Olive Avenue
  - EB left – 225 feet
  - WB left – 250 feet
- Shields Avenue at Locan Avenue
  - EB left – 325 feet
- Shields Avenue at DeWolf Avenue
  - EB left – 325 feet
- Armstrong Avenue at Olive Avenue
  - EB left – 225 feet

With the lengthening of these turn pockets, all intersections are not projected to exceed the mitigated storage lengths in the 95th percentile condition in the Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenario.

All turn pocket length extensions shown in this scenario are a representative snap shot based on the level of service analysis results that are generated by the optimization of the intersection signals. These lengths are subject to change based on reoptimization of signals and ultimately on changes in volumes. Therefore, final decisions on extension of the various turn pockets beyond the City of Fresno standard should be made at the time of intersection modifications based on current volumes and traffic patterns.

2035 PROJECT CONDITIONS

Bike/Pedestrian

Bike

As shown in the City of Fresno Active Transportation Plan, a Class I bike path or a Class II bike lane is planned for Temperance Avenue from north of Dakota to south of Tulare on both sides of the roadway. In addition, Class II bike lanes are planned for the following roadways:

- Dakota Avenue – Fowler Avenue (west) to Locan Avenue (east)
- Shields Avenue – Temperance Avenue (west) to Dakota Avenue (east) – both sides of the roadway
- Clinton Avenue – Clovis Avenue (west) to Locan Avenue (east) – both sides of the roadway
- McKinley Avenue – Temperance Avenue (west) to City of Fresno Sphere of Influence (east) – both sides of the roadway
- Olive Avenue – City of Fresno Sphere of Influence (west) to City of Fresno Sphere of Influence (east) – both sides of the roadway
- Tulare Avenue - Temperance Avenue (west) to Leonard Avenue (east) – both sides of the roadway
- Locan Avenue – City of Fresno Sphere of Influence (north) to Clinton Avenue (south) – both sides of the roadway
- DeWolf Avenue – City of Fresno Sphere of Influence (north) to City of Fresno Sphere of Influence (south) – both sides of the roadway
- Armstrong Avenue – Shields Avenue (north) to south of Olive Avenue (south) – both sides of the roadway

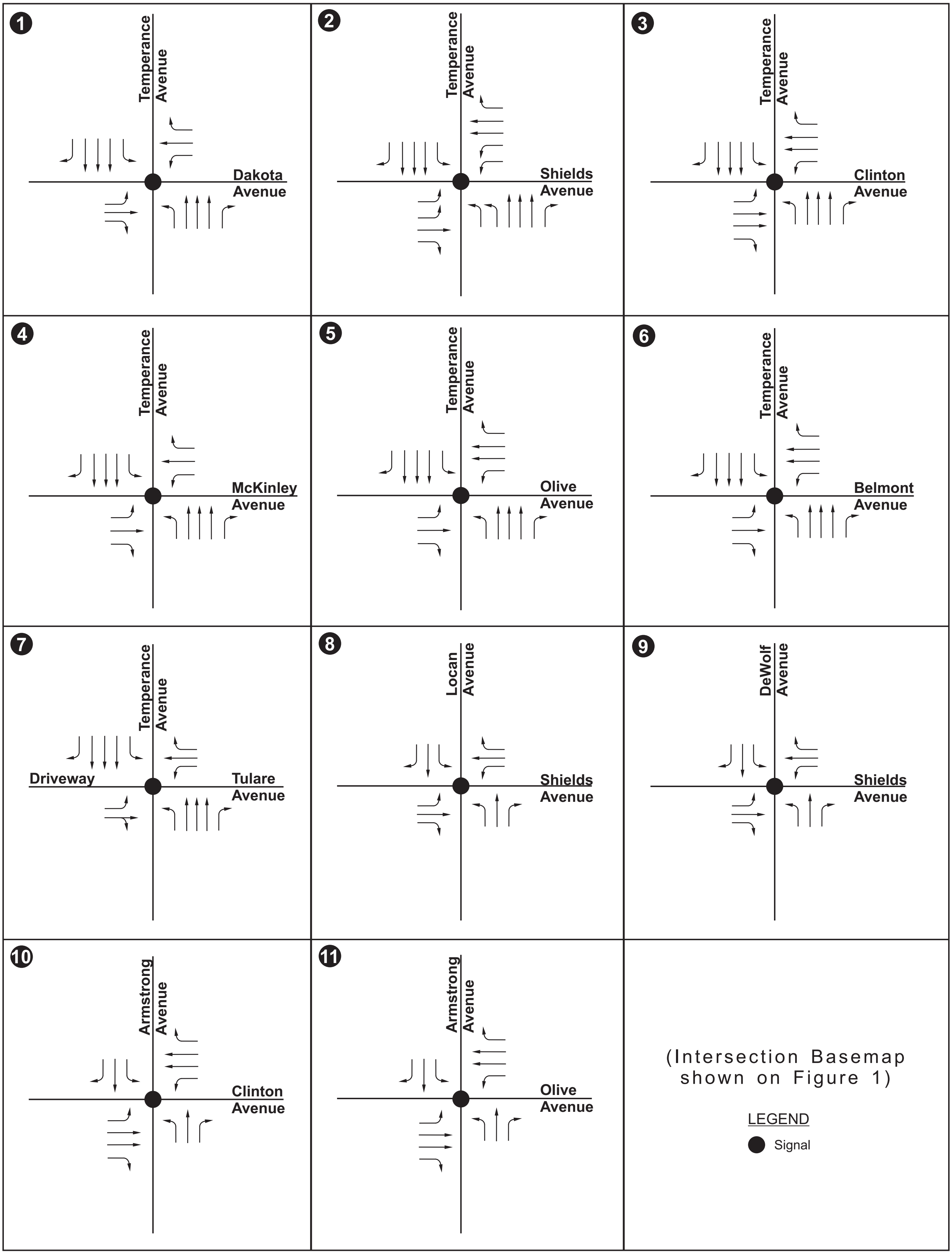
Pedestrian

Per the City of Fresno Development Code, sidewalks must be constructed when a property is developed. In addition, the following locations are shown with planned sidewalks per the City of Fresno Active Transportation Plan:

- Dakota Avenue – Fowler Avenue (west) to Temperance Avenue (east)
- Shields Avenue – Temperance Avenue (west) to east of Highlands Avenue (east)
- Clinton Avenue – east of Temperance Avenue (west) to west of Locan Avenue (east)
- McKinley Avenue – Temperance Avenue (west) to the City of Fresno Sphere of Influence (east)
- Olive Avenue – Clovis Avenue (west) to east of Leonard Avenue (east)
- Belmont Avenue – Armstrong Avenue (west) to the City of Fresno Sphere of Influence (east)
- Tulare Avenue – Temperance Avenue (west) to DeWolf Avenue (east)
- Armstrong Avenue – Shields Avenue (north) to Belmont Avenue (south)
- Temperance Avenue – City of Fresno Sphere of Influence (north) to the City of Fresno Sphere of Influence (south)
- Locan Avenue – City of Fresno Sphere of Influence (north) to Clinton Avenue (south)
- DeWolf Avenue – City of Fresno Sphere of Influence (north) to Olive Avenue (south)

<u>Intersection Level of Service Analysis</u>

The 2035 Project lane configurations and intersection control are shown on Figure 16 and are based on the buildout of the City of Fresno General Plan. The 2035 Project intersection peak hour traffic volumes are shown on Figure 17. Using the lane configurations shown on Figure 16 and the volumes shown on Figure 17, the intersections were analyzed for 2035 Project levels of service. Figure 18 and Table 19 show the 2035 Project levels of service for the study intersections. The signalized intersection levels of service shown on Figure 18 and in Table 19 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 18 and in Table 19. The 2035 Project intersection levels of service calculations are included in Appendix M.



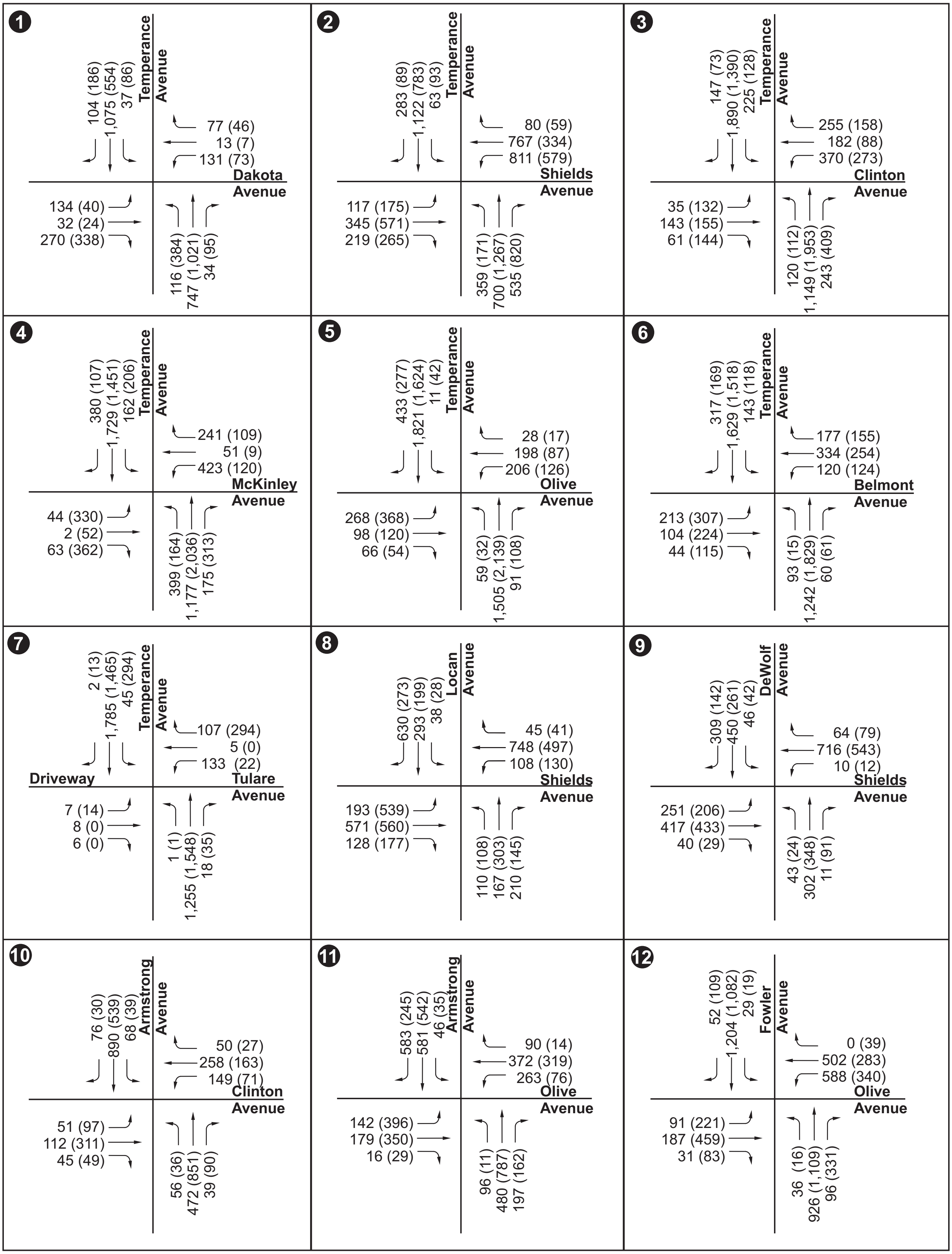
Engineering, PC

LANE CONFIGURATIONS AND INTERSECTION CONTROL

2035 Project

City of Fresno, California

Figure 16



ND Engineering, PC

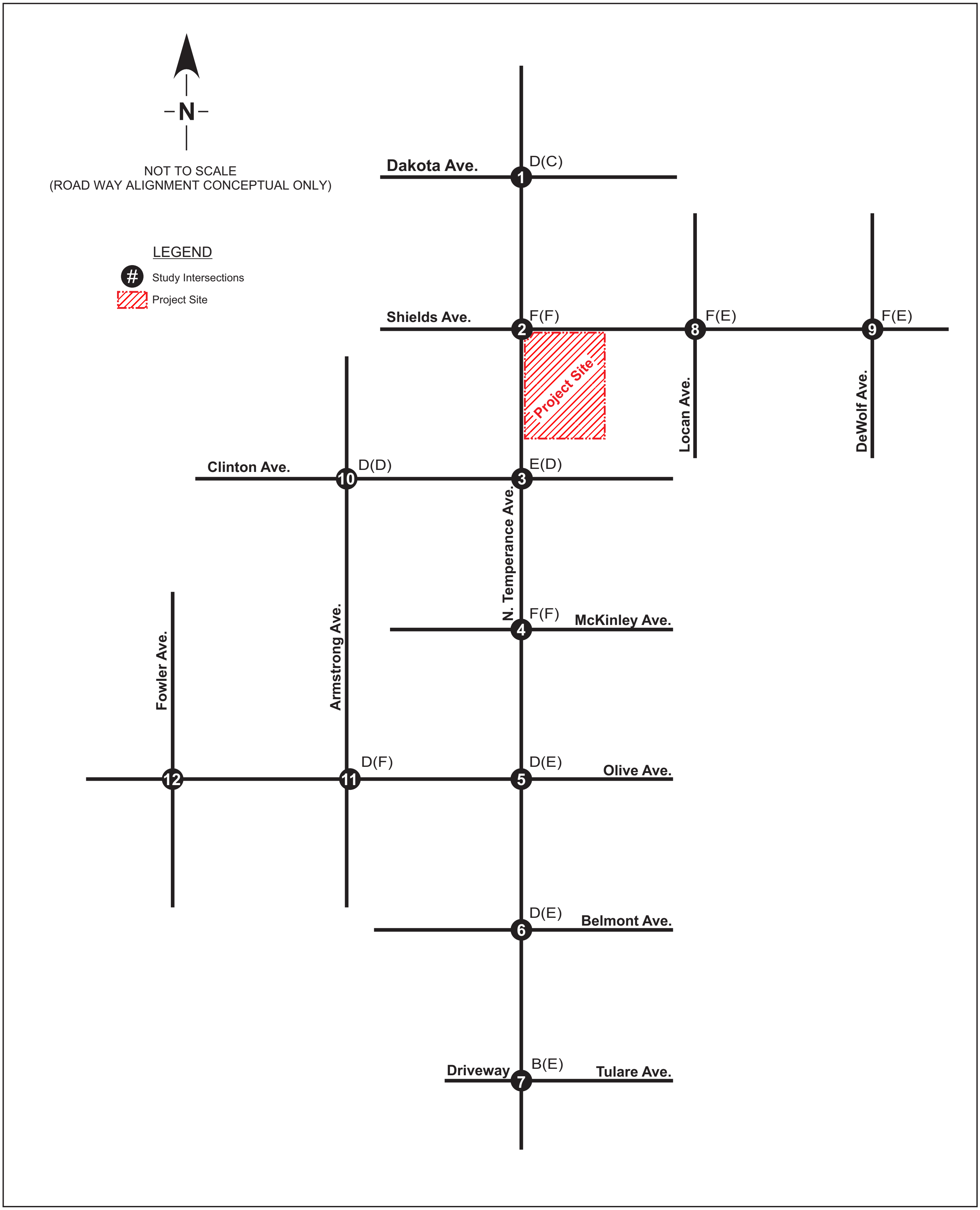
INTERSECTION PEAK HOUR TRAFFIC VOLUMES

2035 Project

(Intersection Basemap shown on Figure 1)

City of Fresno, California

Figure 17



ND Engineering, PC

INTERSECTION LEVELS OF SERVICE

2035 Project

City of Fresno, California

Figure 18

**TABLE 19:
2035 PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE**

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	D	39.6	C	33.6
Temperance Avenue at Shields Avenue	**F**	**145.0**	**F**	**142.3**
Temperance Avenue at Clinton Avenue	E	77.0	D	42.5
Temperance Avenue at McKinley Avenue	**F**	**176.9**	**F**	**138.7**
Temperance Avenue at Olive Avenue	D	48.2	**E**	**71.1**
Temperance Avenue at Belmont Avenue	D	51.4	**E**	**57.1**
Temperance Avenue at Tulare Avenue	B	17.7	**E**	**61.1**
Shields Avenue at Locan Avenue	**F**	**84.7**	**E**	**67.5**
Shields Avenue at DeWolf Avenue	**F**	**84.8**	**E**	**55.3**
Armstrong Avenue at Clinton Avenue	D	38.1	D	36.1
Armstrong Avenue at Olive Avenue	D	41.0	**F**	**87.1**

[1] Delay per vehicle *secs = seconds*

Study intersections projected to operate below the adopted level of service standard in the 2035 Project scenario are shown bolded in Table 19. As shown in Figure 18 and Table 19, the following study intersections, by time period, are projected to operate below the appropriate adopted level of service standard:

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – PM peak hour
- Temperance Avenue at Belmont Avenue – PM peak hour
- Temperance Avenue at Tulare Avenue – PM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – PM peak hours

The remaining study intersections are projected to operate at or above the appropriate adopted level of service standards in the 2035 Project conditions scenario.

<u>Queue Lengths</u>

Table 20 shows the estimated 2035 Project intersection queue lengths developed from the level of service analyses.

TABLE 20:
2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Planned Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
Temperance Avenue at Dakota Avenue		
• **NB Left**	**250**	#133/m**#470**
• NB Through	2,600[1]	46/72
• NB Right	250	0/m3
• SB Left	255	73/133
• SB Through	2,600[1]	396/212
• SB Right	250	16/66
• **EB Left**	**200**	**#206**/76
• EB Through	1,300[1]	46/38
• EB Right	200	64/72
• WB Left	200	#197/#150
• WB Through	600[1]	24/17
• WB Right	200	0/0
Temperance Avenue at Shields Avenue		
• **NB Left**	**250**	**m#310**/m73
• NB Through	2,600[1]	279/m56
• **NB Right**	**250**	**m426/m#704**
• SB Left	250	m#114/m#187
• SB Through	2,600[1]	296/216
• SB Right	250	134/m27
• EB Left	250	85/120
• EB Through	1,100[1]	369/#766
• EB Right	250	97/134
• **WB Left**	**250**	**m#531/m#412**
• WB Through	1,200[1]	m2143/m49
• WB Right	250	m0/m0
Temperance Avenue at Clinton Avenue		
• **NB Left**	**251**	**#251**/m72
• NB Through	900[1]	83/m87
• NB Right	250	0/m11
• **SB Left**	**250**	**m#274**/m#193
• SB Through	2,600[1]	m#582/m422
• SB Right	250	m13/m13
• **EB Left**	**200**	69/**#212**
• EB Through	2,600[1]	77/82
• EB Right	200	0/48
• **WB Left**	**200**	**#708/#526**
• WB Through	700[1]	84/52
• WB Right	200	56/52

TABLE 20:
2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
Temperance Avenue at McKinley Avenue		
• **NB Left**	**250**	**m#723**/m#182
• NB Through	1,300[1]	m431/m#913
• NB Right	250	m138/m144
• **SB Left**	**250**	m109/**m#392**
• SB Through	1,300[1]	m#615/m#566
• SB Right	250	m109/m65
• **EB Left**	**200**	77/**#643**
• EB Through	2,600[1]	8/66
• **EB Right**	**200**	0/**219**
• **WB Left**	**200**	**#831/#204**
• WB Through	5,200[1]	65/19
• WB Right	200	62/12
Temperance Avenue at Olive Avenue		
• NB Left	250	m68/m25
• NB Through	1,300[1]	m#611/m#908
• NB Right	250	m25/m24
• SB Left	250	m8/m41
• SB Through	1,300[1]	m#667/m#629
• SB Right	250	m53/m48
• **EB Left**	**200**	**#498/#667**
• EB Through	2,600[1]	112/176
• EB Right	200	0/39
• **WB Left**	**200**	**#370/#211**
• WB Through	700[1]	102/51
• WB Right	200	0/0
Temperance Avenue at Belmont Avenue		
• NB Left	250	#202/38
• NB Through	1,200[1]	#495/#856
• NB Right	250	5/5
• SB Left	250	m#165/m#212
• SB Through	1,300[1]	m#686/#642
• SB Right	250	m7/m57
• **EB Left**	**250**	**#380/#580**
• EB Through	2,600[1]	114/232
• EB Right	250	0/21
• WB Left	250	#203/#208
• WB Through	700[1]	166/128
• WB Right	250	54/51
Temperance Avenue at Tulare Avenue		

TABLE 20:
2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• NB Left	250	7/7
• NB Through	700[1]	421/#697
• NB Right	250	0/0
• **SB Left**	**250**	84/**#506**
• SB Through	1,200[1]	#734/494
• SB Right	250	0/0
• EB Left	250[2]	23/36
• EB Through-Right	250[2]	23/0
• **WB Left**	**200**	**#266**/49
• WB Through	2,600[1]	13/0
• WB Right	200	13/0
Shields Avenue at Locan Avenue		
• **NB Left**	**200**	**#237/#237**
• NB Through	2,600[1]	188/#404
• NB Right	200	61/48
• SB Left	200	73/58
• **SB Through**	**300[1]**	**332**/245
• **SB Right**	**300[1]**	**#773**/76
• **EB Left**	**250**	**#370/m#492**
• EB Through	1,300[1]	#672/m333
• EB Right	250	20/m7
• WB Left	250	m113/m132
• WB Through	2,600[1]	m#775/m#693
• WB Right	250	m0/m0
Shields Avenue at DeWolf Avenue		
• NB Left	200	81/53
• NB Through	5,200[1]	362/#461
• NB Right	200	0/0
• SB Left	200	85/81
• SB Through	1,800[1]	#660/313
• SB Right	200	178/39
• **EB Left**	**250**	**m#371/m#293**
• EB Through	2,600[1]	m451/247
• EB Right	250	m0/m0
• WB Left	250	27/31
• WB Through	2,600[1]	#1006/#673
• WB Right	250	0/0
Armstrong Avenue at Clinton Avenue		
• NB Left	200	#108/67
• NB Through	4,000[1]	438/#1031

TABLE 20:
2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	Planned Queue Storage Length (ft)	95th Percentile Queue Length (ft) (AM/PM)
• NB Right	200	0/0
• SB Left	200	112/70
• SB Through	2,600[1]	#1158/472
• SB Right	200	14/0
• EB Left	200	91/#190
• EB Through	2,600[1]	75/169
• EB Right	200	0/0
• **WB Left**	**200**	**#290**/#131
• WB Through	2,600[1]	152/93
• WB Right	200	0/0
Armstrong Avenue at Olive Avenue		
• NB Left	200	#170/31
• NB Through	1,300[1]	#514/#1106
• NB Right	200	69/55
• SB Left	200	74/69
• SB Through	1,300[1]	#689/593
• SB Right	424	266/54
• **EB Left**	**200**	170/**#676**
• EB Through	2,600[1]	92/207
• EB Right	200	0/0
• **WB Left**	**200**	**#379**/74
• WB Through	2,600[1]	181/136
• WB Right	200	21/0

ft = feet *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *[1] = Approximate distance to next intersection*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[2]= Driveway or local street of unknown length, assumed 250 ft

Intersection queue lengths projected to exceed the planned storage lengths are shown bolded in Table 20. As shown in Table 20, the following intersection queue lengths, by time period, are projected to exceed the planned storage lengths in the 2035 Project scenario:

- Temperance Avenue at Dakota Avenue
  - NB left – PM peak hour
  - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
  - NB left – AM peak hour
  - NB right – AM/PM peak hours
  - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
  - NB left – AM peak hour

  - SB left – AM peak hour
  - EB left – PM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
  - NB left – AM peak hour
  - SB left – PM peak hour
  - EB left – PM peak hour
  - EB right – PM peak hour
  - WB left – AM/PM peak hour
- Temperance Avenue at Olive Avenue
  - EB left – AM/PM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
  - EB left – AM/PM peak hours
- Temperance Avenue at Tulare Avenue
  - SB left – PM peak hour
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - NB left – AM/PM peak hours
  - SB through – AM peak hour
  - SB right – AM peak hour
  - EB left – AM/PM peak hours
- Shields Avenue at DeWolf Avenue
  - EB left – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue
  - WB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour

The remaining analyzed intersection queue lengths are not projected to exceed the planned storage lengths in the 95th percentile condition in the 2035 Project scenario.

MITIGATED 2035 PROJECT CONDITIONS

Based on the information provided in the previous section, the following locations are projected to operate below the appropriate adopted level of service standard in the 2035 Project scenario:

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – PM peak hour
- Temperance Avenue at Belmont Avenue – PM peak hour
- Temperance Avenue at Tulare Avenue – PM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – PM peak hours

In addition, the following locations by time period are projected to exceed the planned storage lengths in the 95th percentile condition in the 2035 Project scenario:

- Temperance Avenue at Dakota Avenue
  - NB left – PM peak hour
  - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
  - NB left – AM peak hour
  - NB right – AM/PM peak hours
  - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
  - NB left – AM peak hour
  - SB left – AM peak hour
  - EB left – PM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
  - NB left – AM peak hour
  - SB left – PM peak hour
  - EB left – PM peak hour
  - EB right – PM peak hour
  - WB left – AM/PM peak hour
- Temperance Avenue at Olive Avenue
  - EB left – AM/PM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
  - EB left – AM/PM peak hours
- Temperance Avenue at Tulare Avenue
  - SB left – PM peak hour
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - NB left – AM/PM peak hours
  - SB through – AM peak hour
  - SB right – AM peak hour
  - EB left – AM/PM peak hours
- Shields Avenue at DeWolf Avenue
  - EB left – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue
  - WB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour

To mitigate the intersections that are projected to operate below the appropriate adopted level of service standard or exceed the planned storage lengths in the 95th percentile condition, the following improvements are recommended in the Mitigated 2035 Project scenario:

- Temperance Avenue at Dakota Avenue
  - Optimize cycle length and offsets
- Temperance Avenue at Shields Avenue

    - Optimize cycle length and offsets
    - Construct a second northbound right-turn lane to a length of 250 feet
    - Construct a second southbound left-turn lane to a length of 250 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Construct a second eastbound and westbound left-turn lane to a length of 200 feet
    - Construct a second southbound left-turn lane to a length of 250 feet
- Temperance Avenue at McKinley Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound and southbound left-turn lane to a length of 250 feet
    - Construct a second eastbound and westbound left-turn lane to a length of 200 feet
    - Construct a second eastbound and westbound through lane
- Temperance Avenue at Olive Avenue
    - Optimize cycle length and offsets
    - Construct a second eastbound and westbound left-turn lane to a length of 200 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Belmont Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound, southbound, eastbound, and westbound left-turn lane to a length of 250 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Tulare Avenue
    - Optimize splits, cycle length, and offsets
    - Change the westbound through lane to a shared through-right lane
- Shields Avenue at Locan Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound, southbound, eastbound, and westbound through lane
    - Construct a second southbound right-turn lane to a length of 273 feet
    - Construct a second eastbound left-turn lane to a length of 250 feet
- Shields Avenue at DeWolf Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound, southbound, eastbound, and westbound through lane
- Armstrong Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound and southbound through lane
- Armstrong Avenue at Olive Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound and southbound through lane

Intersection Level of Service Analysis

The Mitigated 2035 Project lane configurations and intersection control are shown on Figure 19. Using the lane configurations shown on Figure 19 and the volumes shown on Figure 17, the study intersections were analyzed for Mitigated 2035 Project levels of service. Figure 20 and Table 21 show the Mitigated 2035 Project levels of service for the study intersections. The signalized intersection levels of service shown on Figure 20 and in Table 21 are representative of the whole intersection. Individual intersection movements or approaches may operate above or below the signalized level of service or delay shown on Figure 20 and in Table 21. The Mitigated 2035 Project intersection levels of service calculations are included in Appendix N.

TABLE 21:
MITIGATED 2035 PROJECT CONDITIONS ANALYSIS
INTERSECTION WEEKDAY LEVEL OF SERVICE

	AM Peak Hour		PM Peak Hour	
Intersection	**LOS**	**Delay[1] (secs)**	**LOS**	**Delay[1] (secs)**
Temperance Avenue at Dakota Avenue	D	39.6	D	54.9
Temperance Avenue at Shields Avenue	**F**	**166.8**	**F**	**85.8**
Temperance Avenue at Clinton Avenue	**E**	**57.4**	C	34.1
Temperance Avenue at McKinley Avenue	**F**	**102.6**	**F**	**103.4**
Temperance Avenue at Olive Avenue	D	38.5	C	30.3
Temperance Avenue at Belmont Avenue	D	43.8	D	53.0
Temperance Avenue at Tulare Avenue	B	18.0	**C**	22.3
Shields Avenue at Locan Avenue	D	46.0	D	50.9
Shields Avenue at DeWolf Avenue	D	42.7	D	43.9
Armstrong Avenue at Clinton Avenue	C	24.6	C	23.2
Armstrong Avenue at Olive Avenue	D	40.6	D	36.2

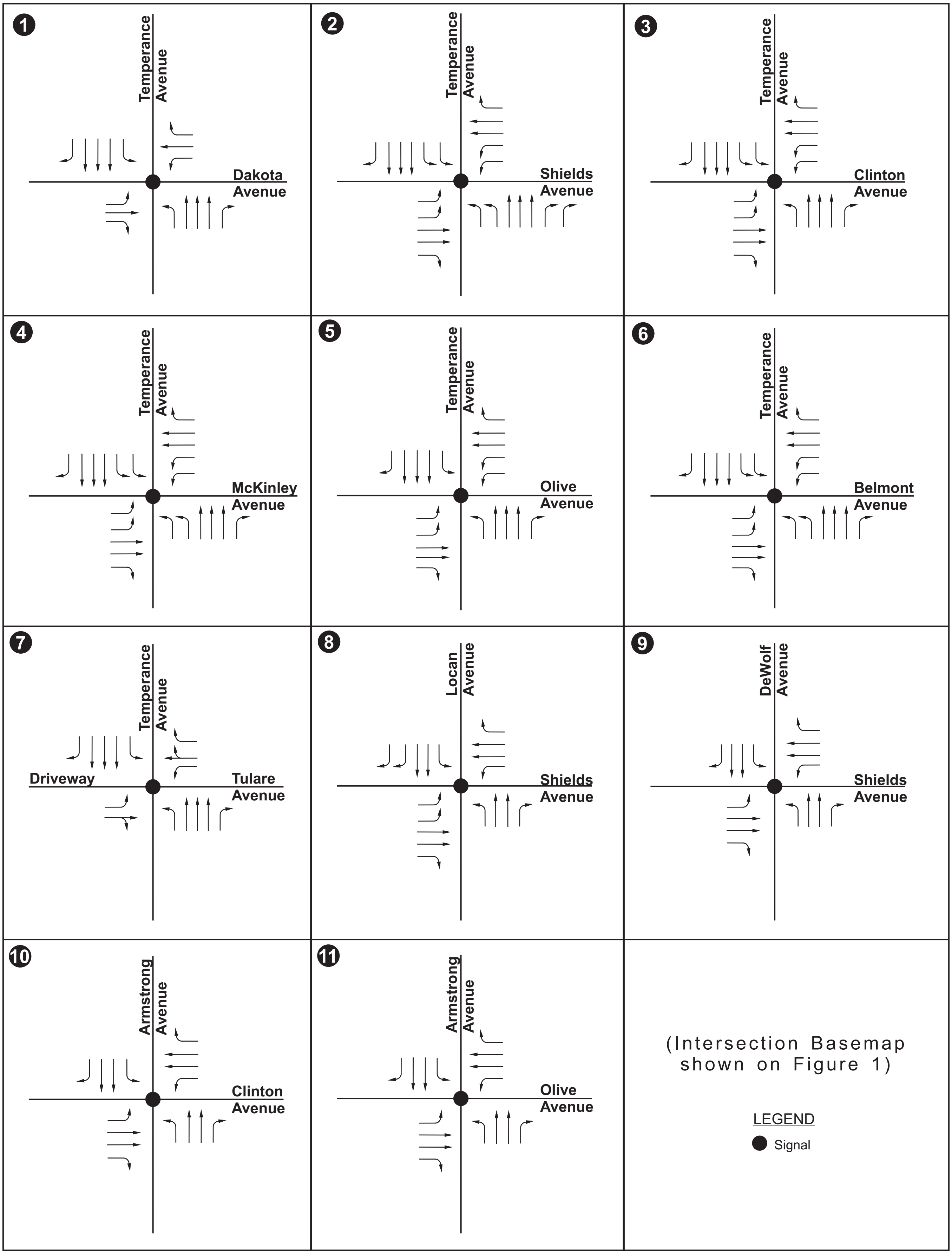
[1] Delay per vehicle *secs = seconds*

Study intersections projected to operate below the adopted level of service standard are shown bolded in Table 21. As shown in Figure 20 and Table 21, the following study intersections, by time period, are projected to operate below the appropriate adopted level of service standard:

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours

The remaining study intersections are projected to operate at or above the appropriate adopted level of service standards in the Mitigated 2035 Project conditions scenario.

As stated in Appendix A, the Temperance Avenue at Shields Avenue intersection is an end point of a road segment designated as being evaluated using a peak hour LOS "F" and a second segment designated as being evaluated using a peak hour LOS "E". As such, this intersection may operate at a LOS "F" without further mitigations and be considered as operating at the adopted level of service standard. Further mitigation of this intersection would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.



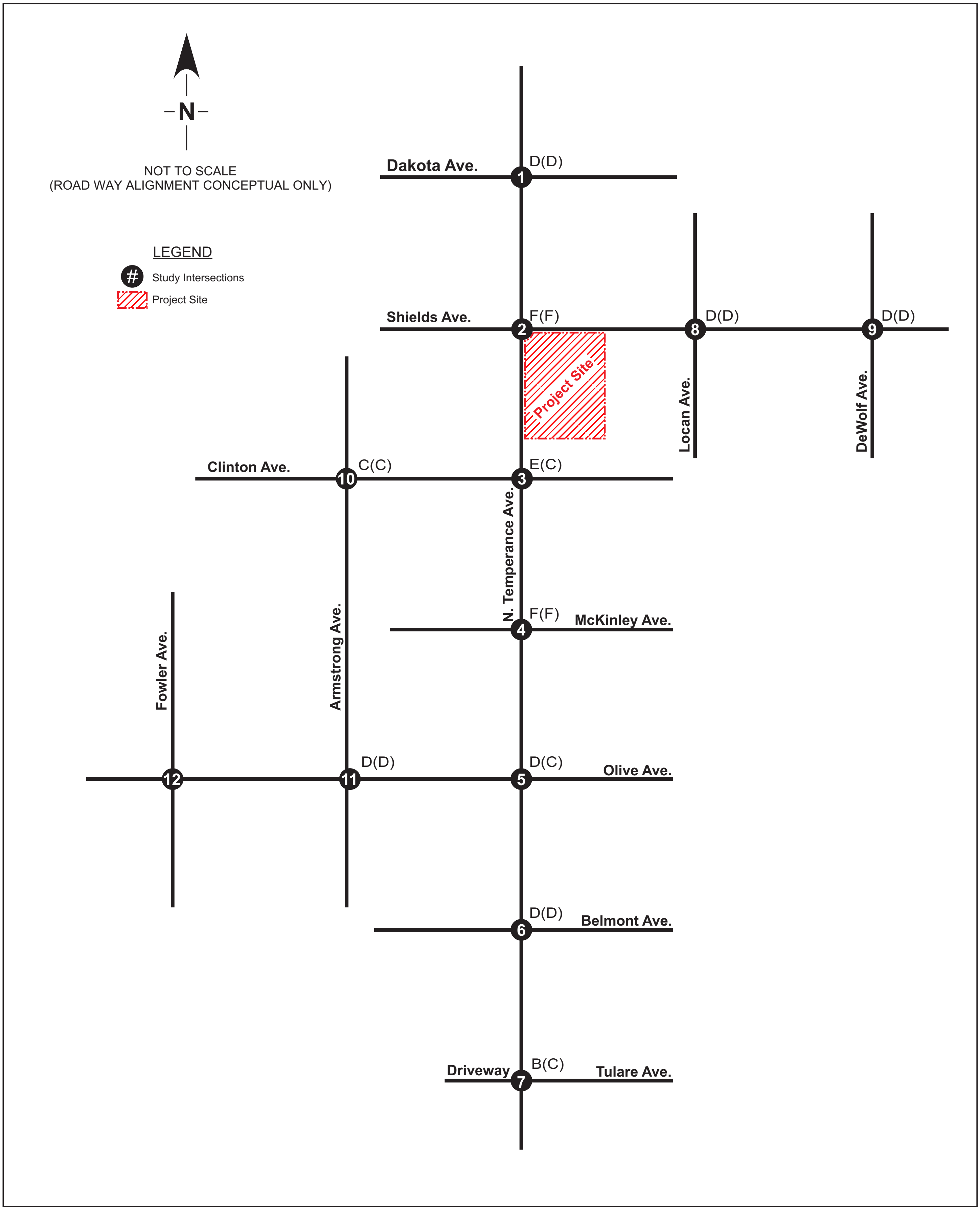
ND Engineering, PC

MITIGATED LANE CONFIGURATIONS AND INTERSECTION CONTROL

2035 Project

City of Fresno, California

Figure 19



ND Engineering, PC

MITIGATED INTERSECTION LEVELS OF SERVICE

2035 Project

City of Fresno, California

Figure 20

Temperance Avenue at McKinley Avenue is located in the road segment designated as being evaluated using a peak hour LOS "E" standard. It should be noted that a roadway segment projected to operate at designated level of service threshold can have intersections that may operate below the segment level of service depending on the amount of turning movement conflicts. As such, it is possible that the Temperance Avenue at McKinley Avenue intersection could operate at a LOS "F" while the overall segment could operate at a LOS "E". Again, to potentially mitigate this intersection it would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

In addition, the overall system of study intersections is optimized to generate the lowest overall delay to all vehicles in the system. As such some movements and intersections are "sacrificed" to operate at a lower level of service (increased vehicle delay) so that the majority of the vehicles and intersections in the system can operate at the highest level of service (decreased vehicle delay) possible.

Queue Lengths

Table 22 shows the estimated Mitigated 2035 Project intersection queue lengths developed from the level of service analyses.

TABLE 22:
MITIGATED 2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
Temperance Avenue at Dakota Avenue		
• **NB Left**	**250**	#133/**#570**
• NB Through	2,600[1]	83/412
• NB Right	250	m0/m19
• SB Left	255	73/132
• SB Through	2,600[1]	396/212
• SB Right	250	16/66
• **EB Left**	**200**	**#206**/76
• EB Through	1,300[1]	46/38
• EB Right	200	64/72
• WB Left	200	#197/#150
• WB Through	600[1]	24/17
• WB Right	200	0/0
Temperance Avenue at Shields Avenue		
• **NB Left**	**250**	**#333**/m#110
• NB Through	2,600[1]	232/#486
• NB Right	250	134/47
• SB Left	250	m44/73
• SB Through	2,600[1]	296/283
• SB Right	250	133/1
• EB Left	250	88/118
• EB Through	1,100[1]	160/269

TABLE 22:
MITIGATED 2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• EB Right	250	77/158
• **WB Left**	**250**	**#794/#498**
• WB Through	1,200[1]	203/m144
• WB Right	250	m1/m2
Temperance Avenue at Clinton Avenue		
• NB Left	251	**81**/m99
• NB Through	900[1]	180/m#715
• NB Right	250	0/m22
• **SB Left**	**250**	m#263/m75
• SB Through	2,600[1]	m549/m292
• SB Right	250	m24/m13
• EB Left	200	33/96
• EB Through	2,600[1]	74/79
• EB Right	200	0/46
• **WB Left**	**200**	**#326/#244**
• WB Through	700[1]	91/50
• WB Right	200	61/54
Temperance Avenue at McKinley Avenue		
• **NB Left**	**250**	**#364**/m77
• NB Through	1,300[1]	290/m#912
• NB Right	250	m80/m143
• SB Left	250	m77/m#184
• SB Through	1,300[1]	m#736/m552
• **SB Right**	**250**	**m251**/m71
• **EB Left**	**200**	40/**#303**
• EB Through	2,600[1]	3/33
• **EB Right**	**200**	0/**262**
• **WB Left**	**200**	**#395**/89
• WB Through	5,200[1]	32/10
• WB Right	200	65/12
Temperance Avenue at Olive Avenue		
• NB Left	250	m#88/m33
• NB Through	1,300[1]	m554/m#947
• NB Right	250	m4/m15
• SB Left	250	m10/m49
• SB Through	1,300[1]	m#645/#665
• SB Right	250	m213/m65
• **EB Left**	**200**	**#226/#329**
• EB Through	2,600[1]	55/65
• EB Right	200	0/0

TABLE 22:
MITIGATED 2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Left	200	#175/93
• WB Through	700[1]	102/51
• WB Right	200	0/0
Temperance Avenue at Belmont Avenue		
• NB Left	250	73/19
• NB Through	1,200[1]	427/#811
• NB Right	250	0/0
• SB Left	250	m74/m79
• SB Through	1,300[1]	#656/#615
• SB Right	250	m114/97
• **EB Left**	**250**	#182/**#274**
• EB Through	2,600[1]	57/110
• EB Right	250	0/19
• WB Left	250	89/91
• WB Through	700[1]	160/123
• WB Right	250	69/52
Temperance Avenue at Tulare Avenue		
• NB Left	250	7/7
• NB Through	700[1]	421/#697
• NB Right	250	0/0
• **SB Left**	**250**	84/**#506**
• SB Through	1,200[1]	#734/494
• SB Right	250	0/0
• EB Left	250[2]	24/36
• EB Through-Right	250[2]	23/0
• **WB Left**	**200**	**#266**/49
• WB Through	2,600[1]	36/0
• WB Right	200	0/0
Shields Avenue at Locan Avenue		
• **NB Left**	**200**	163/**#206**
• NB Through	2,600[1]	83/152
• NB Right	200	55/42
• SB Left	200	73/58
• SB Through	300[1]	153/106
• SB Right	300[1]	97/36
• **EB Left**	**250**	135/**#363**
• EB Through	1,300[1]	222/249
• EB Right	250	31/54
• WB Left	250	m97/m105
• WB Through	2,600[1]	154/64

TABLE 22:
MITIGATED 2035 PROJECT TRAFFIC CONDITIONS ANALYSIS
INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH

Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Right	250	m1/m0
Shields Avenue at DeWolf Avenue		
• NB Left	200	81/53
• NB Through	5,200[1]	162/181
• NB Right	200	0/0
• SB Left	200	85/80
• SB Through	1,800[1]	238/136
• SB Right	200	75/39
• EB Left	250	165/94
• EB Through	2,600[1]	87/169
• EB Right	250	m0/m2
• WB Left	250	30/33
• WB Through	2,600[1]	403/301
• WB Right	250	0/0
Armstrong Avenue at Clinton Avenue		
• NB Left	200	83/59
• NB Through	4,000[1]	197/383
• NB Right	200	0/0
• SB Left	200	#103/63
• SB Through	2,600[1]	#443/224
• SB Right	200	6/0
• EB Left	200	76/#145
• EB Through	2,600[1]	53/131
• EB Right	200	0/0
• **WB Left**	**200**	**#235**/99
• WB Through	2,600[1]	106/73
• WB Right	200	0/0
Armstrong Avenue at Olive Avenue		
• NB Left	200	#161/31
• NB Through	1,300[1]	200/#485
• NB Right	200	53/63
• SB Left	200	71/67
• SB Through	1,300[1]	246/288
• SB Right	424	#400/67
• **EB Left**	**200**	#222/**#560**
• EB Through	2,600[1]	79/183
• EB Right	200	0/0
• **WB Left**	**200**	**#442**/98
• WB Through	2,600[1]	155/167

TABLE 22: MITIGATED 2035 PROJECT TRAFFIC CONDITIONS ANALYSIS INTERSECTION WEEKDAY 95TH PERCENTILE QUEUE LENGTH		
Intersection Approach	**Planned Queue Storage Length (ft)**	**95th Percentile Queue Length (ft) (AM/PM)**
• WB Right	200	16/0

ft = feet *NB = northbound* *SB = southbound*
WB = westbound *EB = eastbound* *[1] = Approximate distance to next intersection*
 # = 95th percentile volume exceeds capacity, queue may be longer, queue shown is maximum after two (2) cycles
m = volume for 95th percentile queue is metered by upstream signal
[2]= Driveway or local street of unknown length, assumed 250 ft

Intersection queue lengths projected to exceed the planned storage lengths are shown bolded in Table 22. As shown in Table 22, the following intersection queue lengths, by time period, are projected to exceed the planned storage lengths:

- Temperance Avenue at Dakota Avenue
  - NB left – PM peak hour
  - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
  - NB left – AM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
  - NB left – AM peak hour
  - SB right – AM peak hour
  - EB left – PM peak hour
  - EB right – PM peak hour
  - WB left – AM peak hour
- Temperance Avenue at Olive Avenue
  - EB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
  - EB left – PM peak hour
- Temperance Avenue at Tulare Avenue
  - SB left – PM peak hour
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - NB left – PM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Clinton Avenue
  - WB left – AM peak
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour

To mitigate these queuing exceedances, the following locations would need to be lengthened or modified as shown:

- Temperance Avenue at Dakota Avenue
  - NB left – 575 feet or convert to dual (2) left turns
  - EB left – 225 feet
- Temperance Avenue at Shields Avenue
  - NB left – 350 feet
  - WB left – 800 feet
- Temperance Avenue at Clinton Avenue
  - SB left – 275 feet
  - WB left – 350 feet
- Temperance Avenue at McKinley Avenue
  - NB left – 375 feet
  - SB right – 275 feet
  - EB left – 325 feet
  - EB right – 275 feet
  - WB left – 400 feet
- Temperance Avenue at Olive Avenue
  - EB left – 350 feet
- Temperance Avenue at Belmont Avenue
  - EB left – 300 feet
- Temperance Avenue at Tulare Avenue
  - SB left – 525 feet or convert to dual (2) lefts
  - WB left – 275 feet
- Shields Avenue at Locan Avenue
  - NB left – 225 feet
  - EB left – 375 feet
- Armstrong Avenue at Clinton Avenue
  - WB left – 250 feet
- Armstrong Avenue at Olive Avenue
  - EB left – 575 feet or convert to dual (2) lefts
  - WB left – 450 feet or convert to dual (2) lefts

With the lengthening of these turn pockets and/or conversion to dual lefts, all intersections are not projected to exceed the planned storage lengths in the 95th percentile condition in the Mitigated 2035 Project scenario.

All turn pocket length extensions shown in this scenario are a representative snap shot based on the level of service analysis results that are generated by the optimization of the intersection signals. These lengths are subject to change based on reoptimization of signals and ultimately on changes in volumes. Therefore, final decisions on extension of the various turn pockets beyond the City of Fresno standard should be made at the time of intersection modifications based on current volumes and traffic patterns.

CONCLUSIONS AND RECOMMENDATIONS

As shown in the previous sections, the following locations, by scenario, are projected to operate below the appropriate adopted level of service standard:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue (SB Left-Through Movement) – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at Clinton Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Temperance Avenue at Tulare Avenue – AM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM peak hour

2035 Project (With the Project)

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – PM peak hour
- Temperance Avenue at Belmont Avenue – PM peak hour
- Temperance Avenue at Tulare Avenue – PM peak hour
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours

- Armstrong Avenue at Olive Avenue – PM peak hours

Mitigated 2035 Project (With the Project)

- Temperance Avenue at Shields Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours

Rural peak hour volume signal warrants were also prepared for the unsignalized study intersections. Based on the rural peak hour volume signal warrant, the warrant is met at the following locations by scenario and time period:

Existing (2018) (Without the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM peak hour
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM peak hour
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM peak hour
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM peak hour
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM peak hour
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue – AM/PM peak hours
- Temperance Avenue at McKinley Avenue – AM/PM peak hours
- Temperance Avenue at Olive Avenue – AM/PM peak hours
- Temperance Avenue at Belmont Avenue – AM/PM peak hours
- Shields Avenue at Locan Avenue – AM/PM peak hours
- Shields Avenue at DeWolf Avenue – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue – AM/PM peak hours
- Armstrong Avenue at Olive Avenue – AM/PM peak hours

As shown in the previous sections, the following locations, by scenario, are projected to have queue storage length exceedances:

Existing (2018) (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left-turn – AM peak hour
  - EB left-turn – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right-turn – AM peak hour

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left-turn – AM peak hour
  - EB left-turn – PM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right-turn – AM peak hour

Mitigated Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
  - EB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour

Existing (2018) Plus Approved/Pending/Proposed Projects (Without the Project)

- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – PM peak hour
- Temperance Avenue at Olive Avenue
  - SB right – AM peak hour
- Shields Avenue at Locan Avenue
  - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
  - NB right – AM peak hour

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Shields Avenue
  - WB left – AM peak hour
- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue

    - SB right – AM peak hour
- Shields Avenue at Locan Avenue
    - SB left-through – AM peak hour
- Armstrong Avenue at Olive Avenue
    - NB right – AM peak hour

Mitigated Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Clinton Avenue
    - SB left – AM peak hour
    - EB left – AM/PM peak hours
- Temperance Avenue at Olive Avenue
    - EB left – PM peak hour
    - WB left – AM peak hour
- Shields Avenue at Locan Avenue
    - EB left – PM peak hour
- Shields Avenue at DeWolf Avenue
    - EB left – PM peak hour
- Armstrong Avenue at Olive Avenue
    - EB left – PM peak hour

2035 Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - NB left – PM peak hour
    - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
    - NB left – AM peak hour
    - NB right – AM/PM peak hours
    - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
    - NB left – AM peak hour
    - SB left – AM peak hour
    - EB left – PM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
    - NB left – AM peak hour
    - SB left – PM peak hour
    - EB left – PM peak hour
    - EB right – PM peak hour
    - WB left – AM/PM peak hour
- Temperance Avenue at Olive Avenue
    - EB left – AM/PM peak hour
    - WB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
    - EB left – AM/PM peak hours
- Temperance Avenue at Tulare Avenue
    - SB left – PM peak hour
    - WB left – AM peak hour
- Shields Avenue at Locan Avenue

  - NB left – AM/PM peak hours
  - SB through – AM peak hour
  - SB right – AM peak hour
  - EB left – AM/PM peak hours
- Shields Avenue at DeWolf Avenue
  - EB left – AM/PM peak hours
- Armstrong Avenue at Clinton Avenue
  - WB left – AM peak hour
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour

Mitigated 2035 Project (With the Project)

- Temperance Avenue at Dakota Avenue
  - NB left – PM peak hour
  - EB left – AM peak hour
- Temperance Avenue at Shields Avenue
  - NB left – AM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at Clinton Avenue
  - SB left – AM peak hour
  - WB left – AM/PM peak hours
- Temperance Avenue at McKinley Avenue
  - NB left – AM peak hour
  - SB right – AM peak hour
  - EB left – PM peak hour
  - EB right – PM peak hour
  - WB left – AM peak hour
- Temperance Avenue at Olive Avenue
  - EB left – AM/PM peak hours
- Temperance Avenue at Belmont Avenue
  - EB left – PM peak hour
- Temperance Avenue at Tulare Avenue
  - SB left – PM peak hour
  - WB left – AM peak hour
- Shields Avenue at Locan Avenue
  - NB left – PM peak hour
  - EB left – PM peak hour
- Armstrong Avenue at Clinton Avenue
  - WB left – AM peak
- Armstrong Avenue at Olive Avenue
  - EB left – PM peak hour
  - WB left – AM peak hour

Recommendations

To mitigate the intersections that are projected to operate below the appropriate adopted LOS standard, meet the rural peak hour volume signal warrant, or exceed the available/planned storage lengths with the 95th percentile queue lengths, the following improvements by scenario are recommended:

Existing (2018) Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the eastbound left-through-right turn lane to a separate left-turn and shared through-right lane
    - Construct the eastbound left-turn lane to a length of 200 feet
- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn to 250 feet
    - Lengthen the eastbound left-turn to 200 feet
- Temperance Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left and shared through-right lane
    - Construct the northbound left-turn lane to a length of 250 feet
    - Construct the eastbound left-turn lane to a length of 200 feet
    - Construct the westbound left-turn lane to a length of 225 feet
    - Change the southbound shared left-through lane to a separate left-turn and a separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to 200 feet
- Temperance Avenue at Belmont Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through-right lanes to a separate left-turn lane and shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 250 feet
    - Change the eastbound and westbound shared left-through lanes to a separate left-turn and a separate through lane
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
    - Lengthen the eastbound and westbound right-turn lanes to 250 feet
- Shields Avenue at Locan Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound left-turn lane to a length of 200 feet
    - Construct the westbound left-turn lane to a length of 250 feet
    - Change the southbound shared left-through lane to a separate left-turn lane and a separate through lane

    - Construct the southbound left-turn lane to a length of 200 feet
    - Lengthen the eastbound left-turn lane to 275 feet
- Shields Avenue at DeWolf Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Construct the eastbound left-turn lane to a length of 325 feet
    - Construct the westbound left-turn lane to a length of 250 feet
- Armstrong Avenue at Clinton Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
    - Construct the northbound, southbound, eastbound, and westbound left-turn lanes to a length of 200 feet
- Armstrong Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through lane to a separate left-turn lane and a separate through lane
    - Construct the northbound and southbound left-turn lanes to a length of 200 feet
    - Lengthen the northbound right-turn lane to a length of 200 feet
    - Lengthen the eastbound left-turn lane to 225 feet
    - Lengthen the westbound left-turn lane to 200 feet

The Temperance Avenue at McKinley Avenue intersection is projected to operate at or above the adopted level of service standard in both the Existing (2018) and Existing (2018) Plus Project scenarios. The Temperance Avenue at McKinley Avenue intersection is also showing that it operates above the basic average accident rate in both fatal + injury and total accidents. Some of these types of accidents, such as broadside, can be reduced by installation of a signal but other types of accidents, such as rear end, can be increased by installation of a signal. Therefore, even though it is projected to meet the peak hour signal warrant in both the Existing (2018) and Existing (2018) Plus Projects scenarios, no mitigations are recommended in the Mitigated Existing (2018) Plus Project scenario. The City of Fresno should monitor the Temperance Avenue at McKinley Avenue intersection and determine when best to signalize this intersection based on level of service analyses, accident rate analyses, as well as additional signal warrant analyses utilizing the following warrants:

- Eight-hour vehicular volume
- Four-hour vehicular volume
- Peak hour
- Crash experience
- Coordinated signal system
- Roadway Network

Existing (2018) Plus Approved/Pending/Proposed Plus Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - Signalize (actuated) with protected left-turns

    - Optimize cycle length and offsets
    - Change the southbound through-right lane to two (2) throughs and a separate right-turn lane
    - Construct the southbound right-turn lane to a length of 250 feet
    - Change the eastbound left-through-right turn lane to a separate left-turn and shared through-right lane
    - Construct the eastbound left-turn lane to a length of 200 feet
- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
    - Construct a second eastbound through lane
    - Lengthen the left- and right-turn lanes on all approaches to 250 feet
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn to 375 feet
    - Lengthen the eastbound left-turn to 250 feet
- Temperance Avenue at McKinley Avenue
    - Signalize (Actuated)
    - Optimize cycle length and offsets
    - Change the southbound left-through lane to a separate left-turn and separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
- Temperance Avenue at Olive Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle length and offsets
    - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left and shared through-right lane
    - Construct the northbound left-turn lane to a length of 250 feet
    - Construct the eastbound left-turn lane to a length of 225 feet
    - Construct the westbound left-turn lane to a length of 250 feet
    - Change the southbound shared left-through lane to a separate left-turn and a separate through lane
    - Construct the southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to 200 feet
- Temperance Avenue at Belmont Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets
    - Change the northbound and southbound shared left-through-right lanes to a separate left-turn lane and shared through-right lane
    - Construct the northbound and southbound left-turn lanes to a length of 250 feet
    - Change the eastbound, and westbound shared left-through lanes to a separate left-turn and a separate through lane
    - Construct the eastbound and westbound left-turn lanes to a length of 250 feet
    - Lengthen the eastbound and westbound right-turn lanes to 250 feet
- Shields Avenue at Locan Avenue
    - Signalize (actuated) with protected left-turns
    - Optimize cycle lengths and offsets

  - Change the northbound shared left-through-right lane to a separate left-turn lane and a shared through-right lane
  - Construct the northbound left-turn lane to a length of 200 feet
  - Change the southbound shared left-through lane to a separate left-turn lane and a separate through lane
  - Construct the southbound left-turn lane to a length of 200 feet
  - Construct a second eastbound through lane
  - Lengthen the eastbound left-turn lane to 325 feet
  - Change the westbound shared left-through-right lane to a separate left-turn lane, one (1) through lane, and a shared through-right lane
  - Construct the westbound left-turn lane to a length of 250 feet
- Shields Avenue at DeWolf Avenue
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
  - Construct the northbound left-turn lane to a length of 200 feet
  - Construct the eastbound left-turn lane to a length of 325 feet
  - Construct the westbound left-turn lane to a length of 250 feet
  - Change the southbound shared left-through-right lanes to a separate left-turn, one (1) through, and a separate right-turn lane
  - Construct the southbound left- and right-turn lanes to a length of 200 feet
- Armstrong Avenue at Clinton Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound, southbound, eastbound, and westbound shared left-through-right lanes to a separate left-turn lane and a shared through-right lane
  - Construct the northbound, southbound, eastbound, and westbound left-turn lanes to a length of 200 feet
- Armstrong Avenue at Olive Avenue – same as Mitigated Existing (2018) Plus Project – no additional mitigations needed
  - Signalize (actuated) with protected left-turns
  - Optimize cycle lengths and offsets
  - Change the northbound and southbound shared left-through lane to a separate left-turn lane and a separate through lane
  - Construct the northbound and southbound left-turn lanes to a length of 200 feet
  - Lengthen the northbound right-turn lane to 200 feet
  - Lengthen the eastbound left-turn lane to 225 feet
  - Lengthen the westbound left-turn lane to 200 feet

The Temperance Avenue at Tulare Avenue intersection is projected to operate below the adopted level of service standard in both the Existing (2018) Plus Approved/Pending/Proposed Projects and the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project scenarios but does not meet the peak hour volume signal warrant. It will also not likely meet the other volume warrants either. Due to the low volumes on Tulare Avenue, it will also not meet the AWSC warrant. Since there is only a two (2) second increase in delay between the Existing (2018) Plus Approved/Pending/Proposed Projects and the Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project, the Project's impact to this intersection is not considered significant.

2035 Project (With the Project)

- Temperance Avenue at Dakota Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 575 feet or convert to dual (2) left turns
    - Lengthen the eastbound left-turn lane to 225 feet
- Temperance Avenue at Shields Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 350 feet
    - Construct a second northbound right-turn lane to a length of 250 feet
    - Construct a second southbound left-turn lane to a length of 250 feet
    - Construct a second eastbound and westbound through lane
    - Lengthen the westbound left-turn lane to 800 feet
- Temperance Avenue at Clinton Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn lane to 275 feet
    - Construct a second southbound left-turn lane to a length of 275 feet
    - Construct a second eastbound left-turn lane to a length of 200 feet
    - Lengthen the westbound left-turn lane to 350 feet
    - Construct a second westbound left-turn lane to a length of 350 feet
- Temperance Avenue at McKinley Avenue
    - Optimize cycle length and offsets
    - Lengthen the northbound left-turn lane to 375 feet
    - Construct a second northbound left-turn lane to a length of 375 feet
    - Construct a second southbound left-turn lane to a length of 250 feet
    - Lengthen the southbound right-turn lane to 275 feet
    - Lengthen the eastbound left-turn lane to 325 feet
    - Construct a second eastbound left-turn lane to a length of 325 feet
    - Lengthen the eastbound right-turn lane to 275 feet
    - Lengthen the westbound left-turn lane to 400 feet
    - Construct a second westbound left-turn lane to a length of 400 feet
    - Construct a second eastbound and westbound through lane
- Temperance Avenue at Olive Avenue
    - Optimize cycle length and offsets
    - Lengthen the eastbound left-turn lane to 350 feet
    - Construct a second eastbound left-turn lane to a length of 350 feet
    - Construct a second westbound left-turn lane to a length of 200 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Belmont Avenue
    - Optimize cycle length and offsets
    - Construct a second northbound, southbound, and westbound left-turn lane to a length of 250 feet
    - Lengthen the eastbound left-turn lane to 300 feet
    - Construct a second eastbound left-turn lane to a length of 300 feet
    - Construct a second eastbound through lane
- Temperance Avenue at Tulare Avenue
    - Optimize cycle length and offsets
    - Lengthen the southbound left-turn lane to 525 feet or convert to dual (2) left-turns

  - Lengthen the westbound left-turn lane to 275 feet
- Shields Avenue at Locan Avenue
  - Optimize cycle length and offsets
  - Lengthen the northbound left-turn lane to 225 feet
  - Construct a second northbound, southbound, eastbound, and westbound through lane
  - Construct a second southbound right-turn lane to a length of 273 feet
  - Lengthen the eastbound left-turn lane to 375 feet
  - Construct a second eastbound left-turn lane to a length of 375 feet
- Shields Avenue at DeWolf Avenue
  - Optimize cycle length and offsets
  - Construct a second northbound, southbound, eastbound, and westbound through lane
- Armstrong Avenue at Clinton Avenue
  - Optimize cycle length and offsets
  - Construct a second northbound and southbound through lane
  - Lengthen the westbound left-turn lane to 250 feet
- Armstrong Avenue at Olive Avenue
  - Optimize cycle length and offsets
  - Construct a second northbound and southbound through lane
  - Lengthen the eastbound left-turn lane to 575 feet or convert to dual (2) left-turn lanes
  - Lengthen the westbound left-turn lane to 450 feet or convert to dual (2) left-turn lanes

As stated in Appendix A, the Temperance Avenue at Shields Avenue intersection is an end point of a road segment designated as being evaluated using a peak hour LOS “F” and a second segment designated as being evaluated using a peak hour LOS “E”. As such, this intersection may operate at a LOS “F” without further mitigations and be considered as operating at the adopted level of service standard. Further mitigation of this intersection would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Temperance Avenue at McKinley Avenue is located in the road segment designated as being evaluated using a peak hour LOS “E” standard. It should be noted that a roadway segment projected to operate at designated level of service threshold can have intersections that may operate below the segment level of service depending on the amount of turning movement conflicts. As such, it is possible that the Temperance Avenue at McKinley Avenue intersection could operate at a LOS “F” while the overall segment could operate at a LOS “E”. Again, to potentially mitigate the intersection it would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Conclusions

Based on the results of this TIS, the majority of the impacts are caused by the planned growth in the area. Even with the ultimate build out lane configurations, two intersections are projected to operate with a level of service “F” in the Mitigated 2035 Project scenario. As discussed in Appendix A, the Temperance Avenue at Shields Avenue intersection is an end point of a road segment designated as being evaluated using a peak hour LOS “F” and a second segment designated as being evaluated using a peak hour LOS “E”. As such, this intersection may operate at a LOS “F” without further mitigations and be considered as operating at the adopted level of service standard. Further mitigation of this intersection would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

Temperance Avenue at McKinley Avenue is located in the road segment designated as being evaluated using a peak hour LOS “E” standard. It should be noted that a roadway segment projected to operate at designated level of service threshold can have intersections that may operate below the segment level of service depending on the amount of turning movement conflicts. As such, it is possible that the Temperance Avenue at McKinley Avenue intersection could operate at a LOS “F” while the overall segment could operate at a LOS “E”. Again, to potentially mitigate the intersection it would potentially require widening Temperance Avenue from a six (6) lane super arterial to an eight (8) lane super arterial.

All turn pocket length extensions shown in this document are a representative snap shot based on the level of service analysis results that are generated by the optimization of the intersection signals. These lengths are subject to change based on reoptimization of signals and ultimately on changes in volumes. Therefore, final decisions on extension of the various turn pockets beyond the City of Fresno standard should be made at the time of intersection modifications based on current volumes and traffic patterns.

In addition, the overall system of study intersections is optimized to generate the lowest overall delay to all vehicles in the system. As such some movements and intersections are “sacrificed” to operate at a lower level of service (increased vehicle delay) so that the majority of the vehicles and intersections in the system can operate at the highest level of service (decreased vehicle delay) possible.

Mitigation Impact Fees

Assuming the site develops consistent with this TIS, the Project would pay the following Traffic Signal Mitigation Impact Fee (TSMI), New Growth Area Street Fee (FMSI), and Regional Transportation Mitigation Fee (RTMF):

TSMI = 349 dus X $475 (fee rate per latest City of Fresno fee schedule) = $165,775
FMSI = 55.1 acres X $28,585 (fee rate per latest City of Fresno fee schedule) = $1,575,033.50
RTMF = 349 dus X $1,637 (fee rate per latest Fresno COG fee schedule) = $571,313

The TSMI fee would at a minimum include the following signals:

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at Shields Avenue – signal appears to be complete
- Temperance Avenue at Clinton Avenue – signal appears to be complete
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue – This signal was removed from the TSMI fee program because of its location in the Southeast Growth Area (SEGA) which is currently not allowed for development. However, this signal is a Fresno County requirement for the school development at the northeast corner of Shields Avenue and Locan Avenue
- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

In addition, the New Growth Area FMSI fee would at a minimum include the following improvements:

- Travel lanes
- Medians and median landscaping
- Parking lanes
- Bike lanes
- Curb and gutter

- Bus bays
- Irrigation pipes and canals
- Railroad crossings
- Soft costs (engineering, plan check, and inspection costs)

The streets that are included in the FMSI include:

- Temperance Avenue – 6-lane super arterial – Jensen Avenue to north of Dakota Avenue
- Shields Avenue – 4-lane arterial – west of Fowler Avenue to Locan Avenue
- Belmont Avenue – 4-lane arterial – west of Clovis Avenue to Temperance Avenue
- Dakota Avenue – 3-lane/5-lane collector – Fowler Avenue to Temperance Avenue
- Clinton Avenue – 3-lane collector – west of Sunnyside Avenue to Locan Avenue
- McKinley Avenue – 3-lane collector – Clovis Avenue to Locan Avenue
- Olive Avenue – 5-lane collector – west of Clovis Avenue to Temperance Avenue
- Tulare Avenue – 3-lane collector – Fancher Creek to Fowler Avenue
- Locan Avenue – 3-lane collector – Clinton Avenue to north of Shields Avenue
- Armstrong Avenue – 3-lane/5-lane collector – Jensen Avenue to north of Dakota Avenue

Again, DeWolf Avenue is located in the SEGA and therefore not allowed for development.

Finally, the Regional RTMF fee is intended to ensure that future development contributes to its fair share towards the cost of infrastructure to mitigate the cumulative, indirect regional transportation impacts of new growth in a manner consistent with the provisions of the State of California Mitigation Fee Act. The fees will help fund improvements needed to maintain the target level of service in the face of higher traffic volumes brought on by new developments.

Therefore, any improvements that the Project makes to any of these facilities should be credited towards their impact fees.

Fair Share Percentage

In addition to the analyses requested by the City of Fresno, Fresno County requested a Fair Share Percentage be calculated for the Fowler Avenue at Olive Avenue intersection. The Fair Share Percentage for the Fowler Avenue at Olive Avenue intersections was calculated by using the following formula:

$$\frac{\text{Project Trips}}{\text{20-year Cumulative + Project Volumes}}$$

The Fair Share Percentage for the Fowler Avenue at Olive Avenue intersection using the AM peak hour volumes would be 0.58% and using the PM peak hour volumes would be 0.66%.

APPENDIX A

METHODOLOGY

METHODOLOGY

This TIS was prepared to assess the traffic impacts due to the development of an approximately 57-acre site (Project), which will consist of 349 single family dwelling units. The Project is consistent with the currently adopted City of Fresno General Plan. It is located on the southeast corner of Temperance Avenue and Shields Avenue, in the County of Fresno within the City of Fresno sphere of influence. The Project site is currently in agricultural use with limited structures.

In order to prepare the traffic evaluation for the Project, a variety of data and technical assumptions had to be developed. This section of the report describes the various sources, data and technical assumptions used in this evaluation.

Sources

This report was prepared using information taken from the following sources:

- *2016 Fresno Major Street Impact Fee Program Nexus Study Update*, Economic & Planning Systems, Inc., November 2016.
- *Highway Capacity Manual, 6th Edition*, Transportation Research Board, 2016.
- *Fresno General Plan*, City of Fresno Planning & Development Department, December 18, 2014.
- *California Manual on Uniform Traffic Control Devices (CA MUTCD) for Streets and Highways*, California Department of Transportation, Division of Traffic Operations, March 9, 2018.
- *City of Fresno Active Transportation Plan*, Fehr & Peers, December 2016.
- *City of Fresno Master Fee Schedule*, MS Amendment #525 (December 2015), March 2017.
- *City-Wide Traffic Signal Mitigation Impact Fee Nexus Analysis for Proposed Fee Update*, City of Fresno, Public Works Department, Traffic & Engineering Services Division, September 2016.
- David Padilla, Associate Transportation Planner, Office of Planning & Local Assistance, Caltrans, Phone/email discussions, 2018.
- Dirk Tanoury, City of Fresno Public Works Department, Email discussions, 2018.
- *Draft Master Environmental Impact Report General Plan and Development Code Update, City of Fresno, Fresno County, California*, FirstCarbon Solutions, July 2014.
- *Fresno Area Express,* https://www.fresno.gov/transportation/fax/routes/, November, 2018.
- *Fresno County Rural Transit Agency,* https://www.ruraltransit.org/, November 2018.
- *Fresno County Travel Demand Model*, Fresno Council of Governments, 2014.
- Harmanjit Dhaliwal, PE, City of Fresno Public Works Department, Phone/email discussions, 2018.
- Harpreet Kooner, Department of Public Works and Planning – Design Division, County of Fresno, Phone/email discussions, 2018.
- Jill Gormley, TE, City Traffic Engineer/Traffic Operations & Planning Manager, City of Fresno, Phone/email discussions, 2018.
- John Rowland, PE, TE, Peters Engineering Group, Phone/email discussions, 2018.
- Jose Luis Benavides, PE, TE, Owner, JLB Traffic Engineering, Inc., Phone/email discussions, 2018.
- Jose M. Valenzuela, Planner, Development and Resource Management Department (DARM), City of Fresno, Phone/email discussions, 2018
- Kai Han, TE, Senior Regional Planner, Fresno Council of Governments, Phone/email discussions, 2018.
- Lang Yu, Fresno Council of Governments, Phone/email discussions, 2018Laural Fawcett, Planner I, Fresno COG, Phone/email discussions, 2018.
- *Recommended Procedures for Using Traffic Projections from the Fresno COG Travel Model*, Fresno COG Model Steering Committee, December 2002.
- *Regional Transportation Mitigation Fee*, Fresno Council of Governments, 2019.

- *Synchro 10.0*, Trafficware, 2017.
- Tong Xiong, Department of Public Works and Planning – Design Division, County of Fresno, Email discussions, 2018.
- *Traffic Impact Study Report Guidelines*, City of Fresno Department of Public Works, February, 2006.
- *Transportation Impact Analyses for Site Development*, An ITE Recommended Practice, ITE, 2006.
- *Trip Generation*, 10th Edition, Volume 2, ITE, 2017.
- *Trip Generation,* https://itetripgen.org, 2017.

Scenarios

The scenarios that were analyzed for this study included:

- Existing (2018) Traffic Conditions (Without the Project)
- Existing (2018) Plus Project Traffic Conditions (With the Project)
- Mitigated Existing (2018) Plus Project Traffic Conditions (With the Project)
- Existing (2018) Plus Approved/Pending/Proposed Projects Traffic Conditions (Without the Project)
- Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project Traffic Conditions (With the Project)
- Mitigated Existing (2018) Plus Approved/Pending/Proposed Projects Plus Project Traffic Conditions (With the Project)
- 2035 Project Traffic Conditions (With the Project)
- Mitigated 2035 Project Traffic Conditions (With the Project)

The Existing (2018) Plus Approved/Pending/Proposed Project Plus Project/2035 Project scenarios reflect cumulative conditions analysis as required by CEQA.

Study Locations

The study locations evaluated for this Project are as follows:

Intersections

- Temperance Avenue at Dakota Avenue
- Temperance Avenue at Shields Avenue
- Temperance Avenue at Clinton Avenue
- Temperance Avenue at McKinley Avenue
- Temperance Avenue at Olive Avenue
- Temperance Avenue at Belmont Avenue
- Temperance Avenue at Tulare Avenue
- Shields Avenue at Locan Avenue
- Shields Avenue at DeWolf Avenue
- Armstrong Avenue at Clinton Avenue
- Armstrong Avenue at Olive Avenue

Figure 1 shows the intersection analysis locations.

In addition, Fresno County requested that a pro-rata share be developed for the Olive Avenue at Fowler Avenue intersection. No analysis of Olive Avenue at Fowler Avenue was requested by either the County of Fresno or the City of Fresno.

Analysis Time Periods

According to *Transportation Impact Analyses for Site Development*, the overall purpose of a traffic impact study is to determine the project impacts that are likely to occur to the surrounding street system. In order to accomplish this purpose, you need to determine what occurs when the peak of the project generated traffic overlays the peak of the street traffic. *Transportation Impact Analyses for Site Development* states "the peak periods [of the adjacent street and highway system] are generally the weekday morning (7-9 a.m.) and evening (4-6 p.m.) peak hours, although local area characteristics occasionally result in other peaks (e.g., at major shopping or recreational centers)". The peak hours analyzed in this study were:

- 7:00 to 9:00 AM
- 4:00 to 6:00 PM

These are the standard peak hours of the street typically used for study in the City of Fresno as stated in the *Traffic Impact Study Report Guidelines*.

Traffic Counts

According to the City of Fresno *Traffic Impact Study Report Guidelines*, one of the common rules for counting vehicular traffic is:

"Vehicle counts should be conducted on Tuesdays, Wednesdays, or Thursdays during weeks not containing a holiday and conducted in favorable weather conditions."

Table A1 shows the dates and days the existing intersection counts for the existing intersections were taken for this Project. Prior to conducting these counts, it was verified that these were non-holiday weeks.

TABLE A1:
EXISTING INTERSECTION COUNTS
DATES AND DAYS COUNTED

Intersections	AM Peak Hour		PM Peak Hour	
	Day	**Date**	**Day**	**Date**
Temperance Avenue at Dakota Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Temperance Avenue at Shields Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Temperance Avenue at Clinton Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Temperance Avenue at McKinley Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Temperance Avenue at Olive Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Temperance Avenue at Belmont Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Temperance Avenue at Tulare Avenue	Wednesday	8/5/18	Wednesday	8/5/18
Shields Avenue at Locan Avenue	Tuesday	6/5/18	Tuesday	6/5/18
Shields Avenue at DeWolf Avenue[1]	Wednesday	4/3/18	Wednesday	4/3/18
Armstrong Avenue at Clinton Avenue[2]	Thursday	1/25/18	Thursday	1/25/18
Armstrong Avenue at Olive Avenue	Wednesday	11/14/18	Wednesday	11/14/18
Fowler Avenue at Olive Avenue[2]	Thursday	1/25/18	Thursday	1/25/18

[1] Count taken from Clovis Unified School District Shields-Locan Elementary School TIA, JLB Traffic Engineering, Inc., May 24, 2018
[2] Counts taken from Tentative Tract 6214 TIA, JLB Traffic Engineering, Inc., April 13, 2018

As shown in Table A1 all intersection counts were conducted on days that were appropriate to count. The intersection counts are included in Appendix A1.

Fresno County Travel Demand Model

Background

Fresno COG is the State Regional Transportation Planning Agency and the federal Metropolitan Planning Organization for Fresno County. As a transportation planning agency, Fresno COG is responsible for developing and maintaining a microcomputer-based traffic simulation model that represents Fresno County.

Modeling activities are monitored by the Model Steering Committee. This Committee includes representatives from local agencies, private consultants, and others interested in the development and application of the Model to local traffic analysis issues. The Committee provides a focused forum for presentation of traffic related issues to local agency planning and traffic engineering staffs as well as project proponents. Since being formed in 1986, the Committee has developed into a valuable resource to both monitor modeling applications and to provide ongoing direction for continued Model development.

The current Model was adopted by the Model Steering Committee in 2017 and was developed to analyze proposed land uses, circulation systems, and air quality. This Model covers the entire Fresno County area, and meets or exceeds all State and Federal modeling requirements and is constantly being updated to insure incorporation of the latest planning assumptions. The land use contained in the Model was developed using the land use elements from the City of Fresno, City of Clovis and County of Fresno adopted general plans.

If additional in-depth information on the Model is required, it is available at www.fresnocog.org or by contacting the Fresno COG office.

Project Model Use

The Model was used in this study to develop the following pieces of information:

- Existing (2018) and 2035 Project primary (new) trip distributions
- 2035 No Project/"0" Project background growth increments

The 2018 and 2035 model years were used to create the 2035 No Project/"0" Project background growth increments for the study area roadways per the Fresno COG adopted methodology[1]. Copies of the Model request and plots are included in Appendix A2.

Project Trip Generation

The Project trip generation information was developed from the information provided the applicant using the Institute of Transportation Engineers (ITE) *Trip Generation* manual and the corresponding software[2]. Table A2 lists the corresponding land use codes and page numbers as provided for in the *Trip Generation* manual that were looked at in developing the Project trip generation information for the Project.

TABLE A2:
ITE TRIP GENERATION DATA
MANUAL REFERENCE INFORMATION

Land Use	Land Use Code	Page Number
Single Family Detached Housing	210	249-276

[1] *Recommended Procedures for Using Traffic Projections from the Fresno COG Travel Model*, Fresno COG Model Steering Committee, September 2001.
[2] *Trip Generation,* https://itetripgen.org, 2017.

Table A3 lists the daily, AM peak of the street, and PM peak of the street average rates and the directional distribution used in the Project assessment. Project trips were actually calculated using the *Trip Generation* software and therefore there may be some rounding differences in the data used in the analysis and data prepared using the rates shown in Table A3. It should be noted that the trip generation information prepared from either the use of the manual or the software is raw data to be used as a basis for further evaluation by the traffic impact study preparer.

TABLE A3:
ITE TRIP GENERATION DATA
AVERAGE RATE AND DIRECTIONAL DISTRIBUTION DATA

Land Use	Period	Average Rate	Directional Distribution (%) Enter	Exit
Single Family Detached Housing	Daily	9.44	50	50
	AM Peak of Street	0.74	25	75
	PM Peak of Street	0.99	63	37

The rates shown in Table A3 are based on the number of dwelling units as the independent trip generation variable.

Table A4 shows the projected number of daily, AM and PM peak hour trips that are generated by the Project based on the average rate and distributional data shown in Table A3.

TABLE A4:
PROJECT TRIP GENERATION DATA

			AM		PM	
Uses	Size (du)	Daily (trips)	Enter (trips)	Exit (trips)	Enter (trips)	Exit (trips)
Single Family Detached Housing	349	3,295	64	194	218	128

du = dwelling units

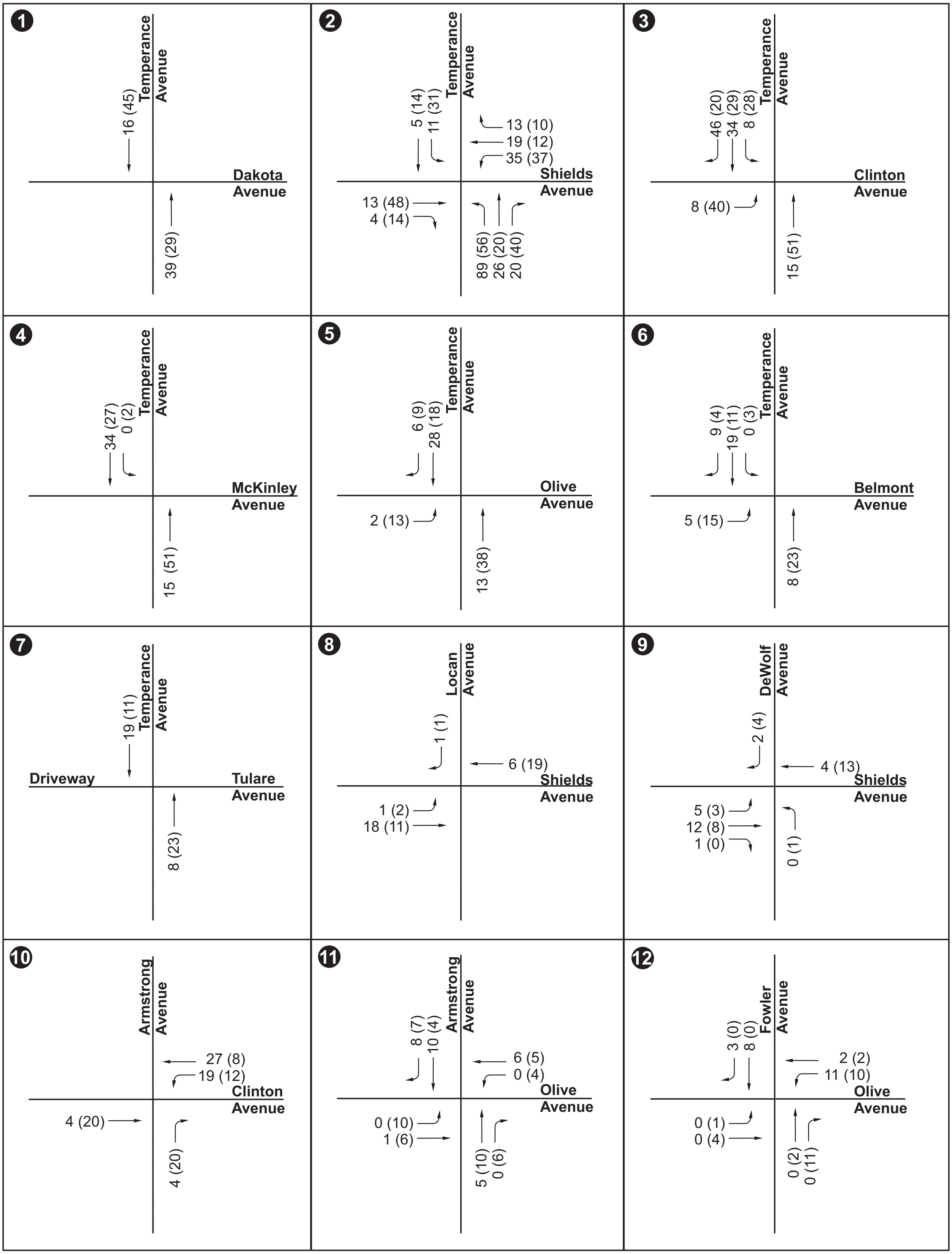
A copy of the *Trip Generation* data software printout is included in Appendix A3.

Project Trip Distribution

Trip distribution for the Project primary (new) trips was based on Model generated trip distribution data.[3] Basically the Model determines the locations of employees/donors/consumers that are likely to access the Project uses. The Model then estimates the roadways that these employees/donors/consumers would likely use to travel to/from the site, and calculates the number of Model generated vehicle trips projected to occur on each roadway. This roadway trip data is then converted to match the ITE based trip generation data developed for the Project. Per *Transportation Impact Analyses for Site Development*, use of a Model is one of the most commonly accepted methods for estimating trip distribution.[4] As stated previously, the Project primary (new) trip distribution data was prepared using the 2018 and 2035 Models. Figure A1 shows the Project primary (new) intersection assignments and Figure A2 shows the Project primary (new) driveway volumes.

---

[3] Project primary (new) trip distribution was based on a Fresno COG Model select zone analysis prepared as part of a full equilibrium run with the congested speed network for 2035.
[4] *Traffic Access and Impact Studies for Site Development*, A Recommended Practice, ITE, Transportation Planners Council Task Force on Traffic Access/Impact Studies, 1991, page 27.



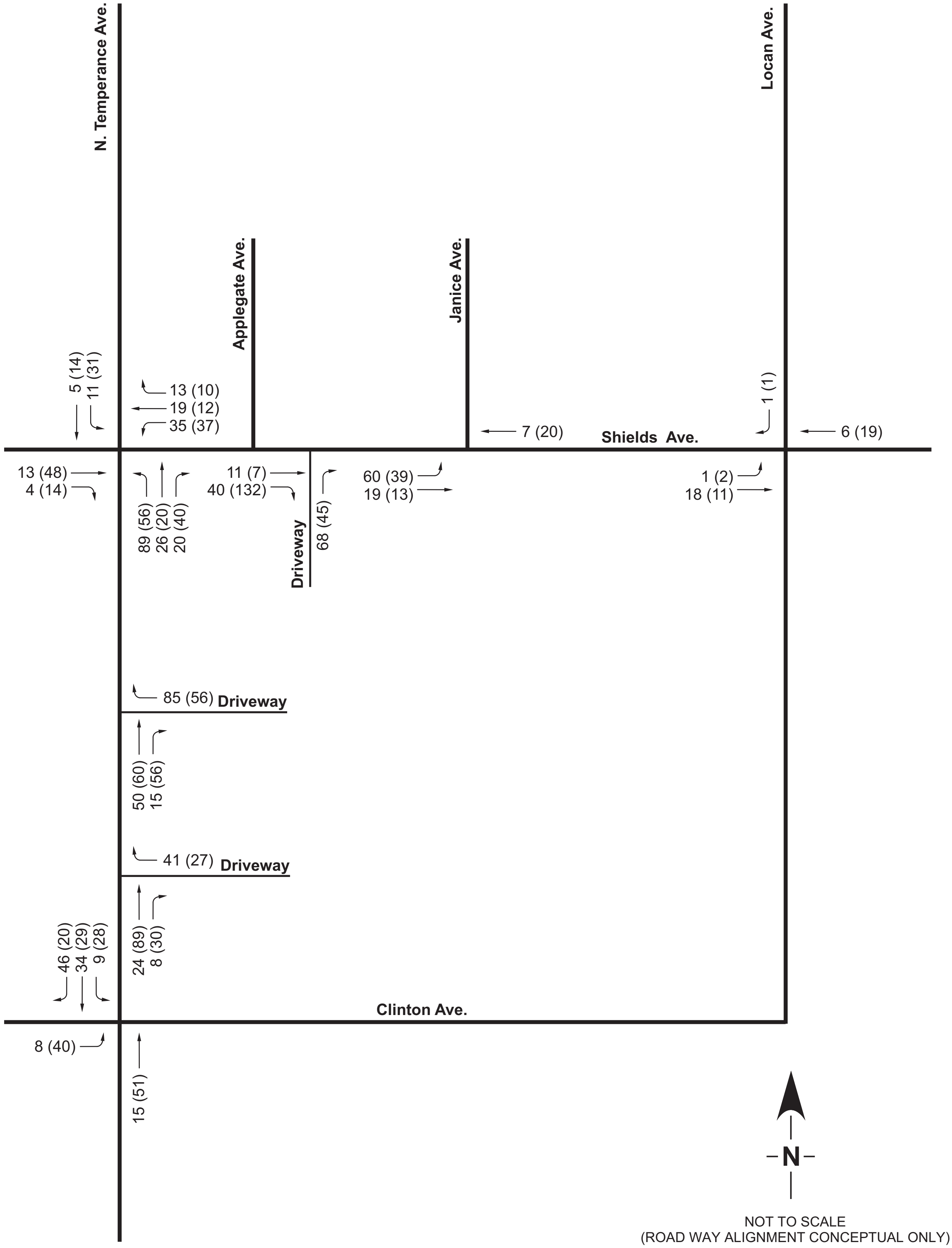
ND Engineering, PC

INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Project Trips

City of Fresno, California

Figure A1



ND Engineering, PC

INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Project Trips

City of Fresno, California

Figure A2

Future Traffic Volumes

The 2035 No Project/"0" Project forecasted volumes were calculated using growth increment data developed from the 2018 and 2035 No Project/"0" Project Model runs.

Approved/Pending/Proposed Project Trips

The City of Fresno stated that the *Draft Traffic Impact Analysis for the Clovis Unified School District Shields-Locan Elementary School,* prepared by JLB Traffic Engineering, Inc, May 24, 2018, was to be used to develop all approved/pending/proposed project trips to be used in the near term background assessment. Therefore, the approved/pending/proposed projects trips used in this study includes the following projects:

- Clovis Unified School District Shields-Locan Elementary School
- Tentative Tract (TT) 5171 (portion of)
- TT 5341 (portion of)
- TT 5424
- TT 5427
- TT 5464
- TT 5498
- TT 5531 (portion of)
- TT 5592
- TT 5605
- TT 5626 (portion of)
- TT 5638
- TT 5701A (portion of)
- TT 5717 (portion of)
- TT 5913
- TT 5953
- TT 5998 (portion of)
- TT 6023
- TT 6095 (portion of)
- TT 6101
- TT 6107 (portion of)
- TT 6112 (portion of)
- TT 6114 (portion of)
- TT 6130
- TT 6143
- TT 6164
- TT 6174
- TT 6191
- TT 6193
- TT 6208
- TT 6214
- Creekside Village Apartments
- CUSD Fowler-McKinley Elementary School
- Fancher Creek Town Center (portion of)
- Neighborhood Shopping Center (portion of)
- Sanger Education Center
- Sunnyside Market

Figure A3 shows the Approved/Pending/Proposed project trips used in this study. Appendix A4 contains the trip generation/trip distribution data taken from the Clovis Unified School District Shields-Locan Elementary School TIA.

Intersection Analysis and Volume Adjustments

Peak hour intersections volumes were adjusted, or balanced, between intersections based on a review of potential intervening opportunities to show a "smooth" progression of traffic volumes up and down the corridor.

Intersection heavy vehicle percentages were developed from the existing conditions count data at the majority of the study intersection approach locations. Heavy vehicle percentages used in the analysis were the greater of either the counted or the *HCM 6th edition* 2% default. These percentages were used in all scenarios.

Existing peak hour factors taken from the existing count data were used in the existing and near term analyses. A peak hour factor of 0.92 as provided in the *HCM 6th edition* was used in all intersection analyses for the 2035 scenarios.

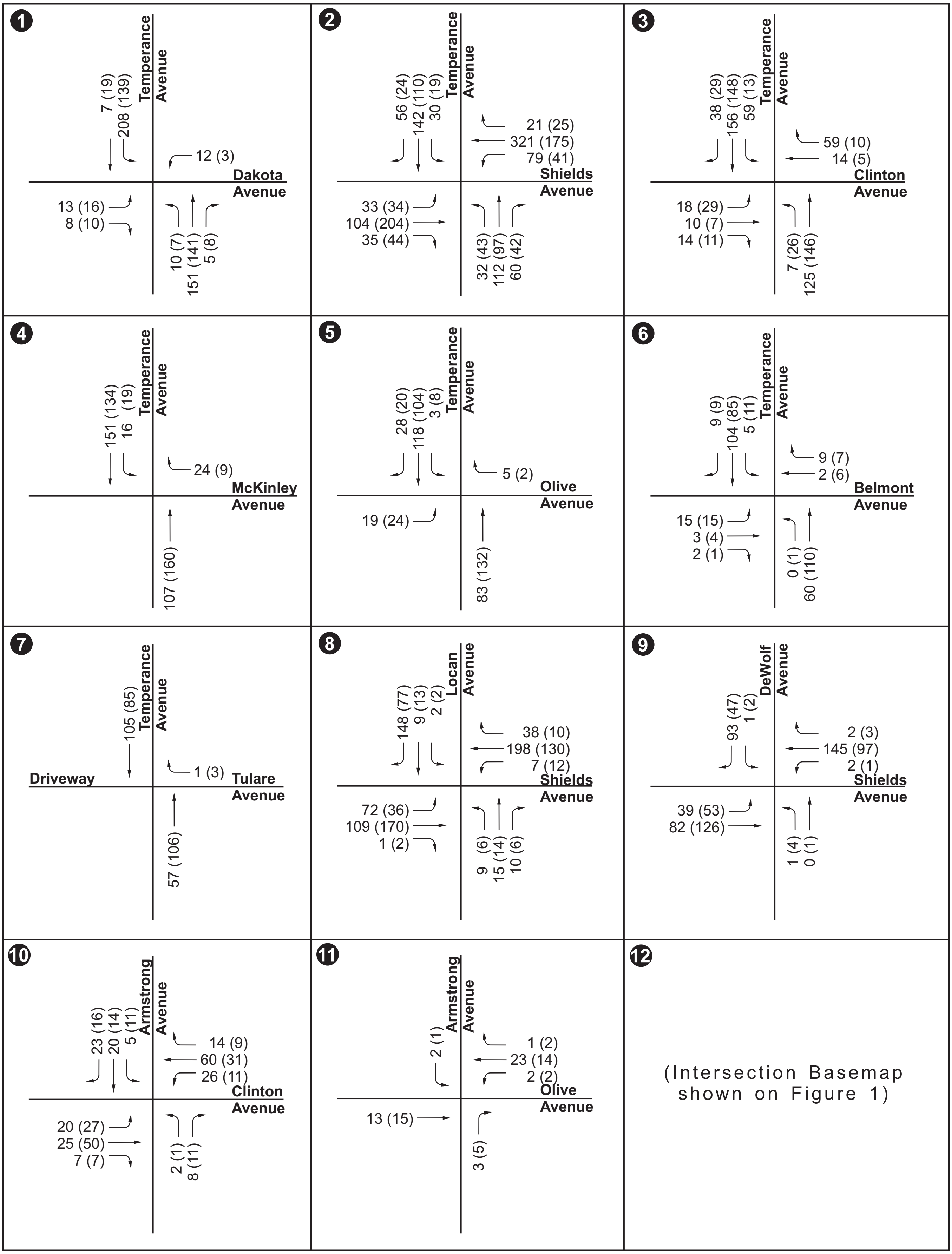
The 2035 scenario assumes build out of all study intersections with signalization and widening to include at a minimum separate lefts, the designated number of throughs, and separate rights where appropriate. These lane configurations are shown on Figure 16.

Signal timing data for Temperance Avenue at Shields Avenue and Temperance Avenue at Clinton Avenue used in the existing and near term analyses were provided by the City of Fresno. Signal timing for intersections that are not currently signalized, the 2035 scenario, and all mitigation scenarios were optimized. In addition, the following signal defaults were used:

- Minimal Initial – 8 seconds
- Minimum Gap – 2 seconds
- Minimum Yellow – 3.5 seconds
- Minimum All Red – 1 second
- Minimal Split for Protected Left-turns – 12 seconds
- 10 pedestrian calls per hour.

The existing and mitigated near term signalized study intersections were analyzed as actuated uncoordinated. Actuated signals use vehicle detectors and an actuated controller unit to assign the right of way based on changing traffic demand. The 2035 and mitigated 2035 signalized intersections were analyzed as actuated coordinated except for the Temperance Avenue at Tulare Avenue which was analyzed as actuated uncoordinated per discussions with City of Fresno staff. Coordinated signals use system phasing and offsets to provide smooth progression of traffic flow along a corridor.

Left-turns at existing and near term signalized intersections were analyzed as "protected". Left-turns at all future intersections and future scenarios were analyzed as "protected". Permitted/unprotected lefts are left-turns that are allowed to go at the same time as the opposing direction through and right-turn movements while protected lefts are left-turns that are only allowed to go during their "protected" phase of the signal, and the left-turns are not allowed to go at the same time as the opposing direction through and right-turn movements.



ND Engineering, PC

INTERSECTION PEAK HOUR TRAFFIC VOLUMES

Approved/Pending/Proposed Projects

City of Fresno, California

Figure A3

Signal Warrant Analysis

Rural peak hour volume warrants (Warrant 3) were prepared for all unsignalized intersections, as appropriate, based on the methodology presented in the *California Manual on Uniform Traffic Control Devices (CA MUTCD) for Streets and Highways*, section 4C.04, pages 830, 831, and 837. According to the CA MUTCD, "the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." Therefore prior to making a final determination on installation of a proposed signal, a thorough engineering investigation, including collision history, should be conducted.

Queuing Analysis

Queuing analysis was completed using *Synchro*. *Synchro* printouts provide the 95th percentile maximum queue lengths in vehicles for unsignalized intersections and in feet for signalized. The queue lengths for unsignalized intersections were then converted from vehicles to feet. According to the *Synchro* manual, "the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes." The queue lengths shown on the printouts are the queues for each lane movement.

Level of Service Analysis Methods

Unsignalized and signalized intersection analyses were completed using *Synchro*, which incorporates the *HCM 6th edition* methodologies. *Synchro* allows for optimization of signals to provide for the greatest reduction in overall intersection delay. This optimization process can result in different signal cycle lengths for both the AM and PM peak hours of a given scenario and across all scenarios. The changing of the signal cycle length somewhat reflects the agency process whereby the agency will adjust intersection signal cycle lengths for differing traffic conditions based on current count data.

Level of Service

For analysis purposes, the *HCM 6th edition* defines six levels of service for various facility types. The six levels are given letter designations ranging from "A" to "F", with "A" representing the best operating conditions and "F" the worst. Quantifiable measures of effectiveness that best describe the quality of operation on the subject facility type are used to determine the facilities level of service. For signalized and unsignalized intersections, the quantifiable measure of effectiveness is average control delay.[5]

Intersections

For AWSC and signalized intersections, "the average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersections as a whole". Level of service for the AWSC and signalized intersection is then based on the aggregated intersection delay. Control delay for two-way stop-controlled (TWSC) intersections, which have stop signs on only the minor street approaches, is also per vehicle but is computed for the stop-controlled or minor street movements only since theoretically the through movements on the major street are not experiencing any delay. Since there is no aggregation of delay for a TWSC intersection, there is no intersection level of service as a whole, only levels of service for the individual minor movements. The minor movements generally consist of separate lefts on the major street approaches and all movements on both minor street approaches.

Table A4 shows the six levels of service and their corresponding ranges of average control delay for both signalized and unsignalized intersections. Table A4 also contains a brief traffic flow description for

---

[5] Control delay, according to the *Highway Capacity Manual 6th edition*, includes initial acceleration delay, queue move-up time, stopped delay, and final acceleration delay.

signalized intersections for each level of service category. The level of service diagrams provided throughout the report show the levels of service for the study intersections. The levels of service shown for signalized intersections are representative of the overall level of service for that intersection. For TWSC intersections, the level of service shown on the maps is the level of service for the worst operating movement at that intersection as opposed to the overall intersection level of service.

TABLE A4: INTERSECTION LEVEL OF SERVICE DESCRIPTION			**Intersections**	
			Signalized	**Unsignalized[1]**
Level of Service	**Conditions**	**Signalized Intersection Description**	**Delay (secs/veh)**	**Delay (secs/veh)**
"A"	Free Flow	*Users experience very low delay. Progression is favorable and most vehicles do not stop at all.*	≤ 10.0	≤ 10.0
"B"	Stable Operations	*Vehicles travel with good progression. Some vehicles stop, causing slight delay.*	> 10.0 to 20.0	> 10.0 to 15.0
"C"	Stable Operations	*Higher delays result from fair progression. A significant number of vehicles stop, although many continue to pass through the intersection without stopping.*	> 20.0 to 35.0	> 15.0 to 25.0
"D"	Approaching Unstable	*Congestion is noticeable. Progression is unfavorable, with more vehicles stopping rather than passing through the intersection.*	> 35.0 to 55.0	> 25.0 to 35.0
"E"	Unstable Operations	*Traffic volumes are at capacity. Users experience poor progression and long delays.*	> 55.0 to 80.0	> 35.0 to 50.0
"F"	Forced Flow	*Intersection's capacity is oversaturated, causing poor progression and unusually long delays.*	> 80.0	> 50.0

Source: Highway Capacity Manual 6th edition, Transportation Research Board.
[1] Unsignalized intersections include TWSC and AWSC

Level of Service Standards

The City of Fresno has established four (4) Traffic Impact Zones (TIZ) that have varying level of service standards for the roadways within those individual TIZs. The Project study area falls within TIZ III, which has an adopted peak hour segment LOS standard of "D". However, per the MEIR, the following segments are projected to exceed the peak hour TIS III LOS "D" standard with implementation of the General Plan:

- Temperance Avenue – Ashlan Avenue to Shields Avenue – LOS "F"
- Temperance Avenue – Shields Avenue to McKinley Avenue – LOS "E"

These roadway segments and all intersections associated with them will be evaluated using a LOS "F" or LOS "E" standard as appropriate. These study intersections include the following:

- Temperance Avenue at Shields Avenue – LOS "F" or LOS "E"
- Temperance Avenue at Clinton Avenue – LOS "E"
- Temperance Avenue at McKinley Avenue – LOS "E"

All remaining study intersections will be evaluated using the LOS "D" standard.

APPENDIX A-1

2018 TRAFFIC COUNTS

Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

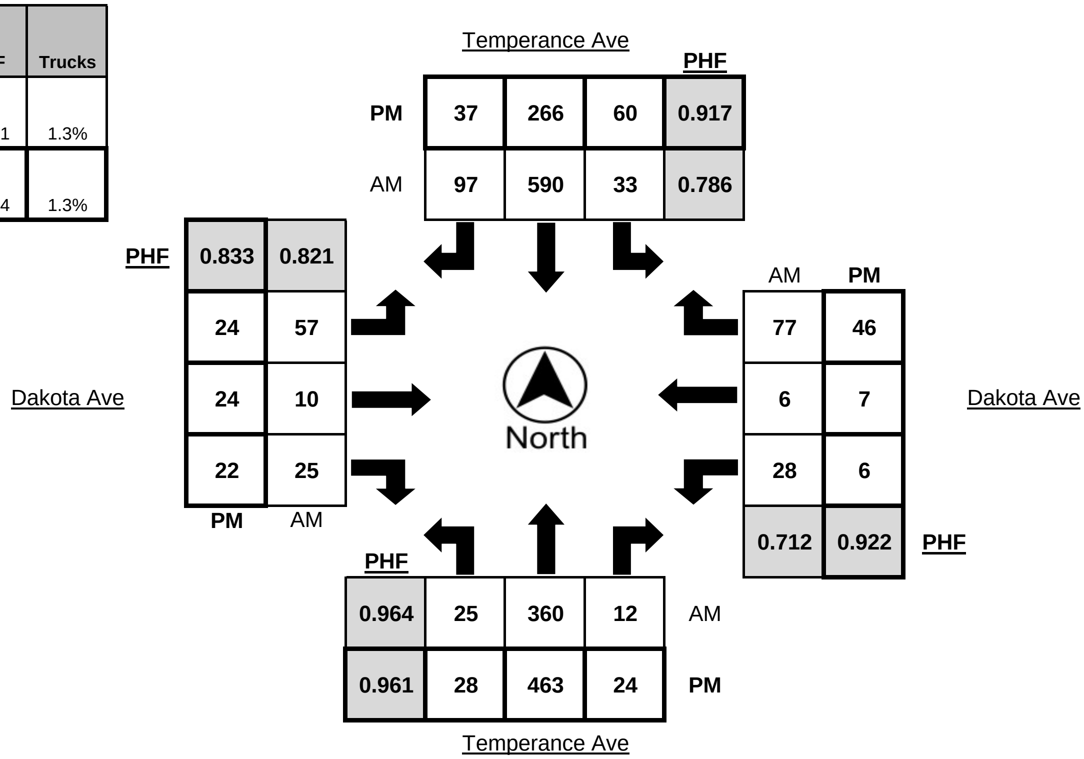
LOCATION	Temperance Ave @ Dakota Ave	**LATITUDE**	36.7866
COUNTY	Fresno	**LONGITUDE**	-119.6640
COLLECTION DATE	Tuesday, June 05, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:00 AM - 7:15 AM	3	54	2	3	3	106	3	1	14	2	6	0	7	0	17	0
7:15 AM - 7:30 AM	6	89	1	5	3	140	12	1	17	2	2	0	11	1	27	0
7:30 AM - 7:45 AM	5	93	1	2	15	176	38	0	12	0	5	1	4	0	30	0
7:45 AM - 8:00 AM	6	91	6	3	9	135	25	2	16	5	7	0	8	2	10	0
8:00 AM - 8:15 AM	8	87	4	0	6	139	22	1	12	3	11	1	5	3	10	1
8:15 AM - 8:30 AM	2	78	5	2	4	77	9	2	8	1	2	1	1	1	10	0
8:30 AM - 8:45 AM	3	75	0	4	5	68	9	1	2	1	3	0	4	1	15	0
8:45 AM - 9:00 AM	0	65	1	4	4	67	7	4	9	2	6	2	4	2	6	0
TOTAL	**33**	**632**	**20**	**23**	**49**	**908**	**125**	**12**	**90**	**16**	**42**	**5**	**44**	**10**	**125**	**1**

	Northbound				Southbound				Eastbound				Westbound			
Time	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
4:00 PM - 4:15 PM	9	87	4	2	8	67	3	3	3	2	6	0	1	4	9	1
4:15 PM - 4:30 PM	10	117	7	2	15	62	7	3	6	8	7	1	2	2	12	0
4:30 PM - 4:45 PM	6	109	7	0	11	63	8	1	7	7	7	0	2	2	12	0
4:45 PM - 5:00 PM	6	121	5	0	20	69	10	3	6	7	4	0	2	1	13	0
5:00 PM - 5:15 PM	6	116	5	2	14	72	12	1	5	2	4	0	0	2	9	0
5:15 PM - 5:30 PM	2	106	6	1	20	68	6	1	6	4	3	0	3	2	4	0
5:30 PM - 5:45 PM	4	130	6	1	16	62	9	2	6	4	3	0	7	1	8	0
5:45 PM - 6:00 PM	6	113	9	0	18	75	9	2	8	4	5	0	4	3	11	0
TOTAL	**49**	**899**	**49**	**8**	**122**	**538**	**64**	**16**	**47**	**38**	**39**	**1**	**21**	**17**	**78**	**1**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**	**Left**	**Thru**	**Right**	**Trucks**
7:15 AM - 8:15 AM	25	360	12	10	33	590	97	4	57	10	25	2	28	6	77	1
4:15 PM - 5:15 PM	28	463	24	4	60	266	37	8	24	24	22	1	6	7	46	0

	PHF	**Trucks**
AM	0.871	1.3%
PM	0.954	1.3%



Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

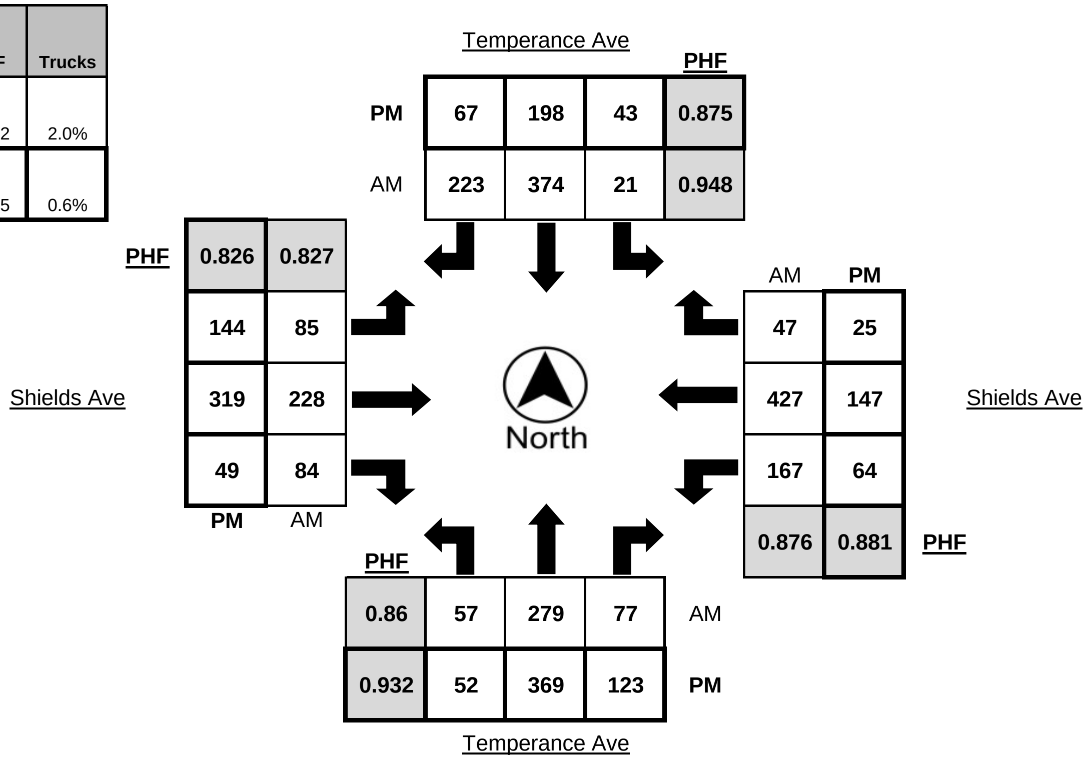
LOCATION	Temperance Ave @ Shields Ave	**LATITUDE**	36.7794
COUNTY	Fresno	**LONGITUDE**	-119.6640
COLLECTION DATE	Tuesday, June 05, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	7	38	13	3	3	80	31	0	12	60	13	2	40	90	9	2
7:15 AM - 7:30 AM	17	59	16	9	2	87	59	2	29	74	11	3	39	111	11	1
7:30 AM - 7:45 AM	8	66	16	3	3	96	57	2	24	68	28	7	49	119	15	2
7:45 AM - 8:00 AM	18	75	27	2	7	86	58	3	20	50	25	2	46	112	11	1
8:00 AM - 8:15 AM	14	79	18	1	9	105	49	2	12	36	20	1	33	85	10	1
8:15 AM - 8:30 AM	27	55	17	7	4	54	19	2	17	24	13	0	24	52	9	0
8:30 AM - 8:45 AM	12	62	13	5	1	61	14	2	14	21	14	5	20	45	7	0
8:45 AM - 9:00 AM	18	57	10	2	8	42	25	2	8	22	14	2	20	43	3	2
TOTAL	**121**	**491**	**130**	**32**	**37**	**611**	**312**	**15**	**136**	**355**	**138**	**22**	**271**	**657**	**75**	**9**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	15	67	16	2	19	44	14	2	26	44	14	0	10	29	11	5
4:15 PM - 4:30 PM	7	96	37	1	10	42	16	2	38	76	10	0	11	33	10	1
4:30 PM - 4:45 PM	15	81	30	0	7	54	12	1	27	57	17	0	13	33	11	0
4:45 PM - 5:00 PM	10	90	17	2	11	48	13	3	40	71	18	1	12	43	6	0
5:00 PM - 5:15 PM	11	91	32	3	8	52	16	0	38	85	12	0	15	36	4	0
5:15 PM - 5:30 PM	11	75	33	1	8	45	10	0	37	101	17	0	12	30	7	0
5:30 PM - 5:45 PM	14	106	25	1	15	51	22	1	39	72	8	2	19	42	6	0
5:45 PM - 6:00 PM	16	97	33	0	12	50	19	2	30	61	12	0	18	39	8	0
TOTAL	**99**	**703**	**223**	**10**	**90**	**386**	**122**	**11**	**275**	**567**	**108**	**3**	**110**	**285**	**63**	**6**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	57	279	77	15	21	374	223	9	85	228	84	13	167	427	47	5
5:00 PM - 6:00 PM	52	369	123	5	43	198	67	3	144	319	49	2	64	147	25	0

	PHF	Trucks
AM	0.942	2.0%
PM	0.955	0.6%



Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

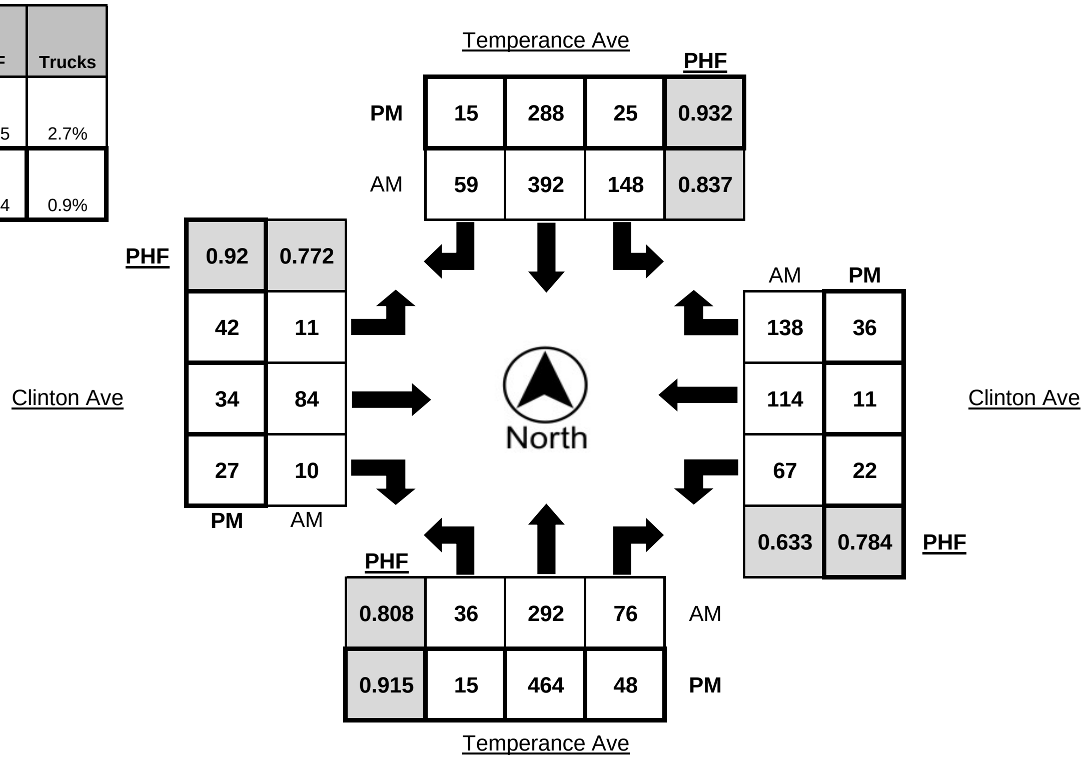
LOCATION	Temperance Ave @ Clinton Ave	**LATITUDE**	36.7721
COUNTY	Fresno	**LONGITUDE**	-119.6641
COLLECTION DATE	Tuesday, June 05, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	11	59	14	9	3	121	6	2	6	6	1	2	11	13	6	0
7:15 AM - 7:30 AM	4	65	4	7	7	104	24	0	4	12	4	1	4	15	10	0
7:30 AM - 7:45 AM	3	76	11	2	16	139	24	9	2	13	3	0	10	18	15	0
7:45 AM - 8:00 AM	12	74	26	2	64	82	18	2	4	23	0	0	13	35	40	2
8:00 AM - 8:15 AM	13	86	26	5	52	93	13	3	2	29	3	2	36	44	46	3
8:15 AM - 8:30 AM	8	56	13	7	16	78	4	1	3	19	4	0	8	17	37	1
8:30 AM - 8:45 AM	5	59	6	5	13	80	2	4	7	8	3	1	7	11	18	0
8:45 AM - 9:00 AM	3	71	11	2	13	62	5	6	3	10	1	1	9	9	8	1
TOTAL	**59**	**546**	**111**	**39**	**184**	**759**	**96**	**27**	**31**	**120**	**19**	**7**	**98**	**162**	**180**	**7**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	5	85	13	4	7	59	1	1	7	14	9	0	3	6	9	0
4:15 PM - 4:30 PM	4	129	10	0	3	62	3	1	3	7	10	0	8	7	12	0
4:30 PM - 4:45 PM	3	99	18	0	5	70	3	0	10	13	14	0	6	2	12	0
4:45 PM - 5:00 PM	5	111	8	2	3	68	5	3	6	9	15	0	8	6	4	1
5:00 PM - 5:15 PM	6	114	8	2	4	78	2	0	10	11	7	0	6	2	4	1
5:15 PM - 5:30 PM	5	104	18	1	7	69	2	0	10	8	9	0	3	3	8	0
5:30 PM - 5:45 PM	2	113	13	1	12	63	3	0	13	5	6	0	8	2	11	0
5:45 PM - 6:00 PM	2	133	9	0	2	78	8	3	9	10	5	1	5	4	13	0
TOTAL	**32**	**888**	**97**	**10**	**43**	**547**	**27**	**8**	**68**	**77**	**75**	**1**	**47**	**32**	**73**	**2**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:30 AM - 8:30 AM	36	292	76	16	148	392	59	15	11	84	10	2	67	114	138	6
5:00 PM - 6:00 PM	15	464	48	4	25	288	15	3	42	34	27	1	22	11	36	1

	PHF	Trucks
AM	0.805	2.7%
PM	0.924	0.9%



Turning Movement Report

Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

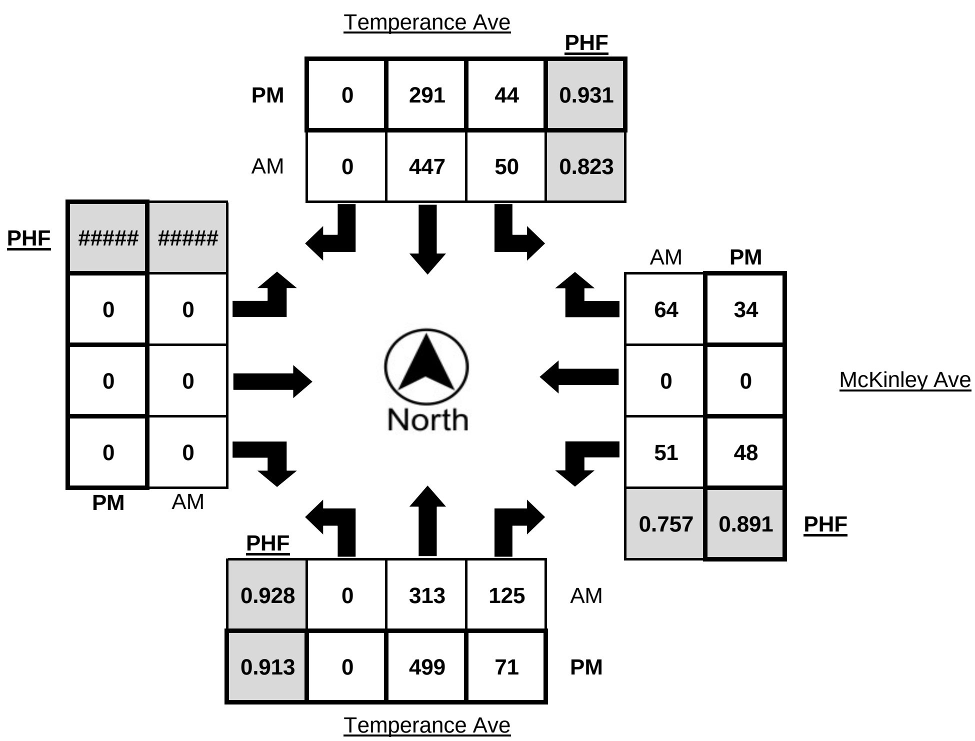
LOCATION Temperance Ave @ McKinley Ave
LATITUDE 36.7649
COUNTY Fresno
LONGITUDE -119.6641
COLLECTION DATE Tuesday, June 05, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	0	70	46	15	6	125	0	2	0	0	0	0	14	0	12	3
7:15 AM - 7:30 AM	0	61	41	8	11	108	0	2	0	0	0	0	10	0	10	5
7:30 AM - 7:45 AM	0	83	35	6	16	135	0	10	0	0	0	0	13	0	11	0
7:45 AM - 8:00 AM	0	82	29	7	8	85	0	4	0	0	0	0	16	0	22	1
8:00 AM - 8:15 AM	0	87	20	10	15	119	0	3	0	0	0	0	12	0	21	2
8:15 AM - 8:30 AM	0	63	11	6	6	88	0	2	0	0	0	0	12	0	15	4
8:30 AM - 8:45 AM	0	60	8	12	11	78	0	10	0	0	0	0	9	0	6	2
8:45 AM - 9:00 AM	0	73	9	5	9	68	0	6	0	0	0	0	9	0	7	2
TOTAL	**0**	**579**	**199**	**69**	**82**	**806**	**0**	**39**	**0**	**0**	**0**	**0**	**95**	**0**	**104**	**19**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	0	107	19	7	16	61	0	3	0	0	0	0	9	0	8	2
4:15 PM - 4:30 PM	0	128	17	3	17	59	0	0	0	0	0	0	12	0	6	1
4:30 PM - 4:45 PM	0	116	24	2	8	83	0	3	0	0	0	0	15	0	8	3
4:45 PM - 5:00 PM	0	114	17	3	10	72	0	2	0	0	0	0	8	0	8	0
5:00 PM - 5:15 PM	0	121	16	4	8	82	0	0	0	0	0	0	10	0	8	0
5:15 PM - 5:30 PM	0	123	19	1	14	68	0	1	0	0	0	0	13	0	10	1
5:30 PM - 5:45 PM	0	117	18	4	14	66	0	1	0	0	0	0	13	0	10	0
5:45 PM - 6:00 PM	0	138	18	1	8	75	0	4	0	0	0	0	12	0	6	1
TOTAL	**0**	**964**	**148**	**25**	**95**	**566**	**0**	**14**	**0**	**0**	**0**	**0**	**92**	**0**	**64**	**8**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	0	313	125	31	50	447	0	19	0	0	0	0	51	0	64	8
5:00 PM - 6:00 PM	0	499	71	10	44	291	0	6	0	0	0	0	48	0	34	2

	PHF	Trucks
AM	0.896	5.5%
PM	0.960	1.8%



Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

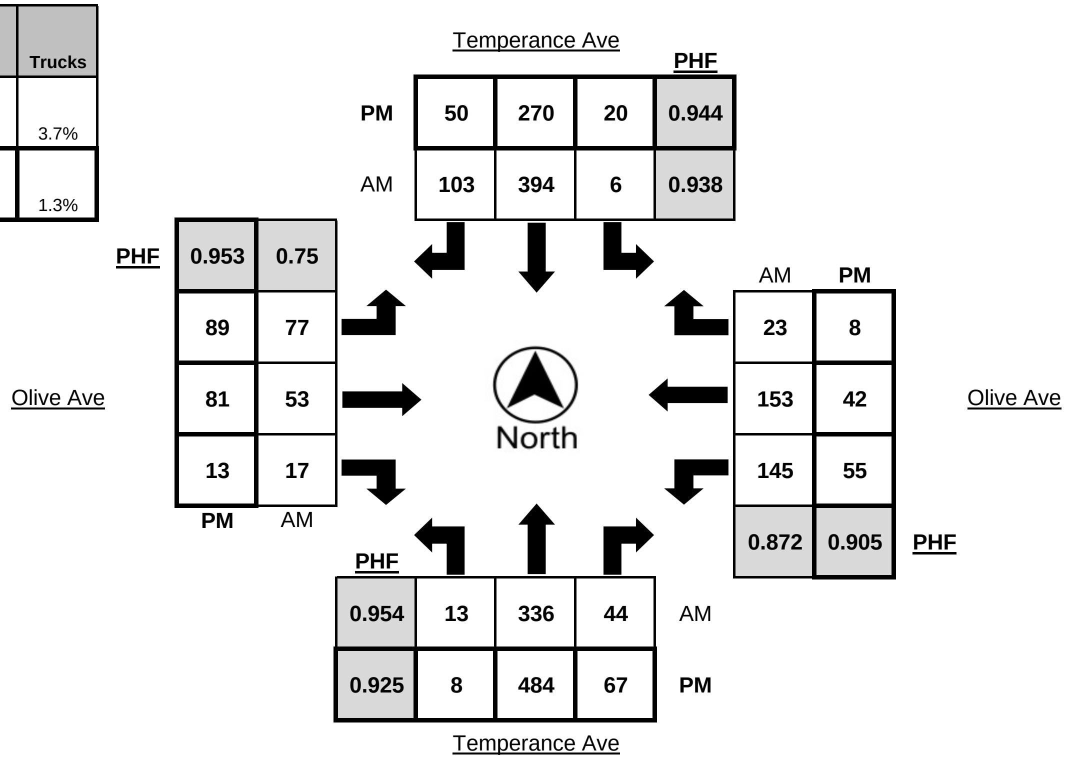
LOCATION	Temperance Ave @ Olive Ave	**LATITUDE**	36.7575
COUNTY	Fresno	**LONGITUDE**	-119.6640
COLLECTION DATE	Tuesday, June 05, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	4	84	13	9	1	107	26	1	21	11	2	4	33	25	7	0
7:15 AM - 7:30 AM	0	83	10	5	0	93	24	0	17	11	1	2	37	40	2	5
7:30 AM - 7:45 AM	3	91	9	4	2	105	27	4	18	14	3	3	38	41	6	1
7:45 AM - 8:00 AM	6	78	12	4	3	89	26	2	21	17	11	1	37	47	8	5
8:00 AM - 8:15 AM	8	84	11	2	2	90	18	3	12	14	14	2	33	29	6	1
8:15 AM - 8:30 AM	2	63	10	3	5	85	16	4	8	6	4	0	27	14	0	0
8:30 AM - 8:45 AM	1	56	7	4	2	65	24	3	10	7	4	2	16	17	3	3
8:45 AM - 9:00 AM	3	66	10	3	3	59	18	5	8	4	4	2	18	14	4	1
TOTAL	**27**	**605**	**82**	**34**	**18**	**693**	**179**	**22**	**115**	**84**	**43**	**16**	**239**	**227**	**36**	**16**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	2	108	9	3	3	51	13	2	17	12	4	1	14	20	3	0
4:15 PM - 4:30 PM	3	125	21	0	5	63	9	1	17	14	2	2	15	8	2	2
4:30 PM - 4:45 PM	5	117	23	2	5	76	11	3	20	17	5	0	23	4	2	0
4:45 PM - 5:00 PM	0	110	14	3	4	67	11	2	19	16	0	0	9	10	4	0
5:00 PM - 5:15 PM	2	114	13	2	5	70	6	1	23	22	2	0	13	9	3	0
5:15 PM - 5:30 PM	2	126	23	1	8	69	11	0	22	24	2	0	14	13	0	4
5:30 PM - 5:45 PM	0	114	16	1	4	63	14	0	21	17	3	1	15	8	1	0
5:45 PM - 6:00 PM	4	130	15	1	3	68	19	3	23	18	6	0	13	12	4	1
TOTAL	**18**	**944**	**134**	**13**	**37**	**527**	**94**	**12**	**162**	**140**	**24**	**4**	**116**	**84**	**19**	**7**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 8:00 AM	13	336	44	22	6	394	103	7	77	53	17	10	145	153	23	11
5:00 PM - 6:00 PM	8	484	67	5	20	270	50	4	89	81	13	1	55	42	8	5

	PHF	Trucks
AM	0.955	3.7%
PM	0.942	1.3%



Turning Movement Report

Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

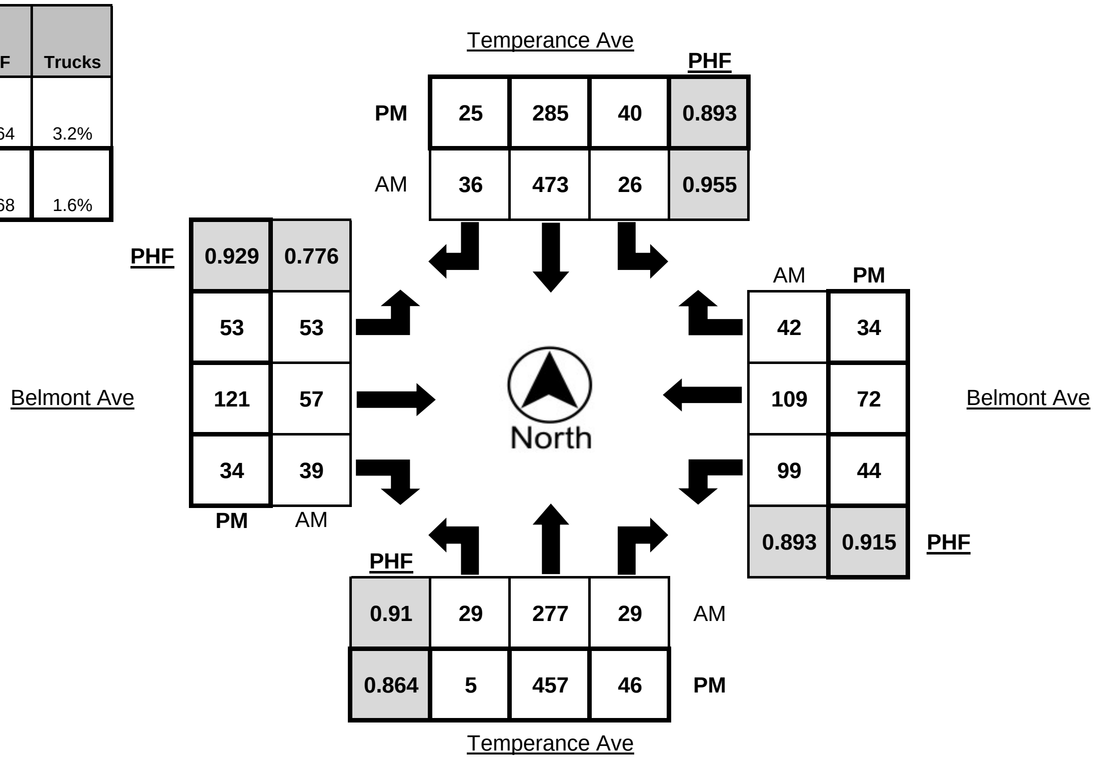
LOCATION	Temperance Ave @ Belmont Ave	**LATITUDE**	36.7503
COUNTY	Fresno	**LONGITUDE**	-119.6640
COLLECTION DATE	Tuesday, June 05, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	2	71	9	2	3	132	5	3	14	15	3	6	20	15	9	6
7:15 AM - 7:30 AM	3	66	13	5	2	117	3	3	15	11	14	0	28	26	6	3
7:30 AM - 7:45 AM	9	74	9	4	3	126	10	4	20	9	5	0	23	30	8	2
7:45 AM - 8:00 AM	9	63	5	3	14	109	11	2	9	25	14	5	25	34	11	3
8:00 AM - 8:15 AM	8	74	2	3	7	121	12	3	9	12	6	0	23	19	17	1
8:15 AM - 8:30 AM	6	53	6	3	13	104	5	4	12	11	7	3	25	14	6	0
8:30 AM - 8:45 AM	2	44	5	3	9	71	7	6	10	10	9	1	17	12	10	3
8:45 AM - 9:00 AM	3	55	2	2	7	72	7	7	13	10	5	2	16	17	8	4
TOTAL	**42**	**500**	**51**	**25**	**58**	**852**	**60**	**32**	**102**	**103**	**63**	**17**	**177**	**167**	**75**	**22**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	4	99	8	2	3	61	7	2	10	18	8	0	20	14	10	0
4:15 PM - 4:30 PM	1	135	11	0	9	69	7	2	19	22	6	1	8	17	10	3
4:30 PM - 4:45 PM	2	106	12	1	10	80	8	2	15	32	9	1	10	13	11	1
4:45 PM - 5:00 PM	1	101	12	3	13	63	5	1	10	31	8	1	12	23	6	0
5:00 PM - 5:15 PM	1	115	11	1	8	73	5	1	9	36	11	1	14	19	7	1
5:15 PM - 5:30 PM	8	124	9	0	9	65	10	3	8	27	8	0	11	11	12	0
5:30 PM - 5:45 PM	5	106	13	1	14	60	8	2	16	18	7	0	12	15	11	1
5:45 PM - 6:00 PM	14	114	4	1	12	71	7	1	12	20	5	0	13	19	15	0
TOTAL	**36**	**900**	**80**	**9**	**78**	**542**	**57**	**14**	**99**	**204**	**62**	**4**	**100**	**131**	**82**	**6**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	29	277	29	15	26	473	36	12	53	57	39	5	99	109	42	9
4:15 PM - 5:15 PM	5	457	46	5	40	285	25	6	53	121	34	4	44	72	34	5

	PHF	Trucks
AM	0.964	3.2%
PM	0.968	1.6%



Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

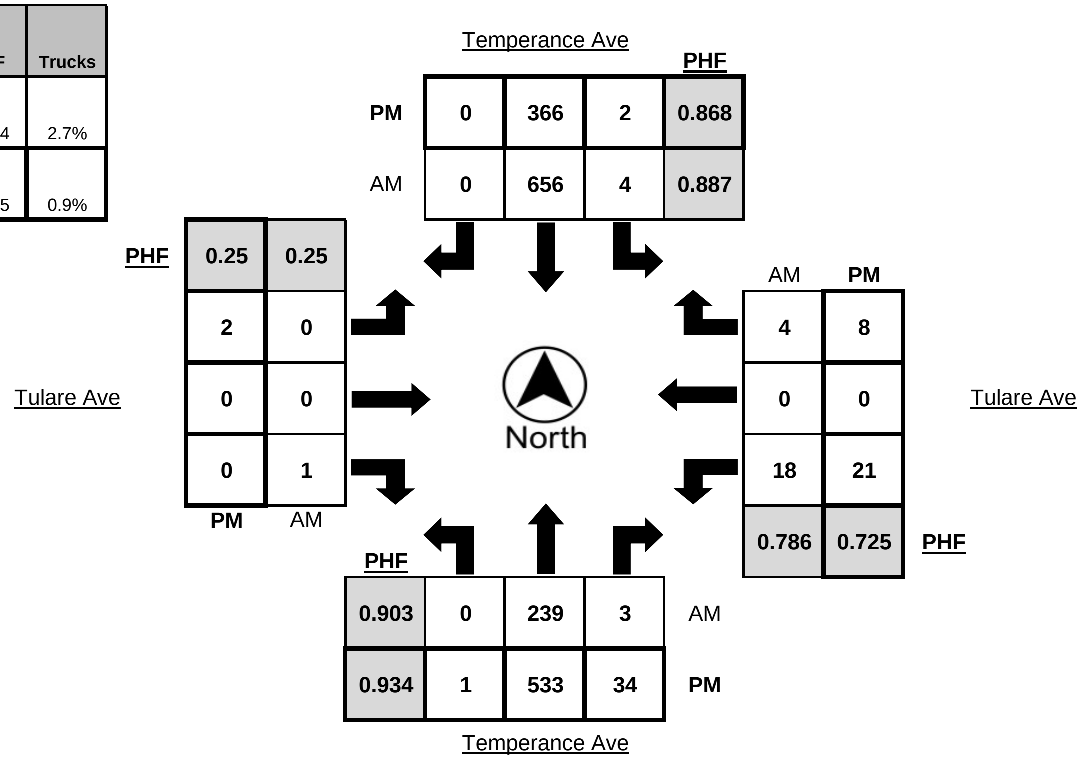
LOCATION Temperance Ave @ Tulare Ave
LATITUDE 36.7436
COUNTY Fresno
LONGITUDE -119.6640
COLLECTION DATE Wednesday, August 15, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	0	65	2	3	2	157	0	3	0	0	1	1	3	0	1	1
7:15 AM - 7:30 AM	0	51	1	2	1	185	0	4	0	0	0	0	7	0	0	1
7:30 AM - 7:45 AM	0	62	0	3	0	178	0	5	0	0	0	0	3	0	1	0
7:45 AM - 8:00 AM	0	61	0	1	1	136	0	1	0	0	0	0	5	0	2	0
8:00 AM - 8:15 AM	0	48	2	0	1	103	0	4	0	0	0	0	5	0	1	0
8:15 AM - 8:30 AM	0	59	5	4	0	100	0	1	0	0	0	0	8	0	1	0
8:30 AM - 8:45 AM	0	55	2	4	3	92	0	6	0	0	0	0	3	0	0	0
8:45 AM - 9:00 AM	0	50	2	5	0	70	0	4	0	0	0	0	1	0	1	1
TOTAL	**0**	**451**	**14**	**22**	**8**	**1021**	**0**	**28**	**0**	**0**	**1**	**1**	**35**	**0**	**7**	**3**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	0	105	11	4	0	95	0	3	0	0	0	0	5	0	0	0
4:15 PM - 4:30 PM	0	125	4	1	1	67	0	0	0	0	0	0	3	0	2	0
4:30 PM - 4:45 PM	0	121	6	1	1	74	0	4	0	0	0	0	3	0	0	0
4:45 PM - 5:00 PM	1	125	11	1	0	75	0	1	0	0	0	0	5	0	0	0
5:00 PM - 5:15 PM	0	136	5	0	1	84	0	1	0	0	0	0	5	0	1	0
5:15 PM - 5:30 PM	0	142	10	2	1	105	0	2	2	0	0	0	7	0	3	0
5:30 PM - 5:45 PM	0	130	8	1	0	102	0	1	0	0	0	0	4	0	4	0
5:45 PM - 6:00 PM	0	99	2	0	2	70	0	0	0	0	0	0	5	0	2	0
TOTAL	**1**	**983**	**57**	**10**	**6**	**672**	**0**	**12**	**2**	**0**	**0**	**0**	**37**	**0**	**12**	**0**

	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 8:00 AM	0	239	3	9	4	656	0	13	0	0	1	1	18	0	4	2
4:45 PM - 5:45 PM	1	533	34	4	2	366	0	5	2	0	0	0	21	0	8	0

	PHF	Trucks
AM	0.944	2.7%
PM	0.895	0.9%



Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

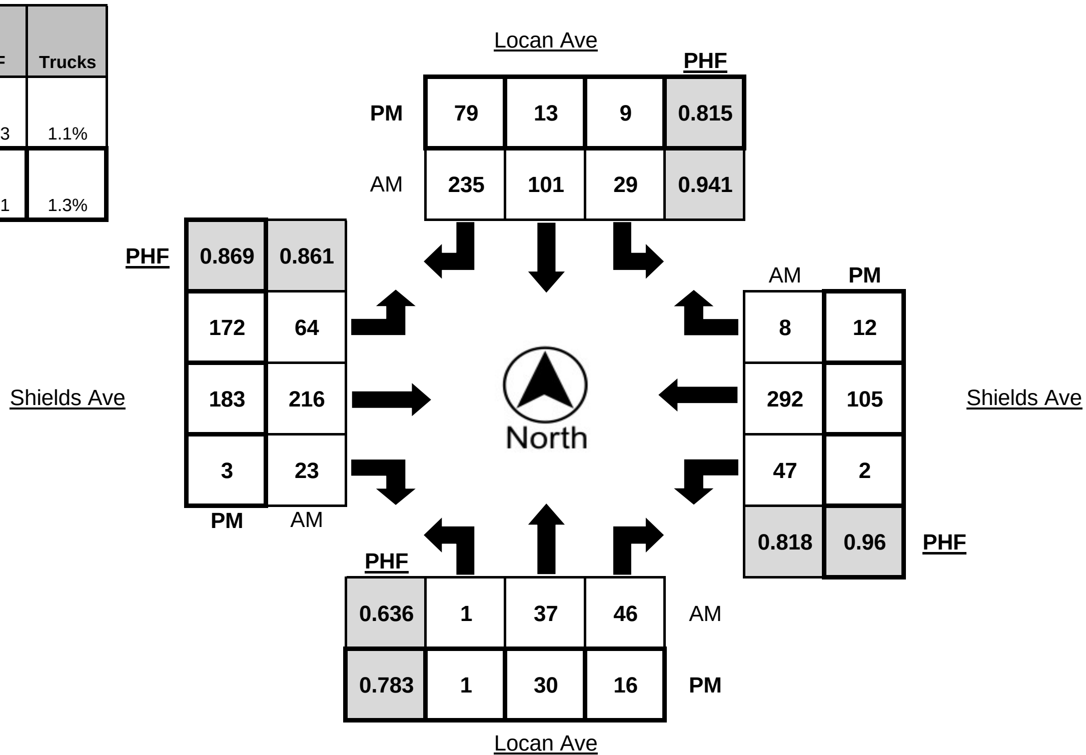
LOCATION	Shields Ave @ Locan Ave	**LATITUDE**	36.7794
COUNTY	Fresno	**LONGITUDE**	-119.6550
COLLECTION DATE	Tuesday, June 05, 2018	**WEATHER**	Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	0	5	5	0	3	14	64	0	20	52	0	4	2	55	3	2
7:15 AM - 7:30 AM	0	1	4	1	7	11	77	0	21	66	1	1	1	70	2	0
7:30 AM - 7:45 AM	0	3	15	0	14	15	68	0	13	70	3	0	8	89	3	1
7:45 AM - 8:00 AM	1	15	12	1	4	34	42	1	18	51	11	1	23	81	2	1
8:00 AM - 8:15 AM	0	18	15	0	4	41	48	2	12	29	8	3	15	52	1	0
8:15 AM - 8:30 AM	6	14	8	1	1	6	27	0	12	23	1	1	2	35	2	0
8:30 AM - 8:45 AM	0	2	3	0	0	5	23	0	7	14	0	1	1	36	1	1
8:45 AM - 9:00 AM	0	3	4	0	1	11	30	1	15	19	2	1	4	24	1	0
TOTAL	**7**	**61**	**66**	**3**	**34**	**137**	**379**	**4**	**118**	**324**	**26**	**12**	**56**	**442**	**15**	**5**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	0	6	6	0	2	1	15	1	25	28	0	0	1	36	3	3
4:15 PM - 4:30 PM	0	9	5	0	1	2	19	0	46	46	1	1	2	28	1	1
4:30 PM - 4:45 PM	1	16	14	0	1	0	14	0	35	34	1	0	1	30	6	0
4:45 PM - 5:00 PM	0	7	4	0	3	4	24	0	37	36	0	1	0	27	2	2
5:00 PM - 5:15 PM	0	6	5	0	5	3	19	1	48	50	1	1	0	28	1	0
5:15 PM - 5:30 PM	0	9	6	0	0	0	13	0	55	48	0	1	2	23	5	0
5:30 PM - 5:45 PM	1	8	1	0	1	6	23	0	32	49	2	2	0	27	4	0
5:45 PM - 6:00 PM	0	11	5	0	4	1	27	0	34	38	1	0	0	13	3	0
TOTAL	**2**	**72**	**46**	**0**	**17**	**17**	**154**	**2**	**312**	**329**	**6**	**6**	**6**	**212**	**25**	**6**

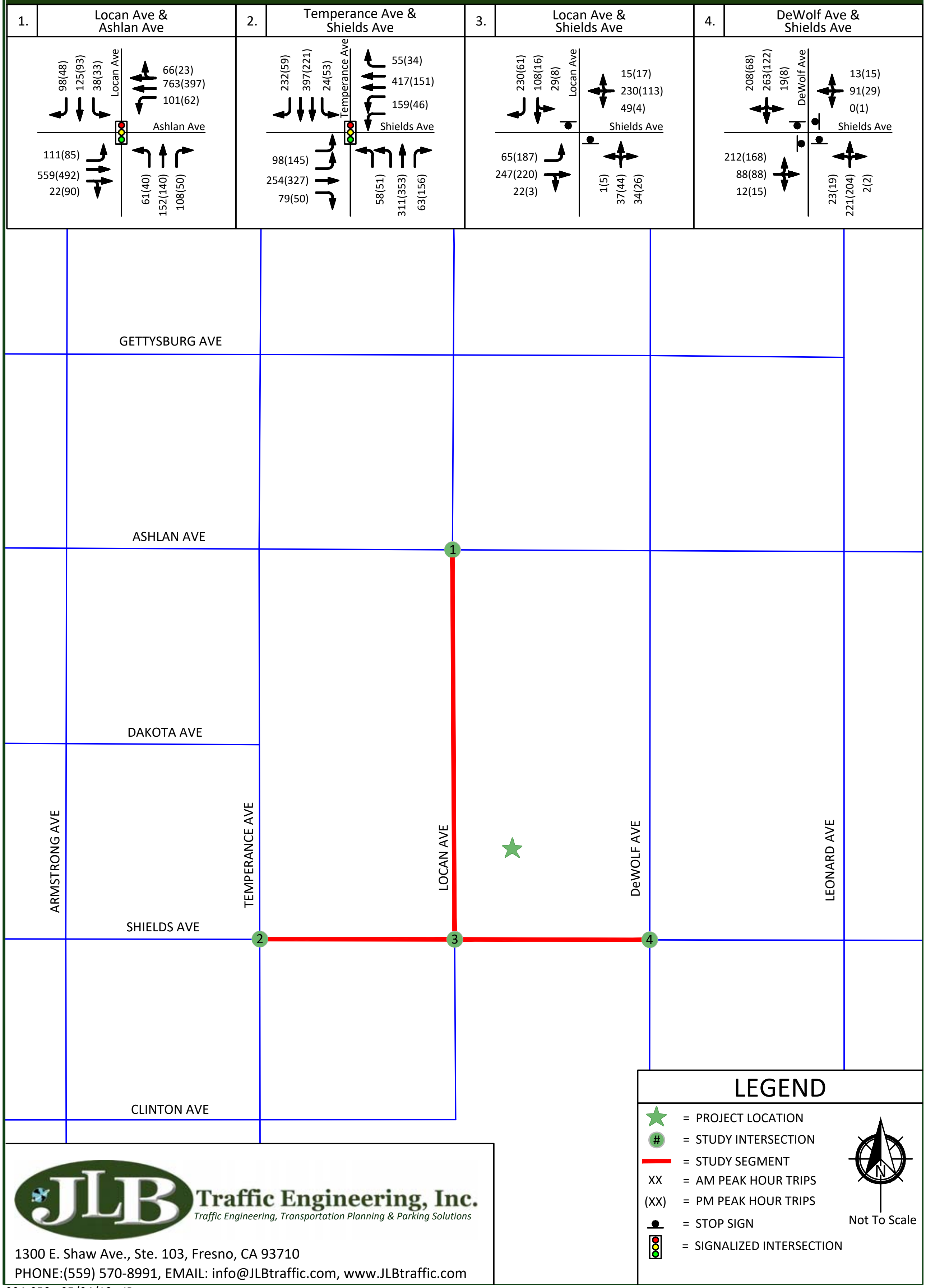
	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	1	37	46	2	29	101	235	3	64	216	23	5	47	292	8	2
4:45 PM - 5:45 PM	1	30	16	0	9	13	79	1	172	183	3	5	2	105	12	2

	PHF	Trucks
AM	0.913	1.1%
PM	0.941	1.3%



CUSD Shields-Locan Elementary School
Existing - Traffic Volumes, Geometrics and Controls

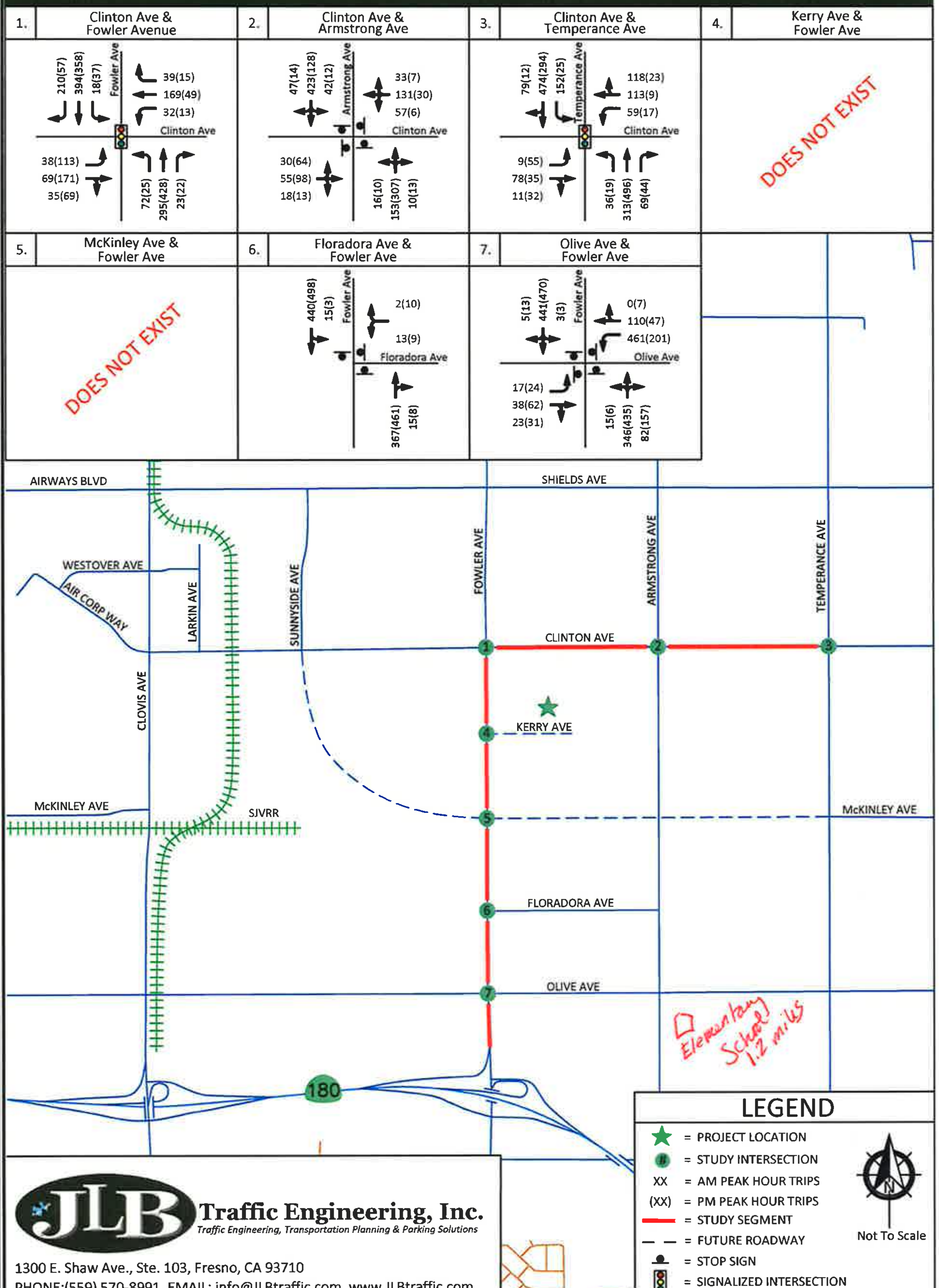
Figure 2



004-058 - 05/04/18 - JR

Tentative Tract 6214 - City of Fresno
Existing - Traffic Volumes, Geometrics and Controls

Figure 2



JLB Traffic Engineering, Inc.

Traffic Engineering, Transportation Planning & Parking Solutions

1300 E. Shaw Ave., Ste. 103, Fresno, CA 93710

PHONE:(559) 570-8991, EMAIL: info@JLBtraffic.com, www.JLBtraffic.com

004-054 - 02/16/18 - JR

Metro Traffic Data Inc.
310 N. Irwin Street - Suite 20
Hanford, CA 93230

800-975-6938 Phone/Fax
www.metrotrafficdata.com

Turning Movement Report

Prepared For:

ND Engineering
6807 Leameadow
Dallas, TX 75248

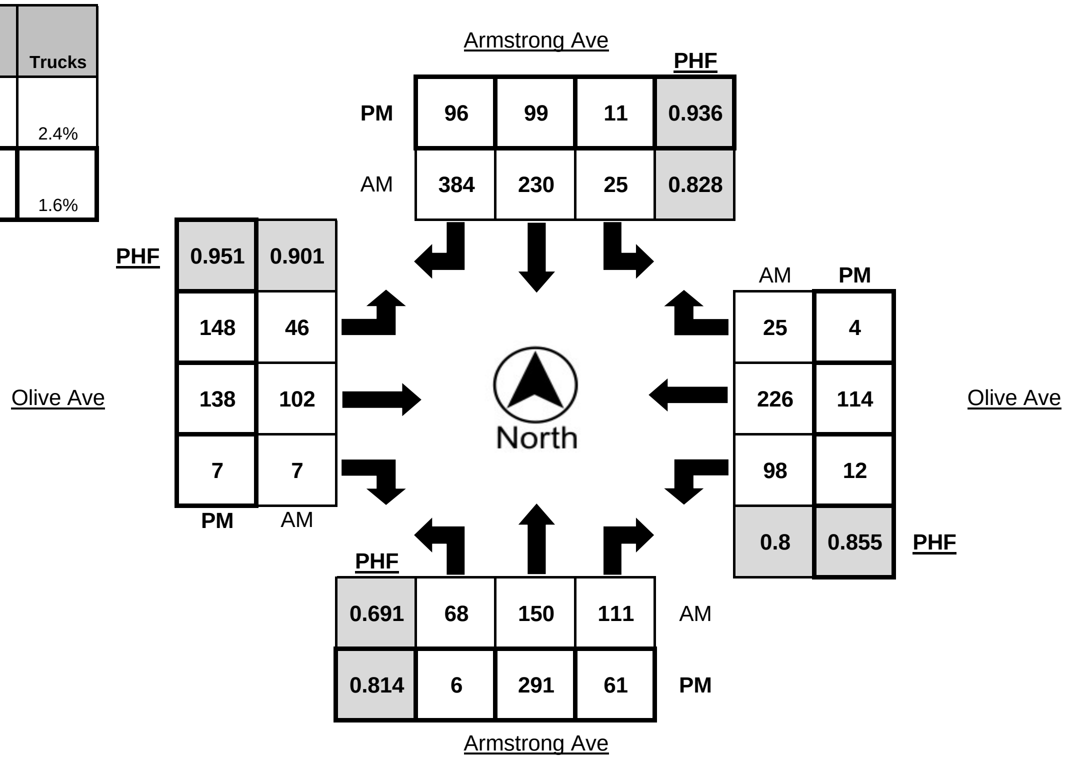
LOCATION Olive Ave @ Armstrong Ave
LATITUDE 36.7574
COUNTY Fresno
LONGITUDE -119.6731
COLLECTION DATE Wednesday, November 14, 2018
WEATHER Clear

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:00 AM - 7:15 AM	3	23	21	1	0	38	92	2	10	29	0	1	5	58	2	0
7:15 AM - 7:30 AM	3	32	10	0	5	64	124	3	8	28	1	5	19	56	0	2
7:30 AM - 7:45 AM	12	31	29	1	8	72	96	1	12	27	0	8	23	43	5	0
7:45 AM - 8:00 AM	24	58	37	0	8	42	94	3	12	28	3	2	28	68	13	3
8:00 AM - 8:15 AM	29	29	35	2	4	52	70	1	14	19	3	2	28	59	7	2
8:15 AM - 8:30 AM	3	22	6	1	3	31	65	1	4	19	1	1	5	54	2	2
8:30 AM - 8:45 AM	5	11	3	0	1	20	49	2	4	20	4	1	1	51	0	1
8:45 AM - 9:00 AM	2	9	0	1	2	14	26	0	10	27	1	4	2	33	3	3
TOTAL	**81**	**215**	**141**	**6**	**31**	**333**	**616**	**13**	**74**	**197**	**13**	**24**	**111**	**422**	**32**	**13**

	Northbound				Southbound				Eastbound				Westbound			
Time	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
4:00 PM - 4:15 PM	2	60	10	1	3	29	21	1	15	38	1	1	4	27	5	1
4:15 PM - 4:30 PM	1	59	13	1	3	21	17	2	35	27	3	1	5	22	3	0
4:30 PM - 4:45 PM	2	54	16	0	2	30	23	2	29	33	4	0	4	22	1	0
4:45 PM - 5:00 PM	1	87	22	0	2	31	21	6	41	29	1	0	1	29	0	1
5:00 PM - 5:15 PM	0	54	13	2	4	26	18	0	36	35	1	1	2	31	0	0
5:15 PM - 5:30 PM	5	79	15	1	2	23	24	1	39	38	0	1	3	24	2	0
5:30 PM - 5:45 PM	0	71	11	0	3	19	33	0	32	36	5	1	6	30	2	2
5:45 PM - 6:00 PM	9	50	17	1	3	20	22	0	25	27	5	2	3	25	0	0
TOTAL	**20**	**514**	**117**	**6**	**22**	**199**	**179**	**12**	**252**	**263**	**20**	**7**	**28**	**210**	**13**	**4**

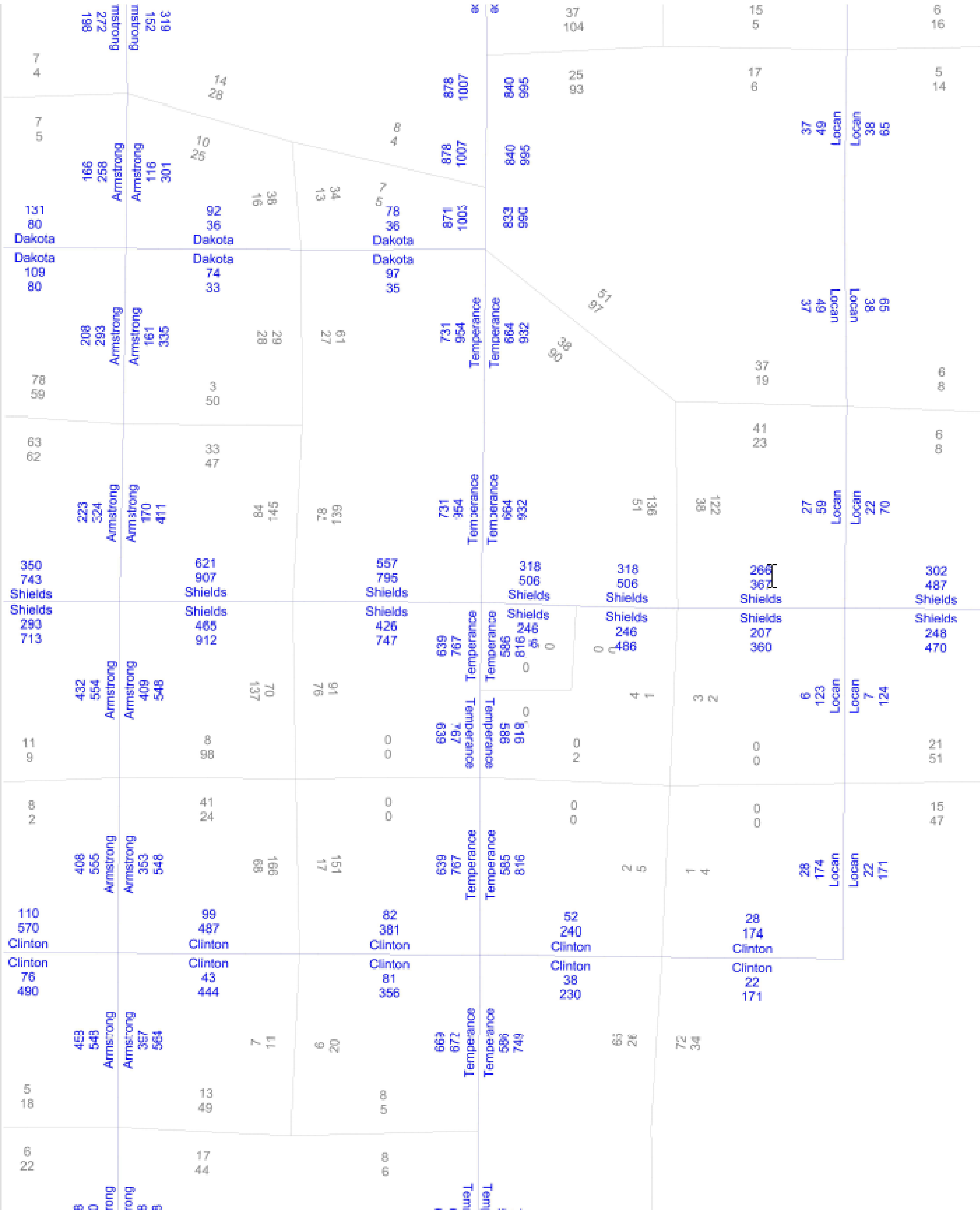
	Northbound				Southbound				Eastbound				Westbound			
PEAK HOUR	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks	Left	Thru	Right	Trucks
7:15 AM - 8:15 AM	68	150	111	3	25	230	384	8	46	102	7	17	98	226	25	7
4:45 PM - 5:45 PM	6	291	61	3	11	99	96	7	148	138	7	3	12	114	4	3

	PHF	Trucks
AM	0.887	2.4%
PM	0.931	1.6%



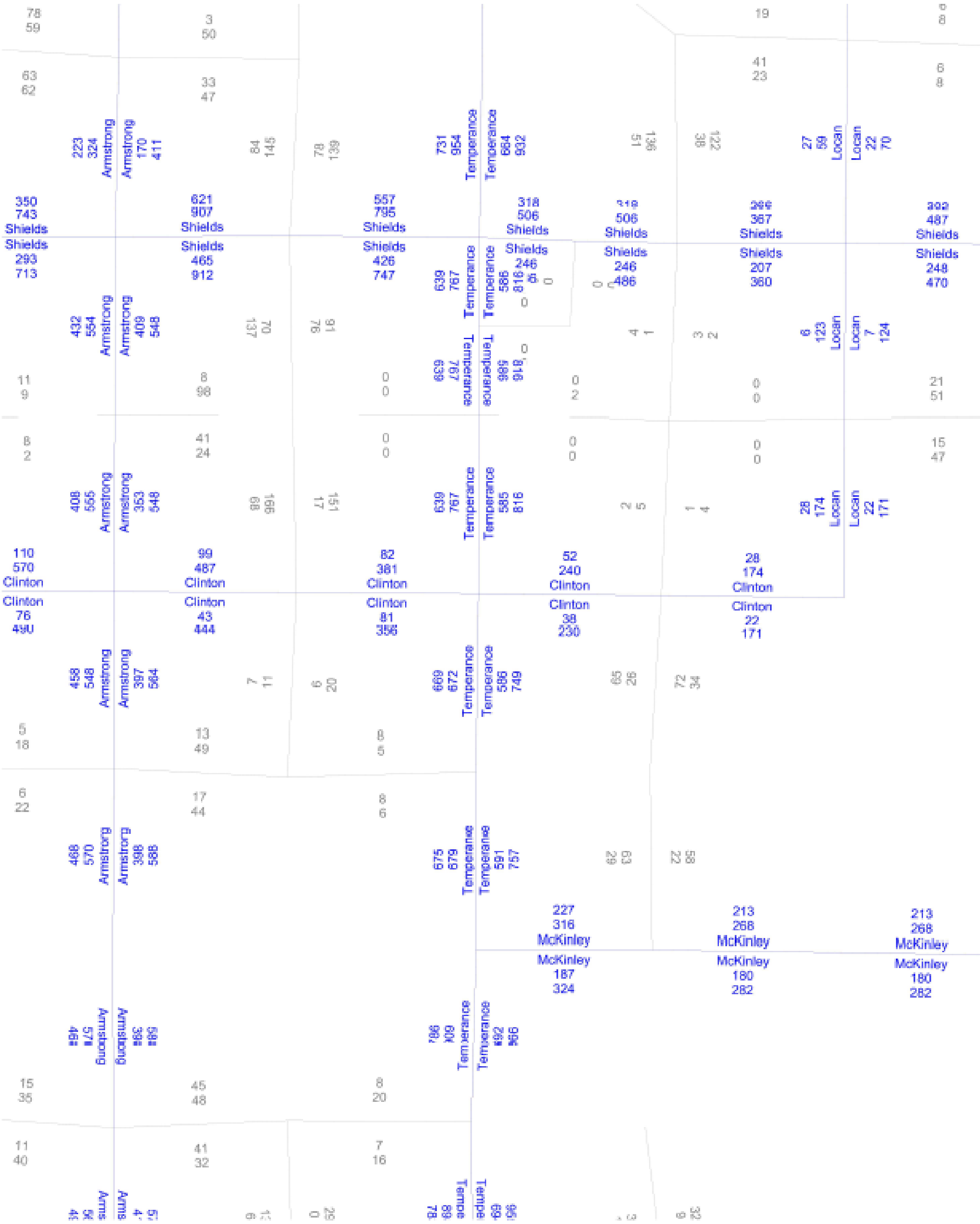
APPENDIX A-2

FRESNO COG MODEL DATA

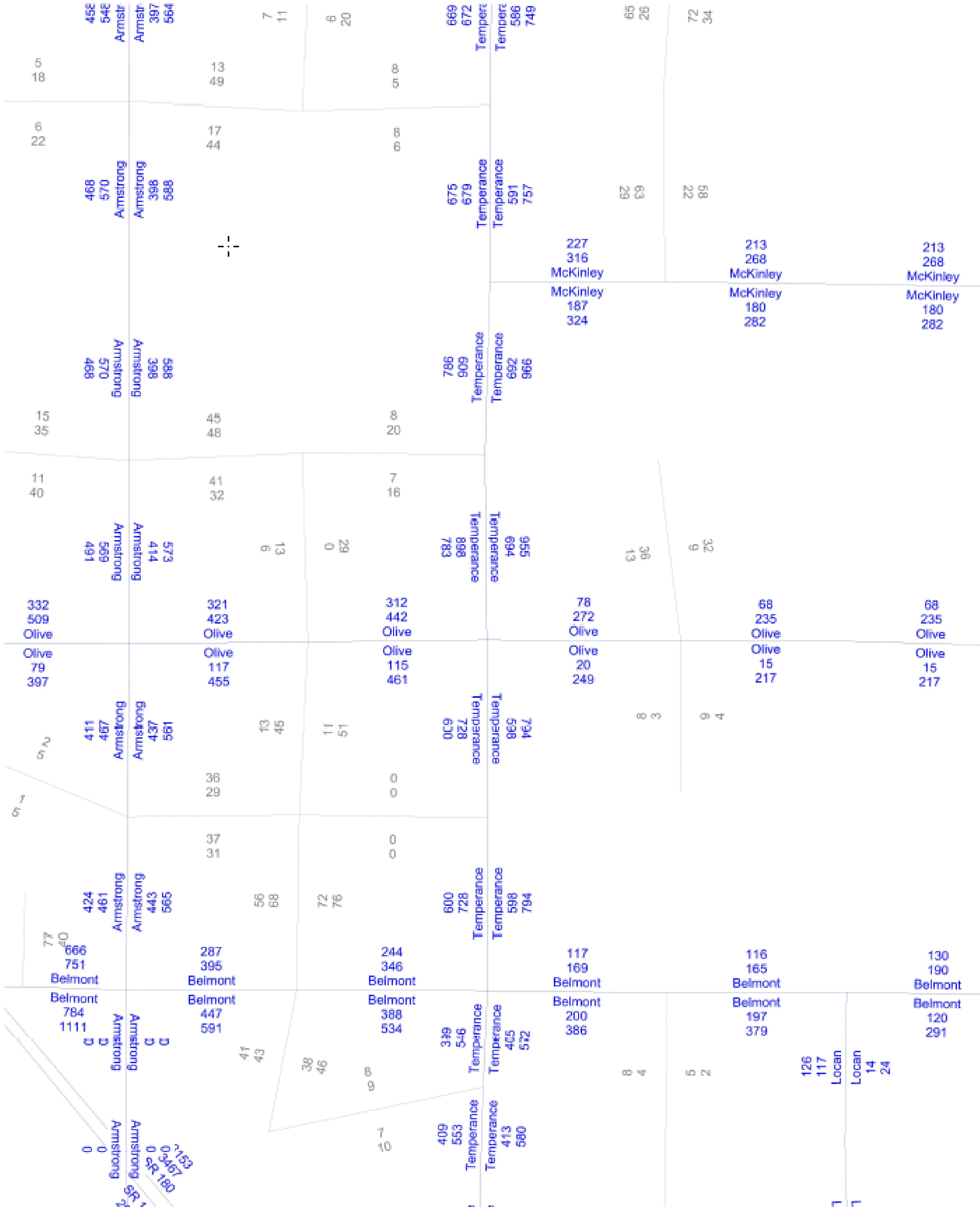


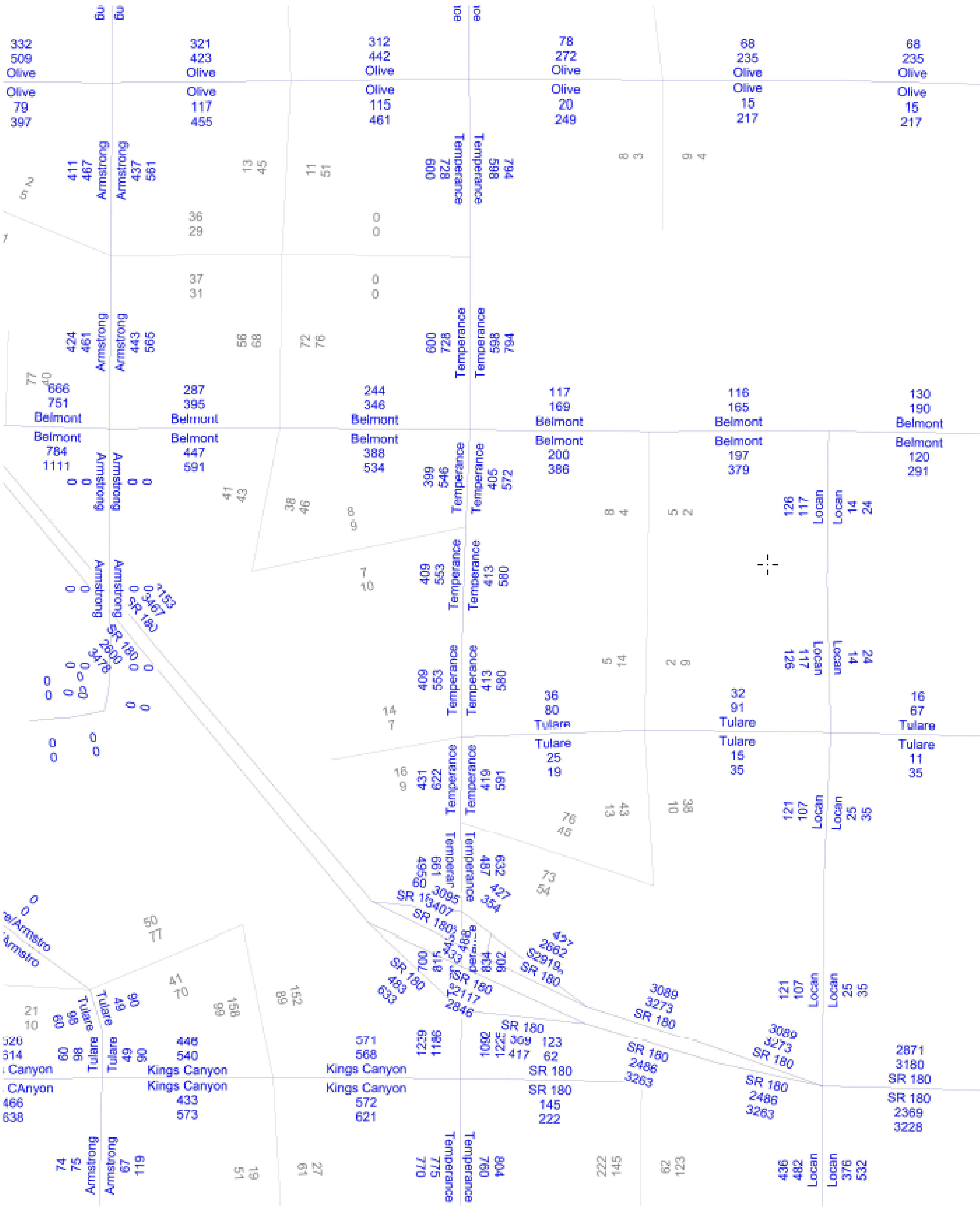
2018 Model Data

2018 Model Data



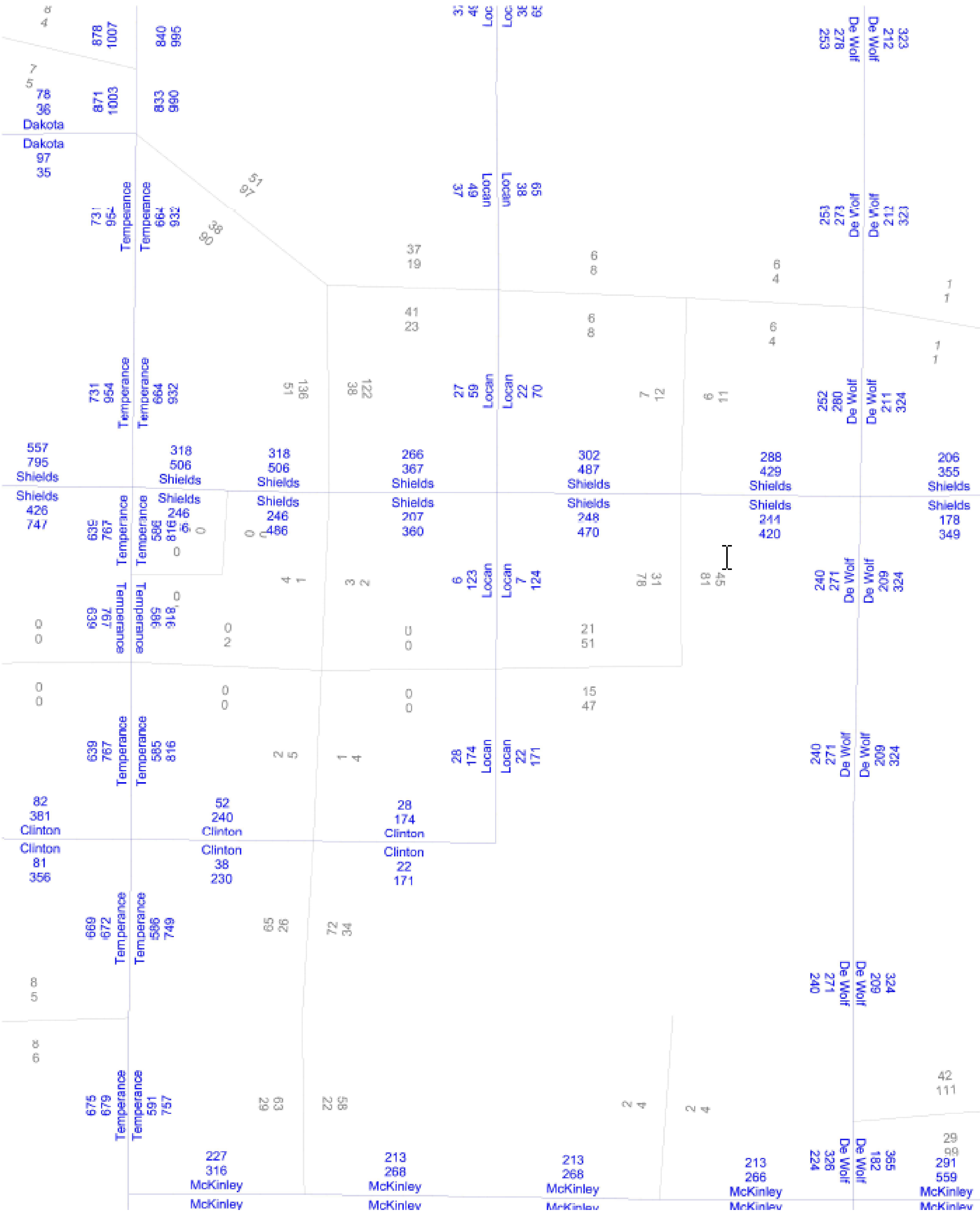
2018 Model Data

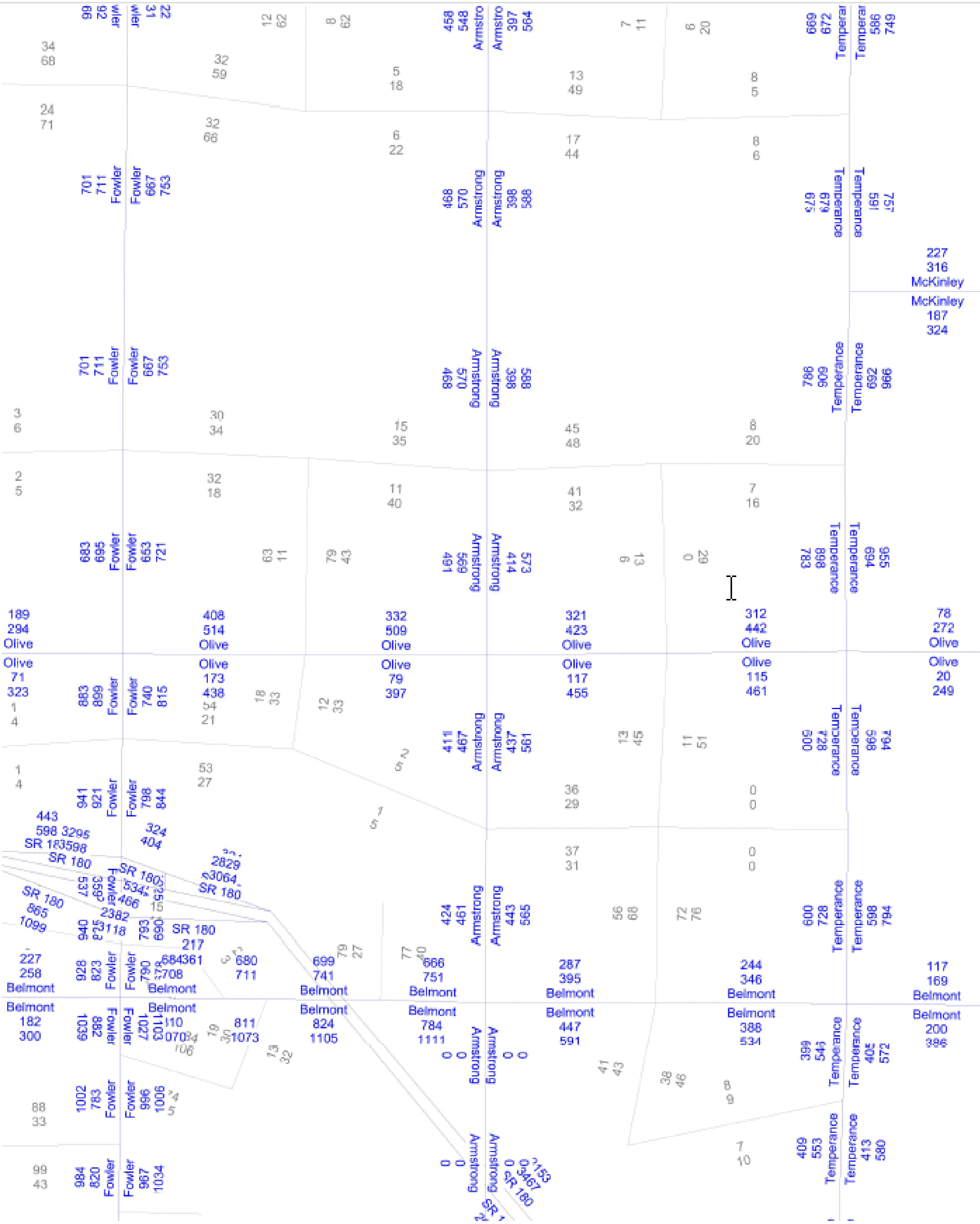




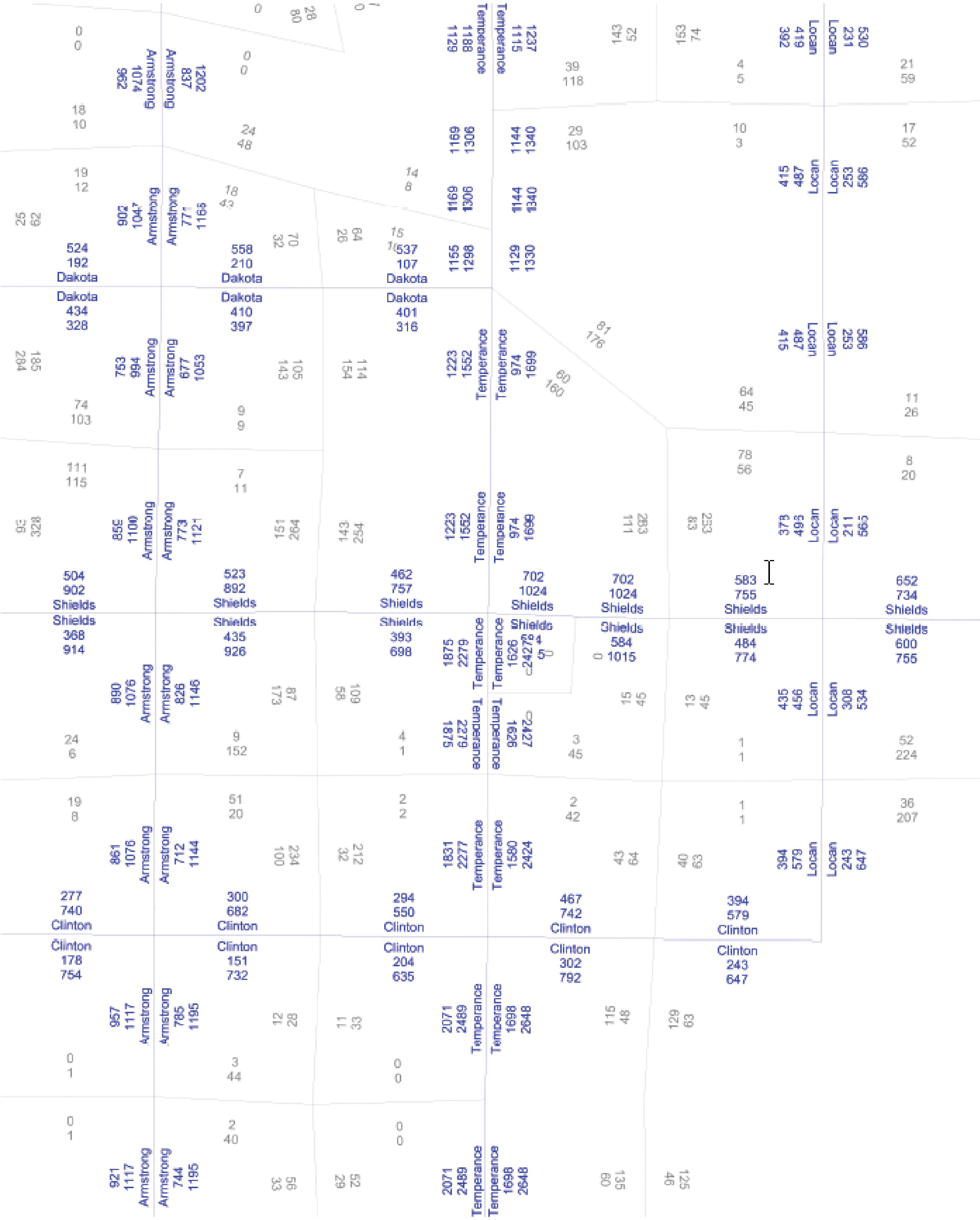
2018 Model Data

2018 Model Data

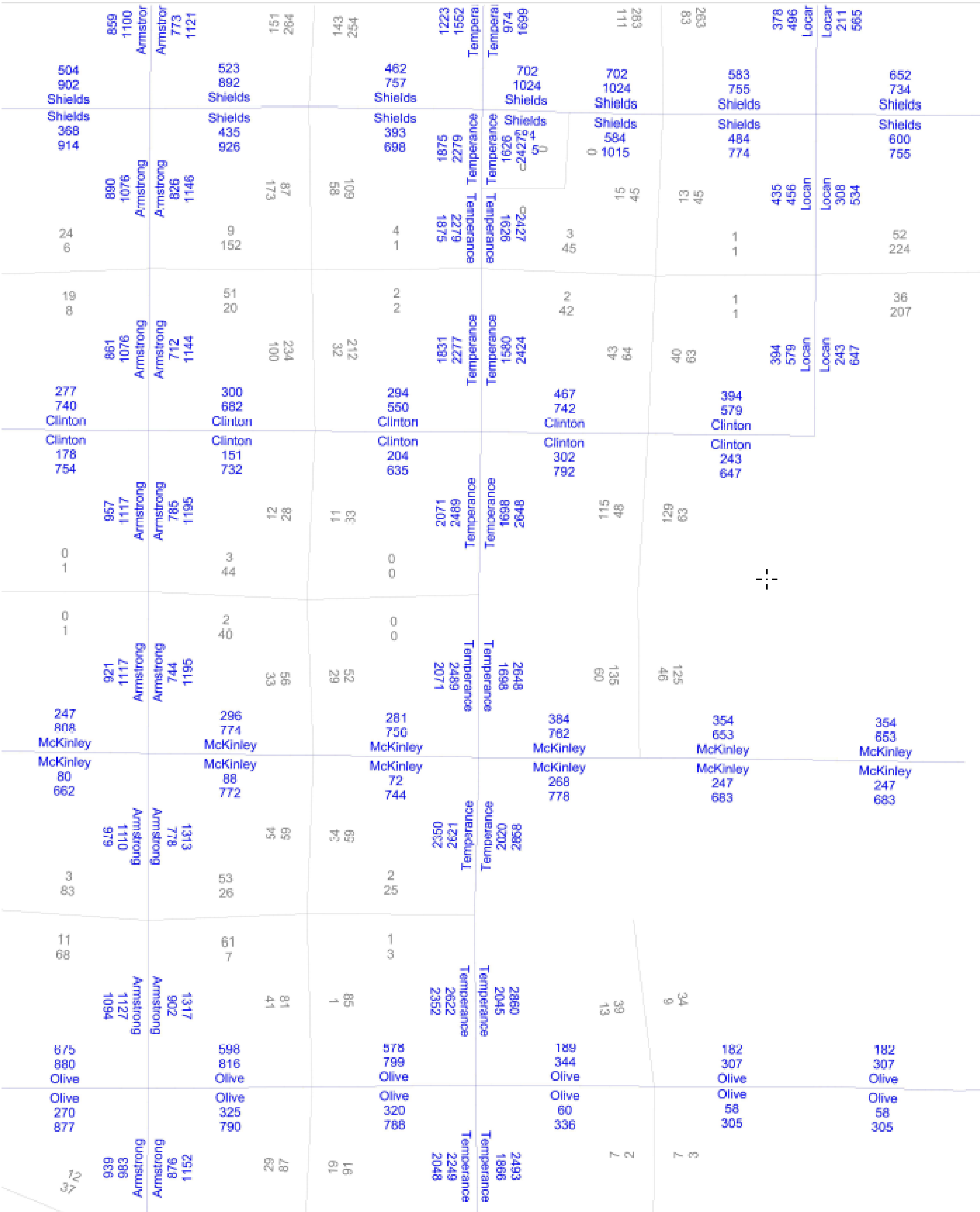




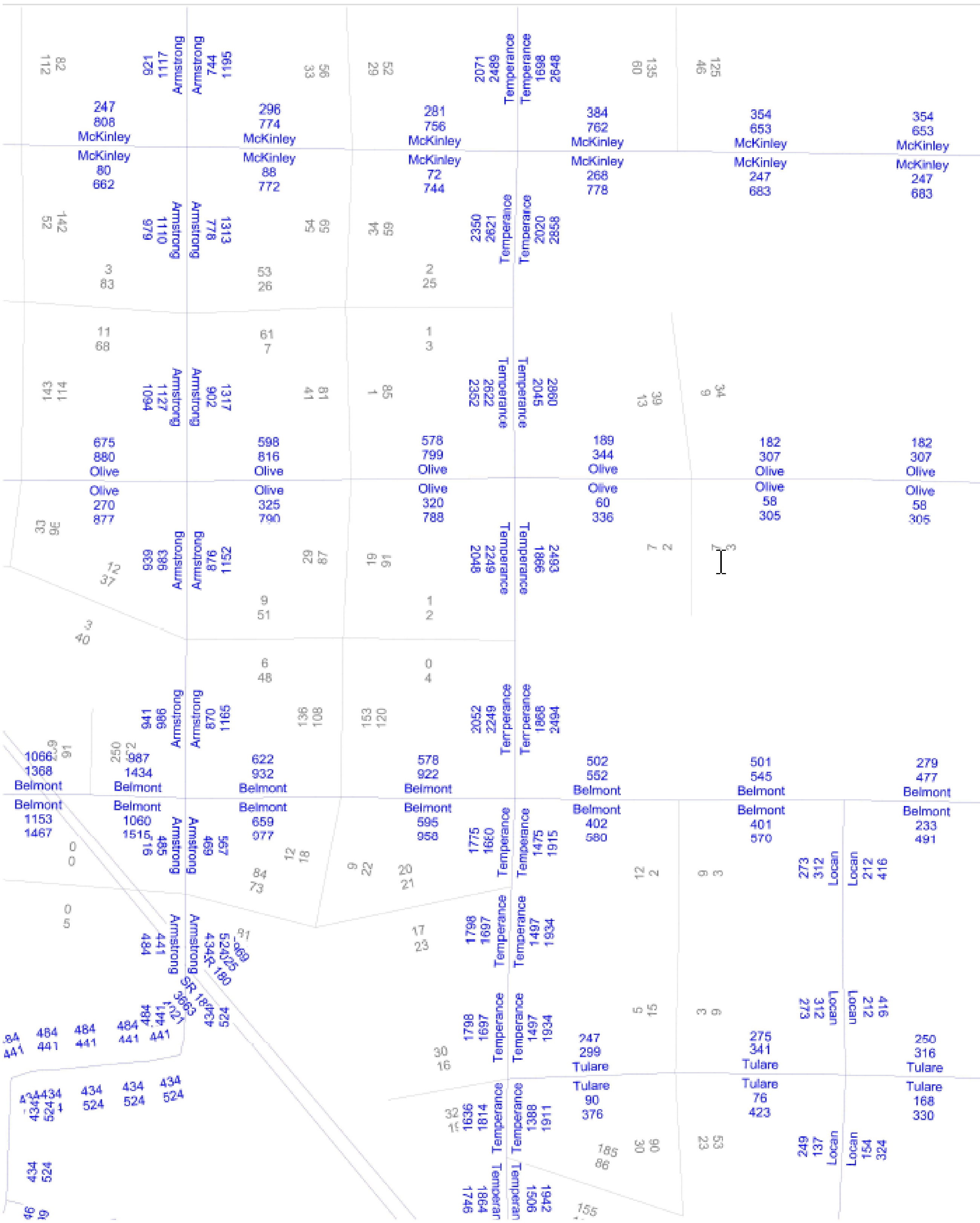
2018 Model Data



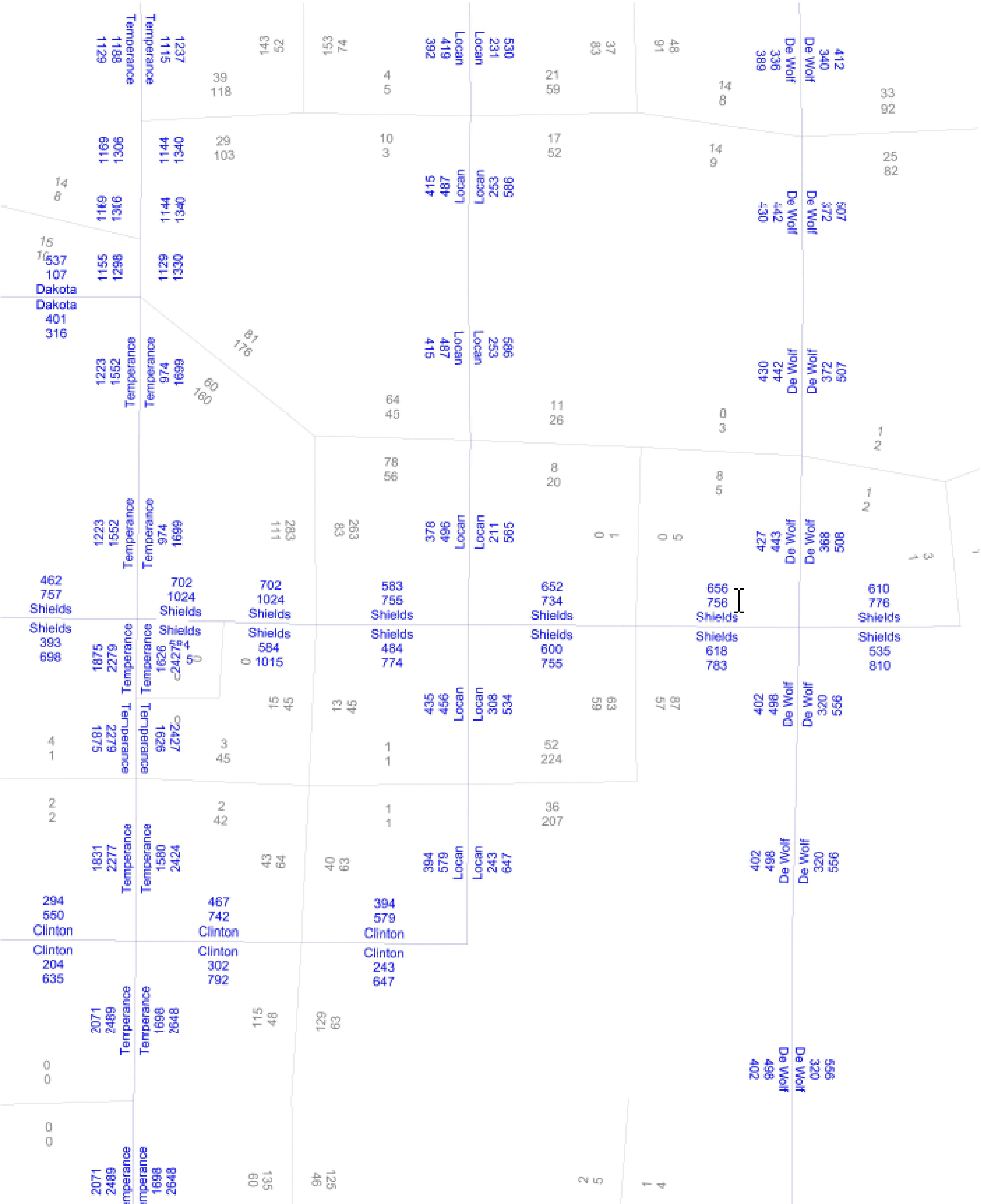
2035 Model Data



2035 Model Data

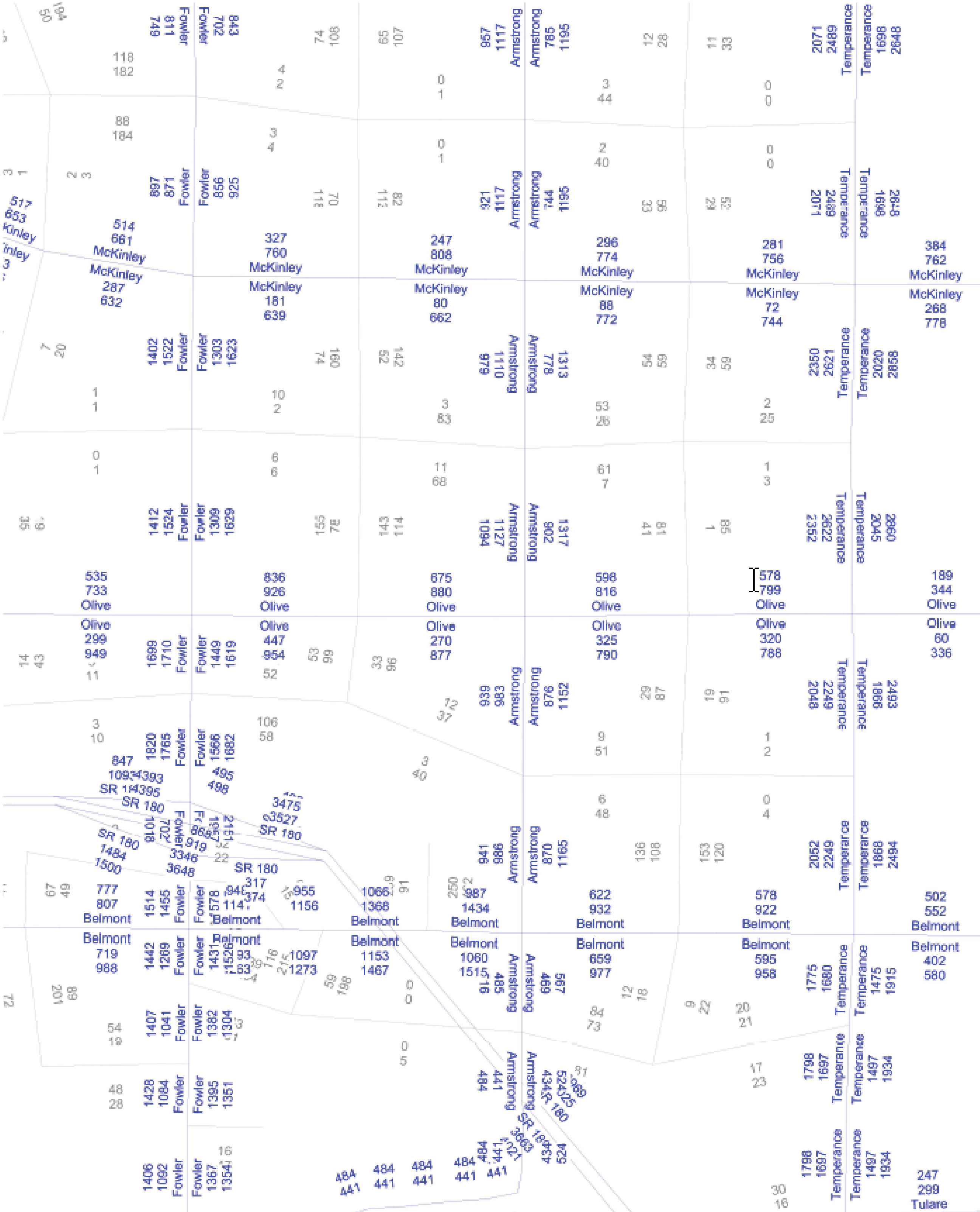


2035 Model Data



2035 Model Data

2035 Model Data



APPENDIX A-3

PROJECT TRIP GENERATION DATA

DATA STATISTICS

Land Use:

Single-Family Detached Housing (210)
Click for more details

Independent Variable:

Dwelling Units

Time Period:

Weekday

Setting/Location:

General Urban/Suburban

Trip Type:

Vehicle

Number of Studies:

159

Avg. Num. of Dwelling Units:

264

Average Rate:

9.44

Range of Rates:

4.81 - 19.39

Standard Deviation:

2.10

Fitted Curve Equation:

$Ln(T) = 0.92\ Ln(X) + 2.71$

R^2:

0.95

Directional Distribution:

50% entering, 50% exiting

Calculated Trip Ends:

Average Rate: 3295 (Total), 1647 (Entry), 1648 (Exit)
Fitted Curve: 3284 (Total), 1642 (Entry), 1642 (Exit)

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210)
Click for more details

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 7 and 9 a.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
173

Avg. Num. of Dwelling Units:
219

Average Rate:
0.74

Range of Rates:
0.33 - 2.27

Standard Deviation:
0.27

Fitted Curve Equation:
T = 0.71(X) + 4.80

R^2:
0.89

Directional Distribution:
25% entering, 75% exiting

Calculated Trip Ends:
Average Rate: 258 (Total), 64 (Entry), 194 (Exit)
Fitted Curve: 253 (Total), 63 (Entry), 190 (Exit)

DATA STATISTICS

Land Use:
Single-Family Detached Housing (210)
Click for more details

Independent Variable:
Dwelling Units

Time Period:
Weekday
Peak Hour of Adjacent Street Traffic
One Hour Between 4 and 6 p.m.

Setting/Location:
General Urban/Suburban

Trip Type:
Vehicle

Number of Studies:
190

Avg. Num. of Dwelling Units:
242

Average Rate:
0.99

Range of Rates:
0.44 - 2.98

Standard Deviation:
0.31

Fitted Curve Equation:
$Ln(T) = 0.96 Ln(X) + 0.20$

R^2:
0.92

Directional Distribution:
63% entering, 37% exiting

Calculated Trip Ends:
Average Rate: 346 (Total), 218 (Entry), 128 (Exit)
Fitted Curve: 337 (Total), 212 (Entry), 125 (Exit)

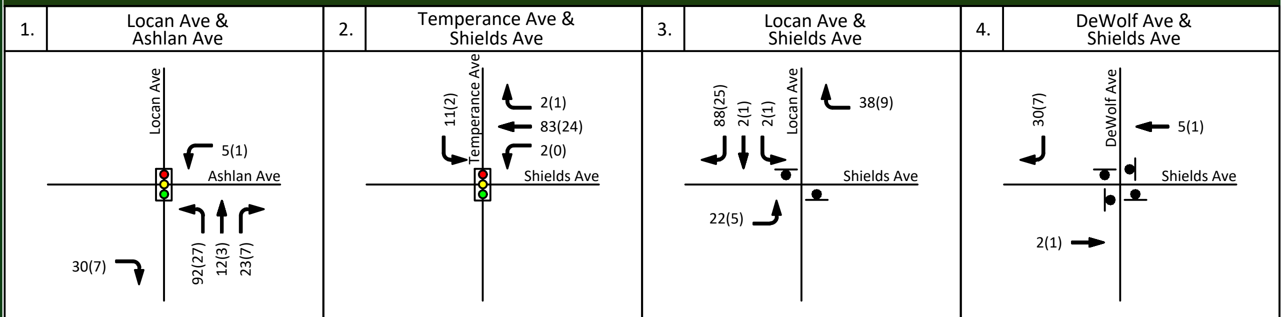
APPENDIX A-4

APPROVED/PENDING/PROPOSED

PROJECT DATA

CUSD Shields-Locan Elementary School
Project Only Trips

Figure 4



LEGEND

- = PROJECT LOCATION
- = STUDY INTERSECTION
- = STUDY SEGMENT
- XX = AM PROJECT ONLY TRIPS
- (XX) = PM PROJECT ONLY TRIPS
- = STOP SIGN
- = SIGNALIZED INTERSECTION

Not To Scale

JLB Traffic Engineering, Inc.
Traffic Engineering, Transportation Planning & Parking Solutions

1300 E. Shaw Ave., Ste. 103, Fresno, CA 93710
PHONE:(559) 570-8991, EMAIL: info@JLBtraffic.com, www.JLBtraffic.com

004-058 - 05/01/18 - JR

Near Term plus Project Traffic Conditions

Description of Approved and Pipeline Projects

Approved and Pipeline Projects consist of developments that are either under construction, built but not fully occupied, are not built but have final site development review (SDR) approval, or for which the lead agency or responsible agencies have knowledge of. The City of Fresno, County of Fresno and Caltrans staff were consulted throughout the preparation of this TIA regarding approved and/or known projects that could potentially impact the study intersections. JLB staff conducted a reconnaissance of the surrounding area to confirm the Near Term Projects. Subsequently, it was agreed that the Near Term Projects listed in Table VI were approved, near approval, or in the pipeline within the proximity of the proposed Project.

The trip generation listed in Table VI is that which is anticipated to be added to the streets and highways by these projects between the time of the preparation of this report and five years after buildout of the proposed Project. As shown in Table VI, the total trip generation for the Near Term Projects is 122,993 daily trips, 9,872 AM peak hour trips and 12,041 PM peak hour trips. Figure 6 illustrates the location of the approved, near approval, or pipeline projects and their combined trip assignment to the study intersections and segments under the Near Term plus Project Traffic Conditions scenario.

Table VI: Near Term Projects' Trip Generation

Approved Project Location	*Approved or Pipeline Project Name*	*Daily Trips*	*AM Peak Hour*	*PM Peak Hour*
A	TT 5171 (portion of)[1]	1,086	85	114
B	TT 5341 (portion of)[2]	1,322	104	139
C	TT 5424[2]	1,369	107	144
D	TT 5427[2]	3,238	254	340
E	TT 5464[2]	1,746	137	183
F	TT 5498[1]	755	59	79
G	TT 5531 (portion of)[1]	1,189	93	125
H	TT 5592[2]	2,436	191	255
I	TT 5605[2]	802	63	84
J	TT 5626 (portion of)[1]	387	30	41
K	TT 5638[2]	4,295	337	450
L	TT 5701A (portion of)[1]	123	23	13
M	TT 5717 (portion of)[3]	7,834	489	776
N	TT 5913[3]	1,029	81	108
O	TT 5953[1]	887	70	93
P	TT 5998 (portion of)[1]	736	58	77
Q	TT 6023[1]	3,578	280	375
R	TT 6095 (portion of)[1]	765	60	80
S	TT 6101[1]	1,048	82	110
T	TT 6107 (portion of)[1]	1,605	126	168
U	TT 6112 (portion of)[1]	519	41	54
V	TT 6114 (portion of)[1]	878	69	92
W	TT 6130[1]	1,650	275	314

Table VI: Near Term Projects' Trip Generation (cont.)

Approved Project Location	*Approved or Pipeline Project Name*	*Daily Trips*	*AM Peak Hour*	*PM Peak Hour*
X	TT 6143 (portion of)[1]	1,520	119	159
Y	TT 6164[1]	425	33	45
Z	TT 6174[1]	689	54	72
AA	TT 6191[4]	1,038	81	109
AB	TT 6193[1]	1,510	118	158
AC	TT 6208[1]	396	31	42
AD	TT 6214[4]	1,982	155	208
AE	Creekside Village Apartments[1]	1,457	92	111
AF	CUSD Fowler-McKinley Elementary School[1]	1,418	503	128
AG	Fancher Creek Town Center (portion of)[1]	62,596	3,251	5,942
AH	Neighborhood Shopping Center (portion of)[1]	2,065	148	159
AI	Sanger Education Center[1]	7,597	2,135	640
AJ	Sunnyside Market[1]	1,023	38	54
Total Approved and Pipeline Project Trips		**122,993**	**9,872**	**12,041**

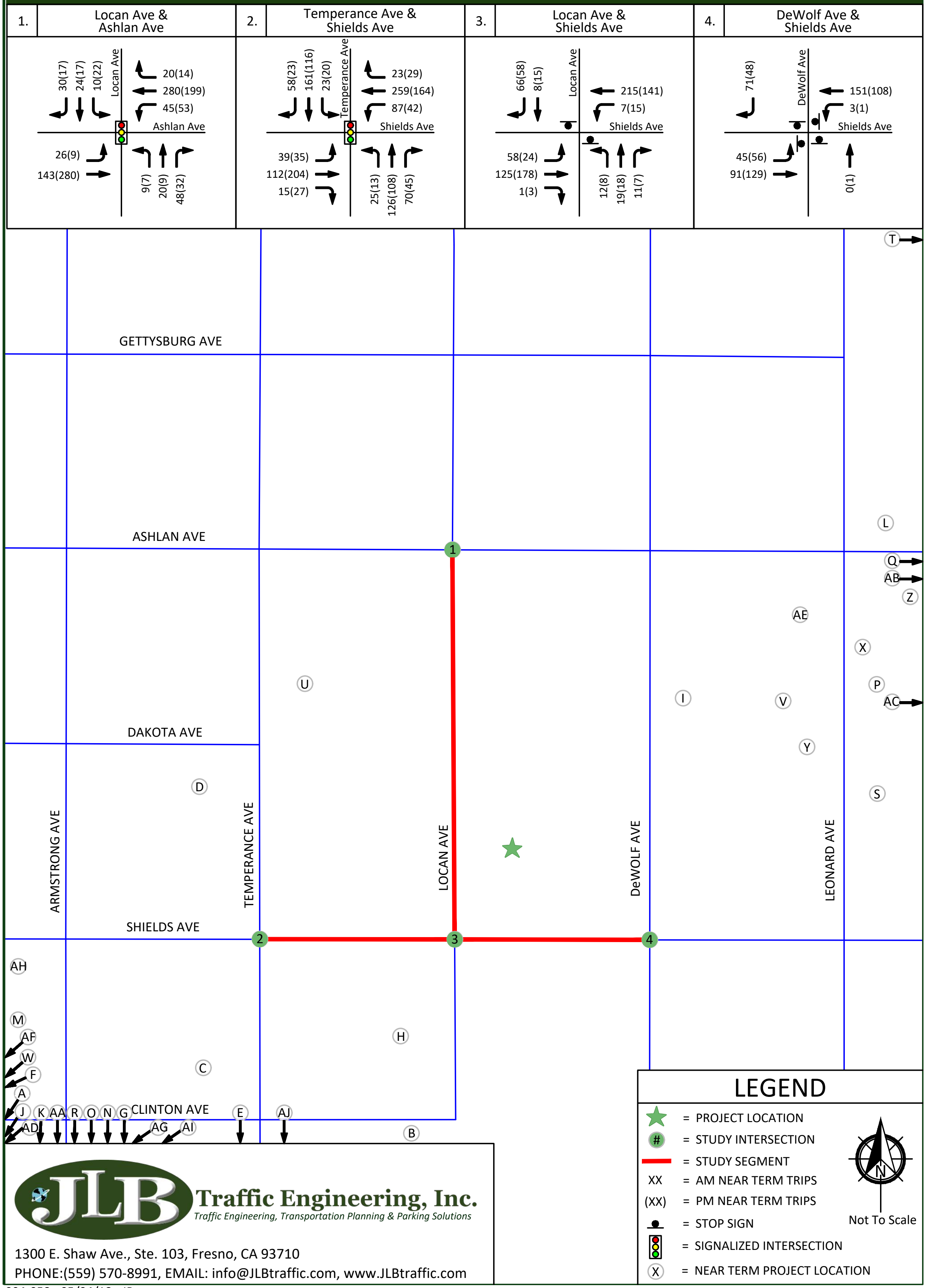
Note: 1 = Trip Generation prepared by JLB Traffic Engineering, Inc. based on readily available information
2 = Trip Generation based on Peters Engineering Group Traffic Impact Analysis Report
3 = Trip Generation based on TJKM Traffic Impact Analysis Report
4 = Trip Generation based on JLB Traffic Engineering, Inc. Traffic Impact Analysis Report

Traffic Signal Warrants

Peak hour traffic signal warrants, as appropriate, were prepared for the unsignalized intersections in the Near Term plus Project Traffic Conditions scenario. These warrants are found in Appendix J. The effects of right-turning traffic from the minor approach onto the major approach were taken into account using engineering judgement pursuant to the CA MUTCD guidelines for the preparation of traffic signal warrants. Under this scenario, the intersections of Locan Avenue and Shields Avenue and DeWolf Avenue and Shields Avenue satisfy the peak hour signal warrant during both peak periods. Based on the signal warrant and engineering judgement, signalization of these intersections is recommended.

CUSD Shields-Locan Elementary School
Near Term Projects' Trip Assignment

Figure 6



JLB Traffic Engineering, Inc.
Traffic Engineering, Transportation Planning & Parking Solutions

1300 E. Shaw Ave., Ste. 103, Fresno, CA 93710
PHONE:(559) 570-8991, EMAIL: info@JLBtraffic.com, www.JLBtraffic.com

004-058 - 05/04/18 - JR

APPENDIX B

ACCIDENT RATE SHEETS

BY: MEB RV **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: Temperance and Dakota

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 4 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	**0.55**	**0.000**	**0.8**	**33.2**	**33.2**	**F, M AND S**	**4 WAY STOP**	**RURAL**
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 4

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 12,681 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{4 \times 1{,}000{,}000}{5.0 \times 365 \times 12{,}681} = \frac{4{,}000{,}000}{23{,}142{,}825} = \mathbf{0.17}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: Temperance and Shields

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: SIGNAL AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.

Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)

For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)

Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection

Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate

"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate

"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	0.55	0.000	0.8	33.2	33.2	F, M AND S	4 WAY STOP	RURAL
I 04	**0.58**	**0.000**	**1.0**	**38.0**	**39.0**	**F, M AND S**	**SIGNALS**	**RURAL**
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE

N_I = TOTAL NUMBER OF ACCIDENTS

ADT = AVERAGE DAILY "ENTERING" TRAFFIC

T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 3

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 19,851 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{3 \quad X \quad 1{,}000{,}000}{5.0 \quad X \quad 365 \quad X \quad 19{,}851} = \frac{3{,}000{,}000}{36{,}228{,}075} = \mathbf{0.08}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: Temperance and Clinton

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: SIGNAL AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	0.55	0.000	0.8	33.2	33.2	F, M AND S	4 WAY STOP	RURAL
I 04	**0.58**	**0.000**	**1.0**	**38.0**	**39.0**	**F, M AND S**	**SIGNALS**	**RURAL**
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 5

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 13,250 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{5 \times 1{,}000{,}000}{5.0 \times 365 \times 13{,}250} = \frac{5{,}000{,}000}{24{,}181{,}250} = \mathbf{0.21}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: **Temperance and McKinley**

INTERSECTION TYPE: T-INTERSECTION CONTROL TYPE: STOP SIGN AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	0.55	0.000	0.8	33.2	33.2	F, M AND S	4 WAY STOP	RURAL
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	**0.16**	**0.000**	**1.8**	**39.5**	**41.3**	**T, Y AND Z**	**STOP/YIELD SIGNS (EXC 4WAY)**	**RURAL**
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \ X\ 1{,}000{,}000}{T\ X\ 365\ X\ ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 11

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 11,039 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \ X\ 1{,}000{,}000}{T\ X\ 365\ X\ ADT} = \frac{11 \quad X \quad 1{,}000{,}000}{5.0 \quad X \quad 365 \quad X \quad 11{,}039} = \frac{11{,}000{,}000}{20{,}146{,}175} = \mathbf{0.55}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: Temperance and Olive

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 4 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	**0.55**	**0.000**	**0.8**	**33.2**	**33.2**	**F, M AND S**	**4 WAY STOP**	**RURAL**
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 6

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 14,459 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{6 \times 1{,}000{,}000}{5.0 \times 365 \times 14{,}459} = \frac{6{,}000{,}000}{26{,}387{,}675} = \mathbf{0.23}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: **Temperance and Belmont**

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 4 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.

Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)

For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)

Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection

Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate

"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate

"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	**0.55**	**0.000**	**0.8**	**33.2**	**33.2**	**F, M AND S**	**4 WAY STOP**	**RURAL**
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE

N_I = TOTAL NUMBER OF ACCIDENTS

ADT = AVERAGE DAILY "ENTERING" TRAFFIC

T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 13

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 13,467 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{13 \times 1{,}000{,}000}{5.0 \times 365 \times 13{,}467} = \frac{13{,}000{,}000}{24{,}577{,}275} = \mathbf{0.53}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: Temperance and Tulare

INTERSECTION TYPE: T-INTERSECTION CONTROL TYPE: STOP SIGN AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	0.55	0.000	0.8	33.2	33.2	F, M AND S	4 WAY STOP	RURAL
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	**0.16**	**0.000**	**1.8**	**39.5**	**41.3**	**T, Y AND Z**	**STOP/YIELD SIGNS (EXC 4WAY)**	**RURAL**
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 4

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 11,121 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{4 \times 1{,}000{,}000}{5.0 \times 365 \times 11{,}121} = \frac{4{,}000{,}000}{20{,}295{,}825} = \mathbf{0.20}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: **SHIELDS AND LOCAN**

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 2 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	**0.22**	**0.000**	**2.5**	**43.4**	**45.9**	**F, M AND S**	**STOP/YIELD SIGNS (EXC 4WAY)**	**RURAL**
I 03	0.55	0.000	0.8	33.2	33.2	F, M AND S	4 WAY STOP	RURAL
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 8

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 9,479 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{8 \times 1{,}000{,}000}{5.0 \times 365 \times 9{,}479} = \frac{8{,}000{,}000}{17{,}299{,}175} = \mathbf{0.46}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: **Shields and Dewolf**

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 4 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	**0.55**	**0.000**	**0.8**	**33.2**	**33.2**	**F, M AND S**	**4 WAY STOP**	**RURAL**
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 0

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 10,102 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{0 \quad X \quad 1{,}000{,}000}{5.0 \quad X \quad 365 \quad X \quad 10{,}102} = \frac{0}{18{,}436{,}150} = \mathbf{0.00}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: **Armstrong and Clinton**

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 4 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	**0.55**	**0.000**	**0.8**	**33.2**	**33.2**	**F, M AND S**	**4 WAY STOP**	**RURAL**
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 0

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 9,305 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{0 \times 1{,}000{,}000}{5.0 \times 365 \times 9{,}305} = \frac{0}{16{,}981{,}625} = \mathbf{0.00}$$

BY: MEB **DATE:** 12/2/2018

INTERSECTION ACCIDENT RATE ANALYSIS

BASED ON BASIC EXPECTED ACCIDENT RATE TABLES F0R HIGHWAYS, INTERSECTIONS & RAMPS, CALTRANS, 2007.

LOCATION: Armstrong and Olive

INTERSECTION TYPE: FOUR-LEGGED CONTROL TYPE: 4 Way Stop AREA TYPE: Rural

BASE RATES

For highway project 0.50 mile in length, the base rate is in accidents per million vehicle miles. For highway projects < 0.50 mile in length, the base rate is in accidents per million vehicles and the Values listed are to be reduced by one-half.
Highway Segments - - - - - Accidents/Million Vehicle Miles (MVM)
For intersection and ramp projects, the base rate is in - - - - - Accidents/Million Vehicle Miles (MVM)
Intersections - - - - - - - - - - Accidents/Million Vehicles (MV) Entering the Intersection
Ramps - - - - - - - - - - - - Accidents/Million Vehicles (MV) Traversing the Ramp

ADT Factor = Value to be added to the base rate
"0.60/" means 0.60 DIVIDED by ADT, in thousands; i.e., with 5,000 ADT, 0.12 would be added to the base rate
"0.017" means 0.017 TIMES ADT, in thousands, i.e., with 20,000 ADT, 0.34 would be added to the base rate

BASIC EXPECTED ACCIDENT RATE TABLE FOR INTERSECTIONS

RATE GROUP	BASE RATE	ADT FACTOR	PERCENT FATALS	PERCENT INJURIES	PERCENT F + I	INTERSECTION TYPE*	CONTROL TYPE	AREA TYPE
I 01	0.09	0.000	2.8	47.2	50.0	F, M AND S	NO CONTROLS	RURAL
I 02	0.22	0.000	2.5	43.4	45.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 03	**0.55**	**0.000**	**0.8**	**33.2**	**33.2**	**F, M AND S**	**4 WAY STOP**	**RURAL**
I 04	0.58	0.000	1.0	38.0	39.0	F, M AND S	SIGNALS	RURAL
I 05	0.49	0.000	0.3	25.2	25.5	F, M AND S	4 WAY FLASHERS	RURAL
I 06	0.31	0.000	0.8	32.1	32.1	F, M AND S	NO CONTROLS	SUBURBAN
I 07	0.23	0.000	1.9	39.0	40.9	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 08	0.27	0.000	1.8	32.9	34.7	F, M AND S	4 WAY STOP	SUBURBAN
I 09	0.43	0.000	0.4	36.1	36.5	F, M AND S	SIGNALS	SUBURBAN
I 10	0.34	0.000	0.8	31.2	32.1	F, M AND S	4 WAY FLASHERS	SUBURBAN
I 11	0.04	0.000	2.6	37.3	37.3	F, M AND S	NO CONTROLS	URBAN
I 12	0.13	0.000	1.1	43.8	45.0	F, M AND S	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 13	0.19	0.000	0.4	29.2	29.2	F, M AND S	4 WAY STOP	URBAN
I 14	0.24	0.000	0.5	44.6	45.0	F, M AND S	SIGNALS	URBAN
I 15	0.22	0.000	1.0	34.6	35.6	F, M AND S	4 WAY FLASHERS	URBAN
I 16	0.11	0.000	1.6	47.0	48.6	T, Y AND Z	NO CONTROLS	RURAL
I 17	0.16	0.000	1.8	39.5	41.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	RURAL
I 18	0.33	0.000	4.8	47.6	52.4	T, Y AND Z	4 WAY STOP	RURAL
I 19	0.22	0.000	0.8	42.6	43.3	T, Y AND Z	SIGNALS	RURAL
I 20	0.39	0.000	0.6	37.1	37.6	T, Y AND Z	4 WAY FLASHERS	RURAL
I 21	0.39	0.000	0.5	35.5	35.9	T, Y AND Z	NO CONTROLS	SUBURBAN
I 22	0.14	0.000	1.2	38.2	39.3	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	SUBURBAN
I 23	0.28	0.000	1.7	22.2	22.2	T, Y AND Z	4 WAY STOP	SUBURBAN
I 24	0.28	0.000	0.4	37.2	37.5	T, Y AND Z	SIGNALS	SUBURBAN
I 25	0.24	0.000	2.9	34.4	34.4	T, Y AND Z	4 WAY FLASHERS	SUBURBAN
I 26	0.05	0.000	0.9	29.5	30.4	T, Y AND Z	NO CONTROLS	URBAN
I 27	0.08	0.000	1.0	45.1	46.1	T, Y AND Z	STOP/YIELD SIGNS (EXC 4WAY)	URBAN
I 28	0.04	0.000	1.1	16.7	16.7	T, Y AND Z	4 WAY STOP	URBAN
I 29	0.19	0.000	0.4	46.8	47.1	T, Y AND Z	SIGNALS	URBAN
I 30	0.14	0.000	2.6	31.6	34.2	T, Y AND Z	4 WAY FLASHERS	URBAN

RATE CALCULATION FORMULA

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT}$$

WHERE:

R_I = INTERSECTION ACCIDENT RATE
N_I = TOTAL NUMBER OF ACCIDENTS
ADT = AVERAGE DAILY "ENTERING" TRAFFIC
T = ANALYSIS PERIOD, IN YEARS

INFORMATION SOURCES

TOTAL NUMBER OF REPORTED ACCIDENTS = 1

TIME RANGE OF ACCIDENT RECORDS 01/01/13 TO 12/31/17 = 5.00 YEARS

TOTAL ADT ENTERING INTERSECTION 13,326 DATE OF COUNT = 06/05/18

CALCULATIONS:

$$R_I = \frac{N_I \times 1{,}000{,}000}{T \times 365 \times ADT} = \frac{1 \times 1{,}000{,}000}{5.0 \times 365 \times 13{,}326} = \frac{1{,}000{,}000}{24{,}319{,}950} = \mathbf{0.04}$$

APPENDIX C

EXISTING (2018) CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Intersection	
Intersection Delay, s/veh	170.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	10	25	29	6	77	26	366	12	33	577	97
Future Vol, veh/h	57	10	25	29	6	77	26	366	12	33	577	97
Peak Hour Factor	0.82	0.82	0.82	0.71	0.71	0.71	0.96	0.96	0.96	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	70	12	30	41	8	108	27	381	13	42	730	123
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	15.8	14.2	17.3	289.3
HCM LOS	C	B	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	62%	100%	0%	100%	0%
Vol Thru, %	0%	100%	91%	11%	0%	7%	0%	86%
Vol Right, %	0%	0%	9%	27%	0%	93%	0%	14%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	26	244	134	92	29	83	33	674
LT Vol	26	0	0	57	29	0	33	0
Through Vol	0	244	122	10	0	6	0	577
RT Vol	0	0	12	25	0	77	0	97
Lane Flow Rate	27	254	140	112	41	117	42	853
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.059	0.515	0.28	0.263	0.099	0.246	0.086	1.614
Departure Headway (Hd)	8.872	8.357	8.293	9.704	9.997	8.805	7.422	6.81
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	406	435	435	372	361	410	482	537
Service Time	6.572	6.057	5.993	7.404	7.697	6.505	5.183	4.57
HCM Lane V/C Ratio	0.067	0.584	0.322	0.301	0.114	0.285	0.087	1.588
HCM Control Delay	12.1	19.6	14.2	15.8	13.8	14.4	10.9	302.9
HCM Lane LOS	B	C	B	C	B	B	B	F
HCM 95th-tile Q	0.2	2.9	1.1	1	0.3	1	0.3	47

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	101	275	95	178	485	52	73	319	99	23	402	239
v/c Ratio	0.36	0.64	0.21	0.68	0.54	0.10	0.32	0.36	0.12	0.20	0.27	0.30
Control Delay	51.2	43.1	2.9	61.9	36.7	0.4	52.6	21.3	0.3	53.5	22.2	4.2
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	51.2	43.1	2.9	61.9	36.7	0.4	52.6	21.3	0.3	53.5	22.2	4.2
Queue Length 50th (ft)	32	167	0	60	155	0	24	113	0	15	92	0
Queue Length 95th (ft)	61	230	10	#118	202	0	50	252	0	44	156	53
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	294	669	642	273	1270	654	273	890	851	141	1482	802
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.41	0.15	0.65	0.38	0.08	0.27	0.36	0.12	0.16	0.27	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	228	79	157	427	46	63	274	85	22	382	227
Future Volume (veh/h)	84	228	79	157	427	46	63	274	85	22	382	227
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	275	95	178	485	52	73	319	99	23	402	239
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.86	0.86	0.86	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	212	381	322	244	778	347	182	859	728	51	1511	674
Arrive On Green	0.06	0.20	0.20	0.07	0.22	0.22	0.05	0.46	0.46	0.03	0.43	0.43
Sat Flow, veh/h	3456	1870	1581	3456	3554	1585	3456	1870	1585	1781	3554	1585
Grp Volume(v), veh/h	101	275	95	178	485	52	73	319	99	23	402	239
Grp Sat Flow(s),veh/h/ln	1728	1870	1581	1728	1777	1585	1728	1870	1585	1781	1777	1585
Q Serve(g_s), s	2.8	13.6	5.0	5.0	12.2	2.1	2.0	11.0	3.6	1.3	7.2	6.9
Cycle Q Clear(g_c), s	2.8	13.6	5.0	5.0	12.2	2.1	2.0	11.0	3.6	1.3	7.2	6.9
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	212	381	322	244	778	347	182	859	728	51	1511	674
V/C Ratio(X)	0.48	0.72	0.29	0.73	0.62	0.15	0.40	0.37	0.14	0.45	0.27	0.35
Avail Cap(c_a), veh/h	280	682	576	280	1295	578	280	859	728	144	1511	674
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	44.8	36.7	33.3	45.0	34.9	21.0	45.3	17.4	15.4	47.2	18.4	9.0
Incr Delay (d2), s/veh	0.6	9.4	1.9	6.3	3.1	0.8	0.5	1.2	0.4	2.4	0.4	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(50%),veh/ln	1.2	6.9	2.0	2.3	5.4	1.0	0.9	4.6	1.3	0.6	2.8	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.4	46.2	35.2	51.3	38.0	21.8	45.8	18.6	15.8	49.6	18.8	10.4
LnGrp LOS	D	D	D	D	D	C	D	B	B	D	B	B
Approach Vol, veh/h		471			715			491			664	
Approach Delay, s/veh		43.8			40.1			22.1			16.9	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	48.0	12.0	26.9	8.5	51.4	12.9	26.0
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	* 5.9
Max Green Setting (Gmax), s	8.0	42.0	8.0	36.0	8.0	38.0	8.0	* 36
Max Q Clear Time (g_c+I1), s	4.0	9.2	4.8	14.2	3.3	13.0	7.0	15.6
Green Ext Time (p_c), s	0.0	7.0	0.0	7.3	0.0	4.2	0.0	4.4

Intersection Summary	
HCM 6th Ctrl Delay	30.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	12	122	106	381	44	360	94	188	542
v/c Ratio	0.06	0.30	0.54	0.65	0.23	0.65	0.17	0.93	0.79
Control Delay	36.3	24.8	46.4	23.1	37.9	32.5	3.6	85.0	36.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.3	24.8	46.4	23.1	37.9	32.5	3.6	85.0	36.2
Queue Length 50th (ft)	5	46	45	114	18	137	0	84	232
Queue Length 95th (ft)	21	71	82	138	54	#306	14	#254	#576
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	203	921	203	880	203	554	549	203	688
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.13	0.52	0.43	0.22	0.65	0.17	0.93	0.79

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	84	10	67	114	126	36	292	76	158	392	63
Future Volume (veh/h)	9	84	10	67	114	126	36	292	76	158	392	63
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	12	109	13	106	181	200	44	360	94	188	467	75
Peak Hour Factor	0.77	0.77	0.77	0.63	0.63	0.63	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	42	380	45	165	243	268	112	534	451	196	522	84
Arrive On Green	0.02	0.23	0.23	0.09	0.30	0.30	0.06	0.29	0.29	0.11	0.34	0.34
Sat Flow, veh/h	1767	1627	194	1767	800	884	1767	1856	1567	1767	1559	250
Grp Volume(v), veh/h	12	0	122	106	0	381	44	360	94	188	0	542
Grp Sat Flow(s),veh/h/ln	1767	0	1821	1767	0	1684	1767	1856	1567	1767	0	1810
Q Serve(g_s), s	0.5	0.0	4.2	4.4	0.0	15.6	1.8	13.1	3.5	8.1	0.0	21.8
Cycle Q Clear(g_c), s	0.5	0.0	4.2	4.4	0.0	15.6	1.8	13.1	3.5	8.1	0.0	21.8
Prop In Lane	1.00		0.11	1.00		0.52	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	42	0	425	165	0	511	112	534	451	196	0	606
V/C Ratio(X)	0.29	0.00	0.29	0.64	0.00	0.75	0.39	0.67	0.21	0.96	0.00	0.89
Avail Cap(c_a), veh/h	196	0	880	196	0	814	196	534	451	196	0	606
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.7	0.0	24.1	33.4	0.0	24.0	34.4	24.1	20.7	33.8	0.0	24.1
Incr Delay (d2), s/veh	1.4	0.0	1.0	2.9	0.0	5.9	0.8	6.7	1.1	51.6	0.0	18.1
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(50%),veh/ln	0.2	0.0	1.8	1.9	0.0	6.5	0.8	6.2	1.3	6.0	0.0	11.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.1	0.0	25.1	36.4	0.0	29.9	35.2	30.8	21.7	85.4	0.0	42.3
LnGrp LOS	D	A	C	D	A	C	D	C	C	F	A	D
Approach Vol, veh/h		134			487			498			730	
Approach Delay, s/veh		26.3			31.3			29.5			53.4	
Approach LOS		C			C			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	32.3	5.8	29.5	12.5	28.7	11.2	24.2
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0
Max Q Clear Time (g_c+I1), s	3.8	23.8	2.5	17.6	10.1	15.1	6.4	6.2
Green Ext Time (p_c), s	0.0	0.0	0.0	4.5	0.0	2.6	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	39.1
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	64	313	125	50	447
Future Vol, veh/h	51	64	313	125	50	447
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	76	76	93	93	82	82
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	67	84	337	134	61	545

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1071	404	0	0	471	0
Stage 1	404	-	-	-	-	-
Stage 2	667	-	-	-	-	-
Critical Hdwy	6.46	6.26	-	-	4.16	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	-	-	2.254	-
Pot Cap-1 Maneuver	240	638	-	-	1070	-
Stage 1	666	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	220	638	-	-	1070	-
Mov Cap-2 Maneuver	220	-	-	-	-	-
Stage 1	666	-	-	-	-	-
Stage 2	462	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.2	0	0.9
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	346	1070	-
HCM Lane V/C Ratio	-	-	0.437	0.057	-
HCM Control Delay (s)	-	-	23.2	8.6	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	2.1	0.2	-

Intersection	
Intersection Delay, s/veh	74.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	77	98	17	145	193	23	13	336	44	6	394	103
Future Vol, veh/h	77	98	17	145	193	23	13	336	44	6	394	103
Peak Hour Factor	0.75	0.75	0.75	0.87	0.87	0.87	0.95	0.95	0.95	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	103	131	23	167	222	26	14	354	46	6	419	110
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	32.9	82.6	82	81.3
HCM LOS	D	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	3%	40%	40%	1%	0%
Vol Thru, %	85%	51%	53%	98%	0%
Vol Right, %	11%	9%	6%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	393	192	361	400	103
LT Vol	13	77	145	6	0
Through Vol	336	98	193	394	0
RT Vol	44	17	23	0	103
Lane Flow Rate	414	256	415	426	110
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.019	0.689	1.022	1.075	0.255
Departure Headway (Hd)	9.291	10.166	9.255	9.41	8.672
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	393	358	394	387	416
Service Time	7.291	8.166	7.255	7.11	6.372
HCM Lane V/C Ratio	1.053	0.715	1.053	1.101	0.264
HCM Control Delay	82	32.9	82.6	98.5	14.3
HCM Lane LOS	F	D	F	F	B
HCM 95th-tile Q	12.6	4.9	12.8	14.3	1

Intersection	
Intersection Delay, s/veh	44.5
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	53	57	39	99	109	42	29	277	29	26	473	36
Future Vol, veh/h	53	57	39	99	109	42	29	277	29	26	473	36
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	68	73	50	111	122	47	32	304	32	27	498	38
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	14.9	19.1	26.7	78.8
HCM LOS	B	C	D	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	9%	48%	0%	48%	0%	5%
Vol Thru, %	83%	52%	0%	52%	0%	88%
Vol Right, %	9%	0%	100%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	335	110	39	208	42	535
LT Vol	29	53	0	99	0	26
Through Vol	277	57	0	109	0	473
RT Vol	29	0	39	0	42	36
Lane Flow Rate	368	141	50	234	47	563
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.72	0.334	0.106	0.534	0.096	1.051
Departure Headway (Hd)	7.24	8.939	7.957	8.589	7.613	6.721
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	504	405	453	423	474	541
Service Time	5.24	6.639	5.657	6.289	5.313	4.744
HCM Lane V/C Ratio	0.73	0.348	0.11	0.553	0.099	1.041
HCM Control Delay	26.7	16.1	11.6	20.7	11.1	78.8
HCM Lane LOS	D	C	B	C	B	F
HCM 95th-tile Q	5.8	1.4	0.4	3.1	0.3	16.3

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	0	1	22	0	5	0	288	4	5	736	0
Future Vol, veh/h	0	0	1	22	0	5	0	288	4	5	736	0
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	25	25	25	79	79	79	90	90	90	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	4	28	0	6	0	320	4	6	827	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1164	1163	827	1163	1161	322	827	0	0	324	0	0
Stage 1	839	839	-	322	322	-	-	-	-	-	-	-
Stage 2	325	324	-	841	839	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	171	194	370	171	194	717	800	-	-	1230	-	-
Stage 1	359	380	-	688	649	-	-	-	-	-	-	-
Stage 2	685	648	-	358	380	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	168	192	370	168	192	717	800	-	-	1230	-	-
Mov Cap-2 Maneuver	168	192	-	168	192	-	-	-	-	-	-	-
Stage 1	359	377	-	688	649	-	-	-	-	-	-	-
Stage 2	679	648	-	351	377	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.8	27.2	0	0.1
HCM LOS	B	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	800	-	-	370	196	1230	-	-
HCM Lane V/C Ratio	-	-	-	0.011	0.174	0.005	-	-
HCM Control Delay (s)	0	-	-	14.8	27.2	7.9	0	-
HCM Lane LOS	A	-	-	B	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.6	0	-	-

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	222	23	46	284	7	1	37	47	28	101	235
Future Vol, veh/h	64	222	23	46	284	7	1	37	47	28	101	235
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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	82	82	82	64	64	63	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	74	258	27	56	346	9	2	58	75	30	107	250

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	355	0	0	285	0	0	1061	887	272	949	896	351
Stage 1	-	-	-	-	-	-	420	420	-	463	463	-
Stage 2	-	-	-	-	-	-	641	467	-	486	433	-
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	1204	-	-	1277	-	-	202	283	767	240	280	692
Stage 1	-	-	-	-	-	-	611	589	-	579	564	-
Stage 2	-	-	-	-	-	-	463	562	-	563	582	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1204	-	-	1277	-	-	79	251	767	163	248	692
Mov Cap-2 Maneuver	-	-	-	-	-	-	79	251	-	163	248	-
Stage 1	-	-	-	-	-	-	574	553	-	544	533	-
Stage 2	-	-	-	-	-	-	223	531	-	427	546	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	1.1	19.2	24.1
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	386	1204	-	-	1277	-	-	223	692
HCM Lane V/C Ratio	0.347	0.062	-	-	0.044	-	-	0.615	0.361
HCM Control Delay (s)	19.2	8.2	-	-	7.9	0	-	44	13.1
HCM Lane LOS	C	A	-	-	A	A	-	E	B
HCM 95th %tile Q(veh)	1.5	0.2	-	-	0.1	-	-	3.6	1.6

Intersection	
Intersection Delay, s/veh	39
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	207	86	11	0	94	13	24	221	2	19	263	214
Future Vol, veh/h	207	86	11	0	94	13	24	221	2	19	263	214
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.79	0.79	0.79	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	227	95	12	0	101	14	30	280	3	23	313	255
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	23.8	13.7	20.1	62.5
HCM LOS	C	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	68%	0%	4%
Vol Thru, %	89%	28%	88%	53%
Vol Right, %	1%	4%	12%	43%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	247	304	107	496
LT Vol	24	207	0	19
Through Vol	221	86	94	263
RT Vol	2	11	13	214
Lane Flow Rate	313	334	115	590
Geometry Grp	1	1	1	1
Degree of Util (X)	0.601	0.668	0.251	1.002
Departure Headway (Hd)	7.033	7.309	7.994	6.109
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	516	498	452	590
Service Time	5.033	5.309	5.994	4.201
HCM Lane V/C Ratio	0.607	0.671	0.254	1
HCM Control Delay	20.1	23.8	13.7	62.5
HCM Lane LOS	C	C	B	F
HCM 95th-tile Q	3.9	4.9	1	14.8

Intersection	
Intersection Delay, s/veh	38.4
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	55	18	57	131	33	16	153	10	42	423	47
Future Vol, veh/h	30	55	18	57	131	33	16	153	10	42	423	47
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.73	0.73	0.73	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	66	22	76	175	44	22	210	14	50	504	56
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.1	18.4	15.2	62.5
HCM LOS	B	C	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	29%	26%	8%
Vol Thru, %	85%	53%	59%	83%
Vol Right, %	6%	17%	15%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	179	103	221	512
LT Vol	16	30	57	42
Through Vol	153	55	131	423
RT Vol	10	18	33	47
Lane Flow Rate	245	124	295	610
Geometry Grp	1	1	1	1
Degree of Util (X)	0.454	0.255	0.561	1.006
Departure Headway (Hd)	6.671	7.503	6.853	5.939
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	537	481	525	610
Service Time	4.753	5.503	4.929	3.998
HCM Lane V/C Ratio	0.456	0.258	0.562	1
HCM Control Delay	15.2	13.1	18.4	62.5
HCM Lane LOS	C	B	C	F
HCM 95th-tile Q	2.3	1	3.4	15.3

Intersection	
Intersection Delay, s/veh	39.2
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	102	7	98	226	25	68	150	111	25	230	384
Future Vol, veh/h	46	102	7	98	226	25	68	150	111	25	230	384
Peak Hour Factor	0.90	0.90	0.90	0.80	0.80	0.80	0.69	0.69	0.69	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	113	8	123	283	31	99	217	161	30	277	463
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	15.9	27.7	27.6	43.6
HCM LOS	C	D	D	E

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	31%	0%	100%	0%	100%	0%	10%	0%
Vol Thru, %	69%	0%	0%	94%	0%	90%	90%	0%
Vol Right, %	0%	100%	0%	6%	0%	10%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	218	111	46	109	98	251	255	384
LT Vol	68	0	46	0	98	0	25	0
Through Vol	150	0	0	102	0	226	230	0
RT Vol	0	111	0	7	0	25	0	384
Lane Flow Rate	316	161	51	121	122	314	307	463
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.762	0.344	0.142	0.317	0.31	0.741	0.691	0.941
Departure Headway (Hd)	8.677	7.689	9.992	9.421	9.201	8.61	8.205	7.43
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	420	465	361	384	393	424	442	490
Service Time	6.377	5.489	7.704	7.133	6.901	6.31	5.905	5.13
HCM Lane V/C Ratio	0.752	0.346	0.141	0.315	0.31	0.741	0.695	0.945
HCM Control Delay	34.3	14.5	14.4	16.5	16	32.2	27.3	54.5
HCM Lane LOS	D	B	B	C	C	D	D	F
HCM 95th-tile Q	6.3	1.5	0.5	1.3	1.3	6	5.1	11.4

Intersection	
Intersection Delay, s/veh	14.8
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	24	23	6	7	46	29	473	24	60	272	37
Future Vol, veh/h	24	24	23	6	7	46	29	473	24	60	272	37
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	29	28	7	8	50	30	493	25	65	296	40
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	11.8	10.6	14.5	16.5
HCM LOS	B	B	B	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	34%	100%	0%	100%	0%
Vol Thru, %	0%	100%	87%	34%	0%	13%	0%	88%
Vol Right, %	0%	0%	13%	32%	0%	87%	0%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	29	315	182	71	6	53	60	309
LT Vol	29	0	0	24	6	0	60	0
Through Vol	0	315	158	24	0	7	0	272
RT Vol	0	0	24	23	0	46	0	37
Lane Flow Rate	30	328	189	86	7	58	65	336
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.056	0.562	0.319	0.176	0.015	0.111	0.125	0.587
Departure Headway (Hd)	6.664	6.159	6.066	7.4	8.071	6.946	6.88	6.291
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	536	585	590	482	441	513	520	571
Service Time	4.422	3.917	3.823	5.184	5.862	4.735	4.642	4.052
HCM Lane V/C Ratio	0.056	0.561	0.32	0.178	0.016	0.113	0.125	0.588
HCM Control Delay	9.8	16.6	11.7	11.8	11	10.6	10.6	17.7
HCM Lane LOS	A	C	B	B	B	B	B	C
HCM 95th-tile Q	0.2	3.5	1.4	0.6	0	0.4	0.4	3.8

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	170	384	63	78	167	27	56	388	132	49	219	74
v/c Ratio	0.32	0.70	0.11	0.36	0.28	0.07	0.26	0.52	0.18	0.43	0.16	0.11
Control Delay	41.3	39.2	0.4	52.3	36.2	0.3	50.3	27.9	4.3	60.3	22.3	0.3
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	41.3	39.2	0.4	52.3	36.2	0.3	50.3	27.9	4.3	60.3	22.3	0.3
Queue Length 50th (ft)	47	225	0	25	52	0	18	194	0	31	49	0
Queue Length 95th (ft)	#110	295	0	51	67	0	40	319	35	#76	82	0
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	525	694	682	219	1318	682	219	753	724	113	1394	700
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.55	0.09	0.36	0.13	0.04	0.26	0.52	0.18	0.43	0.16	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	319	52	69	147	24	52	361	123	43	193	65
Future Volume (veh/h)	141	319	52	69	147	24	52	361	123	43	193	65
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	170	384	63	78	167	27	56	388	132	49	219	74
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	770	488	413	189	330	147	168	747	633	81	1373	611
Arrive On Green	0.22	0.26	0.26	0.05	0.09	0.09	0.05	0.40	0.40	0.05	0.39	0.39
Sat Flow, veh/h	3456	1870	1585	3456	3554	1585	3456	1870	1585	1781	3554	1581
Grp Volume(v), veh/h	170	384	63	78	167	27	56	388	132	49	219	74
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1728	1777	1585	1728	1870	1585	1781	1777	1581
Q Serve(g_s), s	3.9	18.3	2.2	2.1	4.3	1.2	1.5	15.1	3.7	2.6	3.9	1.3
Cycle Q Clear(g_c), s	3.9	18.3	2.2	2.1	4.3	1.2	1.5	15.1	3.7	2.6	3.9	1.3
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	770	488	413	189	330	147	168	747	633	81	1373	611
V/C Ratio(X)	0.22	0.79	0.15	0.41	0.51	0.18	0.33	0.52	0.21	0.60	0.16	0.12
Avail Cap(c_a), veh/h	770	683	579	216	1299	579	216	747	633	112	1373	611
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	30.4	32.9	15.9	43.8	41.4	27.2	44.1	21.8	9.3	44.9	19.2	3.6
Incr Delay (d2), s/veh	0.1	10.5	0.7	0.5	4.6	2.3	0.4	2.6	0.7	2.7	0.2	0.4
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	1.5	9.2	1.1	0.9	2.0	0.7	0.6	6.6	1.9	1.1	1.5	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	43.4	16.6	44.3	45.9	29.4	44.5	24.3	10.0	47.5	19.5	4.0
LnGrp LOS	C	D	B	D	D	C	D	C	B	D	B	A
Approach Vol, veh/h		617			272			576			342	
Approach Delay, s/veh		37.1			43.8			23.0			20.1	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.3	43.0	27.2	14.2	10.1	44.3	11.1	30.3
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	5.3
Max Green Setting (Gmax), s	6.0	37.0	6.0	35.0	6.0	37.0	6.0	35.0
Max Q Clear Time (g_c+I1), s	3.5	5.9	5.9	6.3	4.6	17.1	4.1	20.3
Green Ext Time (p_c), s	0.0	3.0	0.0	2.6	0.0	4.9	0.0	4.7

Intersection Summary	
HCM 6th Ctrl Delay	30.4
HCM 6th LOS	C

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	46	66	28	60	16	504	52	20	323
v/c Ratio	0.17	0.16	0.10	0.15	0.06	0.43	0.05	0.07	0.28
Control Delay	30.2	12.9	30.5	9.4	30.7	19.6	0.1	30.7	17.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.2	12.9	30.5	9.4	30.7	19.6	0.1	30.7	17.4
Queue Length 50th (ft)	10	8	6	3	3	77	0	4	43
Queue Length 95th (ft)	62	41	37	24	30	#572	0	35	#311
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	293	1265	293	1203	293	1159	1033	293	1153
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.05	0.10	0.05	0.05	0.43	0.05	0.07	0.28

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	34	27	22	11	36	15	464	48	19	288	12
Future Volume (veh/h)	42	34	27	22	11	36	15	464	48	19	288	12
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	46	37	29	28	14	46	16	504	52	20	310	13
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.92	0.92	0.92	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	130	147	115	90	49	162	56	727	617	68	705	30
Arrive On Green	0.07	0.15	0.15	0.05	0.13	0.13	0.03	0.39	0.39	0.04	0.40	0.40
Sat Flow, veh/h	1781	972	762	1781	383	1260	1781	1870	1585	1781	1782	75
Grp Volume(v), veh/h	46	0	66	28	0	60	16	504	52	20	0	323
Grp Sat Flow(s),veh/h/ln	1781	0	1733	1781	0	1644	1781	1870	1585	1781	0	1857
Q Serve(g_s), s	1.4	0.0	1.9	0.9	0.0	1.9	0.5	12.7	1.2	0.6	0.0	7.2
Cycle Q Clear(g_c), s	1.4	0.0	1.9	0.9	0.0	1.9	0.5	12.7	1.2	0.6	0.0	7.2
Prop In Lane	1.00		0.44	1.00		0.77	1.00		1.00	1.00		0.04
Lane Grp Cap(c), veh/h	130	0	262	90	0	212	56	727	617	68	0	735
V/C Ratio(X)	0.35	0.00	0.25	0.31	0.00	0.28	0.29	0.69	0.08	0.29	0.00	0.44
Avail Cap(c_a), veh/h	268	0	1134	268	0	1075	268	727	617	268	0	735
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	25.0	0.0	21.2	25.9	0.0	22.3	26.8	14.5	10.9	26.5	0.0	12.5
Incr Delay (d2), s/veh	0.6	0.0	1.4	0.7	0.0	2.0	1.0	5.4	0.3	0.9	0.0	1.9
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(50%),veh/ln	0.5	0.0	0.8	0.3	0.0	0.8	0.2	5.2	0.4	0.3	0.0	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.6	0.0	22.5	26.6	0.0	24.3	27.8	19.8	11.2	27.3	0.0	14.4
LnGrp LOS	C	A	C	C	A	C	C	B	B	C	A	B
Approach Vol, veh/h		112			88			572			343	
Approach Delay, s/veh		23.8			25.0			19.3			15.2	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	5.8	29.1	8.1	13.6	6.2	28.7	6.8	14.9
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0
Max Q Clear Time (g_c+I1), s	2.5	9.2	3.4	3.9	2.6	14.7	2.9	3.9
Green Ext Time (p_c), s	0.0	3.0	0.0	0.6	0.0	3.5	0.0	0.7

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Intersection						
Int Delay, s/veh	2.2					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	34	499	71	44	291
Future Vol, veh/h	48	34	499	71	44	291
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	89	89	91	91	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	38	548	78	47	313

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	994	587	0	0	626	0
Stage 1	587	-	-	-	-	-
Stage 2	407	-	-	-	-	-
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	272	510	-	-	956	-
Stage 1	556	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	256	510	-	-	956	-
Mov Cap-2 Maneuver	256	-	-	-	-	-
Stage 1	556	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.5	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	323	956	-
HCM Lane V/C Ratio	-	-	0.285	0.049	-
HCM Control Delay (s)	-	-	20.5	9	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.2	0.2	-

Intersection	
Intersection Delay, s/veh	37.1
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	89	98	13	55	57	8	8	484	67	20	270	50
Future Vol, veh/h	89	98	13	55	57	8	8	484	67	20	270	50
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.93	0.93	0.93	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	94	103	14	60	63	9	9	520	72	21	287	53
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	15.6	13.6	61.5	17.8
HCM LOS	C	B	F	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	1%	45%	46%	7%	0%
Vol Thru, %	87%	49%	47%	93%	0%
Vol Right, %	12%	7%	7%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	559	200	120	290	50
LT Vol	8	89	55	20	0
Through Vol	484	98	57	270	0
RT Vol	67	13	8	0	50
Lane Flow Rate	601	211	132	309	53
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.001	0.424	0.277	0.59	0.091
Departure Headway (Hd)	5.996	7.254	7.561	6.88	6.128
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	601	495	472	521	582
Service Time	4.051	5.332	5.652	4.646	3.894
HCM Lane V/C Ratio	1	0.426	0.28	0.593	0.091
HCM Control Delay	61.5	15.6	13.6	19.2	9.5
HCM Lane LOS	F	C	B	C	A
HCM 95th-tile Q	15	2.1	1.1	3.8	0.3

Intersection	
Intersection Delay, s/veh	41.8
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	53	121	34	44	72	34	5	457	46	40	285	25
Future Vol, veh/h	53	121	34	44	72	34	5	457	46	40	285	25
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.86	0.86	0.86	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	57	130	37	48	78	37	6	531	53	45	320	28
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	15.8	13.9	70.7	24.6
HCM LOS	C	B	F	C

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	1%	30%	0%	38%	0%	11%
Vol Thru, %	90%	70%	0%	62%	0%	81%
Vol Right, %	9%	0%	100%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	508	174	34	116	34	350
LT Vol	5	53	0	44	0	40
Through Vol	457	121	0	72	0	285
RT Vol	46	0	34	0	34	25
Lane Flow Rate	591	187	37	126	37	393
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	1.031	0.417	0.073	0.29	0.075	0.71
Departure Headway (Hd)	6.281	8.309	7.423	8.576	7.65	6.749
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	585	436	486	421	471	539
Service Time	4.281	6.009	5.123	6.276	5.35	4.749
HCM Lane V/C Ratio	1.01	0.429	0.076	0.299	0.079	0.729
HCM Control Delay	70.7	16.8	10.7	14.7	11	24.6
HCM Lane LOS	F	C	B	B	B	C
HCM 95th-tile Q	16	2	0.2	1.2	0.2	5.7

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	2	0	0	22	0	8	1	547	35	2	376	0
Future Vol, veh/h	2	0	0	22	0	8	1	547	35	2	376	0
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	25	25	25	72	72	72	93	93	93	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	0	31	0	11	1	588	38	2	432	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1051	1064	432	1045	1045	607	432	0	0	626	0	0
Stage 1	436	436	-	609	609	-	-	-	-	-	-	-
Stage 2	615	628	-	436	436	-	-	-	-	-	-	-
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	205	223	624	207	229	496	1128	-	-	956	-	-
Stage 1	599	580	-	482	485	-	-	-	-	-	-	-
Stage 2	479	476	-	599	580	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	200	222	624	206	228	496	1128	-	-	956	-	-
Mov Cap-2 Maneuver	200	222	-	206	228	-	-	-	-	-	-	-
Stage 1	598	578	-	482	485	-	-	-	-	-	-	-
Stage 2	468	476	-	597	578	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	23.7	22.8	0	0
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1128	-	-	200	244	956	-	-
HCM Lane V/C Ratio	0.001	-	-	0.04	0.171	0.002	-	-
HCM Control Delay (s)	8.2	0	-	23.7	22.8	8.8	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.6	0	-	-

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	172	208	3	2	105	12	1	30	18	11	13	79
Future Vol, veh/h	172	208	3	2	105	12	1	30	18	11	13	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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	96	96	96	78	78	78	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	198	239	3	2	109	13	1	38	23	14	16	98

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	122	0	0	242	0	0	814	763	241	787	758	116
Stage 1	-	-	-	-	-	-	637	637	-	120	120	-
Stage 2	-	-	-	-	-	-	177	126	-	667	638	-
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	1465	-	-	1324	-	-	297	334	798	309	336	936
Stage 1	-	-	-	-	-	-	465	471	-	884	796	-
Stage 2	-	-	-	-	-	-	825	792	-	448	471	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1465	-	-	1324	-	-	228	288	798	242	290	936
Mov Cap-2 Maneuver	-	-	-	-	-	-	228	288	-	242	290	-
Stage 1	-	-	-	-	-	-	402	407	-	765	794	-
Stage 2	-	-	-	-	-	-	723	790	-	341	407	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.5	0.1	16.6	11.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	374	1465	-	-	1324	-	-	266	936
HCM Lane V/C Ratio	0.168	0.135	-	-	0.002	-	-	0.111	0.104
HCM Control Delay (s)	16.6	7.8	-	-	7.7	0	-	20.2	9.3
HCM Lane LOS	C	A	-	-	A	A	-	C	A
HCM 95th %tile Q(veh)	0.6	0.5	-	-	0	-	-	0.4	0.3

Intersection	
Intersection Delay, s/veh	11
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	150	79	13	1	29	15	19	204	2	8	122	68
Future Vol, veh/h	150	79	13	1	29	15	19	204	2	8	122	68
Peak Hour Factor	0.90	0.90	0.90	0.77	0.77	0.77	0.90	0.90	0.90	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	167	88	14	1	38	19	21	227	2	9	133	74
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.9	9	11.1	10.2
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	8%	62%	2%	4%
Vol Thru, %	91%	33%	64%	62%
Vol Right, %	1%	5%	33%	34%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	225	242	45	198
LT Vol	19	150	1	8
Through Vol	204	79	29	122
RT Vol	2	13	15	68
Lane Flow Rate	250	269	58	215
Geometry Grp	1	1	1	1
Degree of Util (X)	0.361	0.398	0.088	0.3
Departure Headway (Hd)	5.198	5.326	5.404	5.021
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	698	675	662	717
Service Time	3.198	3.356	3.444	3.052
HCM Lane V/C Ratio	0.358	0.399	0.088	0.3
HCM Control Delay	11.1	11.9	9	10.2
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	1.6	1.9	0.3	1.3

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	98	13	6	30	7	10	307	13	12	128	14
Future Vol, veh/h	64	98	13	6	30	7	10	307	13	12	128	14
Peak Hour Factor	0.78	0.78	0.78	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	82	126	17	9	46	11	11	337	14	13	139	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	11.3	9.3	13	10
HCM LOS	B	A	B	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	37%	14%	8%
Vol Thru, %	93%	56%	70%	83%
Vol Right, %	4%	7%	16%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	330	175	43	154
LT Vol	10	64	6	12
Through Vol	307	98	30	128
RT Vol	13	13	7	14
Lane Flow Rate	363	224	66	167
Geometry Grp	1	1	1	1
Degree of Util (X)	0.506	0.339	0.104	0.244
Departure Headway (Hd)	5.019	5.445	5.637	5.241
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	722	660	634	685
Service Time	3.019	3.481	3.682	3.275
HCM Lane V/C Ratio	0.503	0.339	0.104	0.244
HCM Control Delay	13	11.3	9.3	10
HCM Lane LOS	B	B	A	A
HCM 95th-tile Q	2.9	1.5	0.3	1

Intersection	
Intersection Delay, s/veh	14.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	138	7	12	114	4	6	291	61	11	99	96
Future Vol, veh/h	148	138	7	12	114	4	6	291	61	11	99	96
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.81	0.81	0.81	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	156	145	7	14	134	5	7	359	75	12	105	102
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	12.8	12.3	18.6	10.9
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	0%	100%	0%	100%	0%	10%	0%
Vol Thru, %	98%	0%	0%	95%	0%	97%	90%	0%
Vol Right, %	0%	100%	0%	5%	0%	3%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	297	61	148	145	12	118	110	96
LT Vol	6	0	148	0	12	0	11	0
Through Vol	291	0	0	138	0	114	99	0
RT Vol	0	61	0	7	0	4	0	96
Lane Flow Rate	367	75	156	153	14	139	117	102
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.652	0.119	0.315	0.286	0.03	0.272	0.222	0.172
Departure Headway (Hd)	6.406	5.685	7.279	6.735	7.69	7.054	6.831	6.065
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	561	626	491	530	468	505	522	586
Service Time	4.183	3.462	5.066	4.522	5.39	4.854	4.626	3.86
HCM Lane V/C Ratio	0.654	0.12	0.318	0.289	0.03	0.275	0.224	0.174
HCM Control Delay	20.5	9.2	13.4	12.2	10.6	12.5	11.6	10.1
HCM Lane LOS	C	A	B	B	B	B	B	B
HCM 95th-tile Q	4.7	0.4	1.3	1.2	0.1	1.1	0.8	0.6

APPENDIX D

EXISTING (2018) CONDITIONS

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 50 mph

MINOR STREET: DAKOTA Critical Approach Speed 40 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

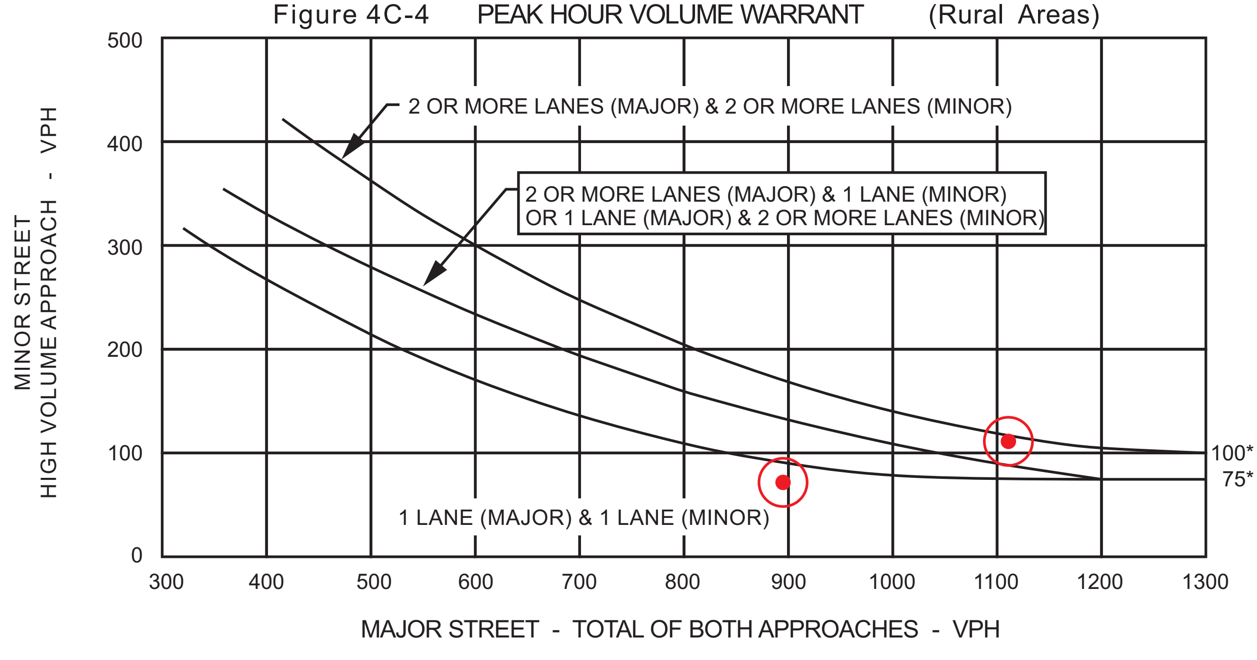
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	1111	895			
Highest Approaches - Minor Street	✓		112	71			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: MCKINLEY Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ] URBAN (U)

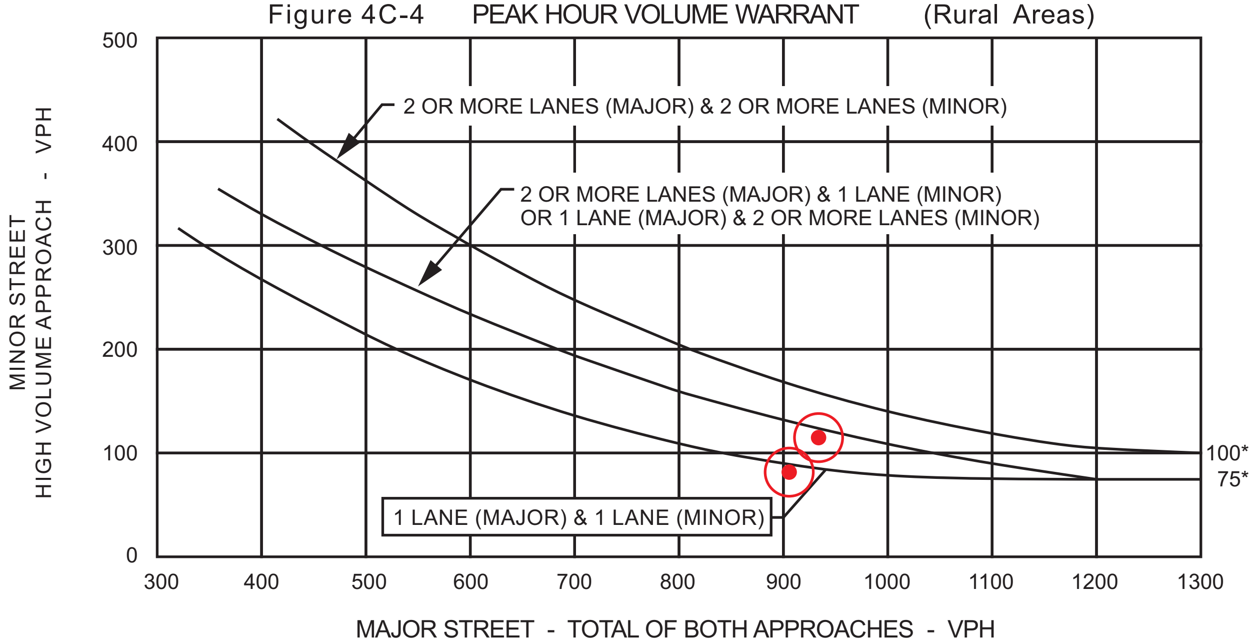
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		935	905			
Highest Approaches - Minor Street	✓		115	82			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

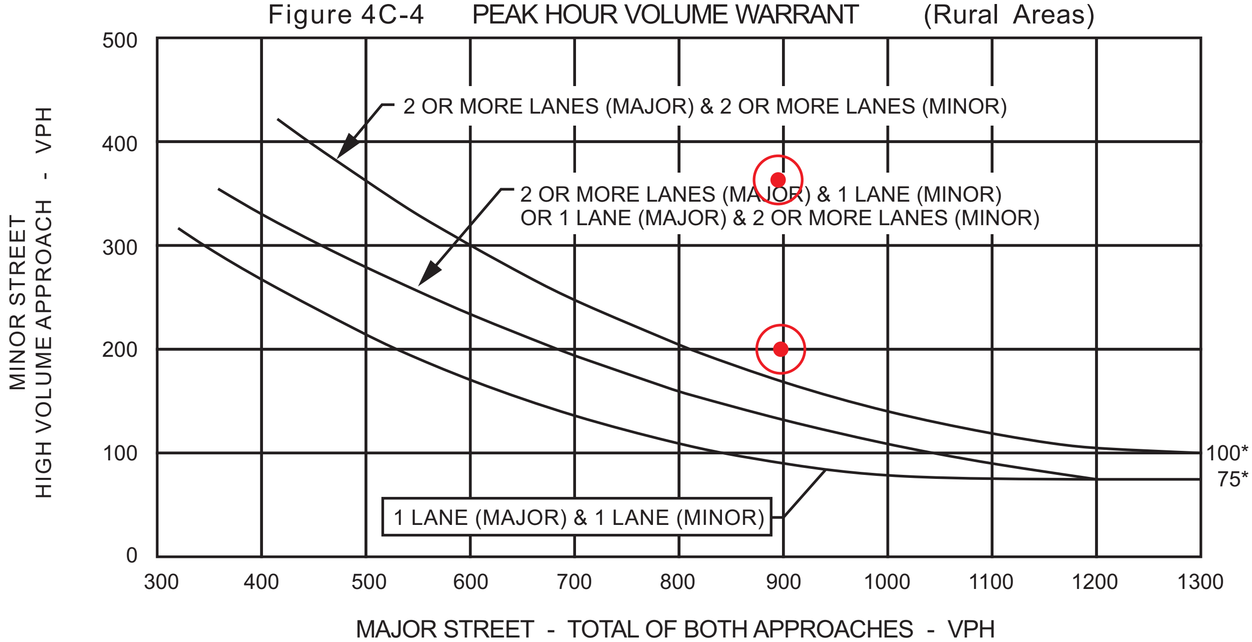
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		896	899			
Highest Approaches - Minor Street	✓		361	200			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: BELMONT Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

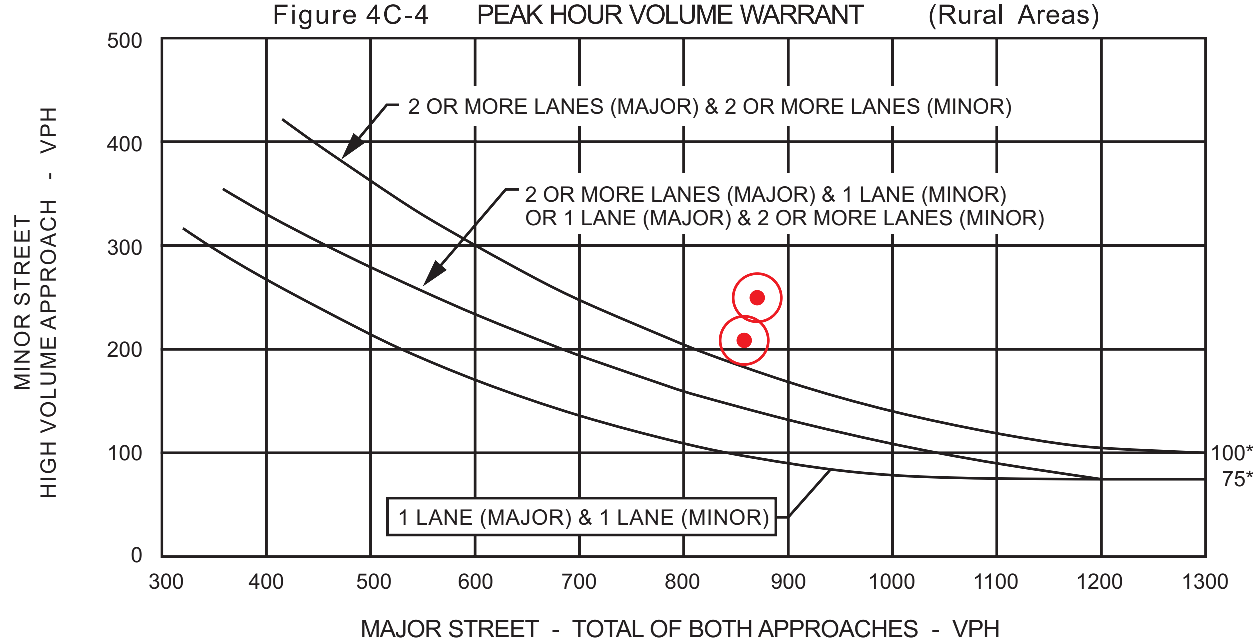
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		870	858			
Highest Approaches - Minor Street	✓		250	208			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: TULARE Critical Approach Speed 50 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

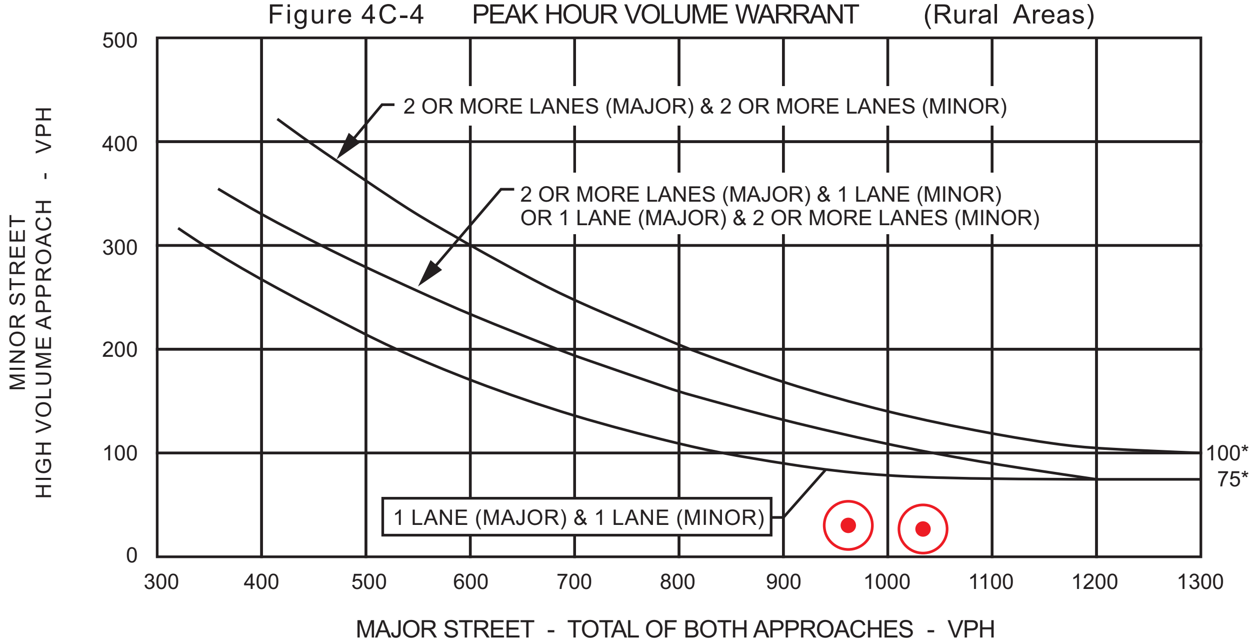
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☐ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1032	961			
Highest Approaches - Minor Street	✓		27	30			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: SHIELDS Critical Approach Speed 45 mph

MINOR STREET: LOCAN Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- ☐

☐ URBAN (U)

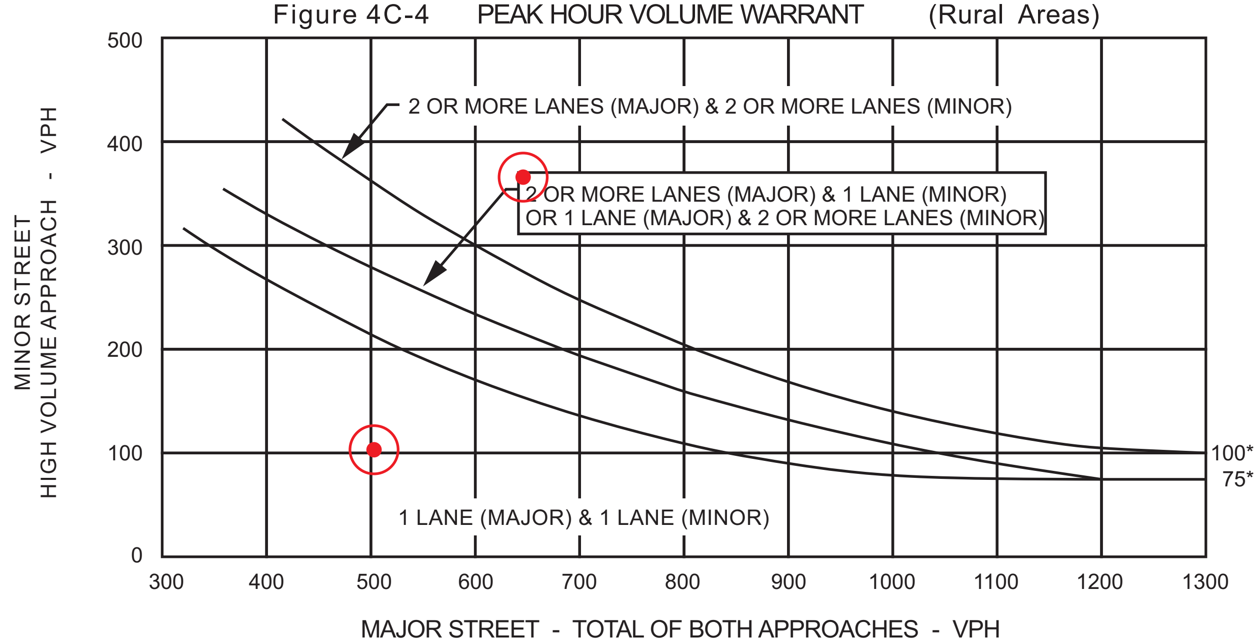
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	646	502			
Highest Approaches - Minor Street	✓		364	103			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: DEWOLF Critical Approach Speed 45 mph

MINOR STREET: SHIELDS Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

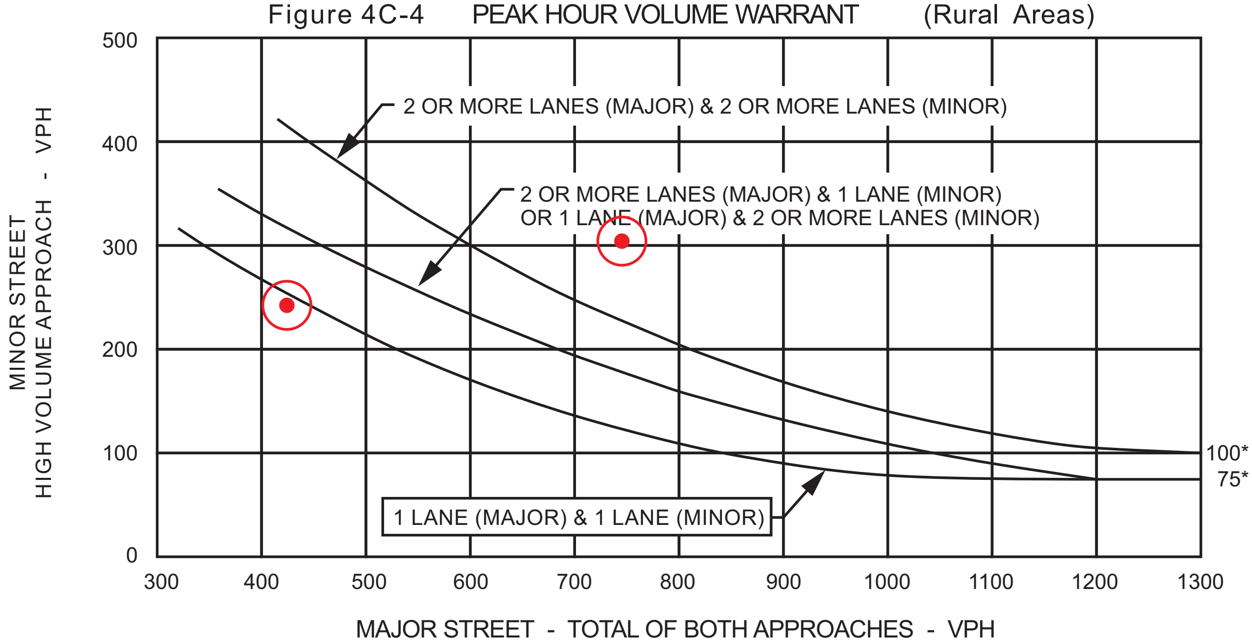
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		743	423			
Highest Approaches - Minor Street	✓		304	242			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: CLINTON Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- ☐

☐ URBAN (U)

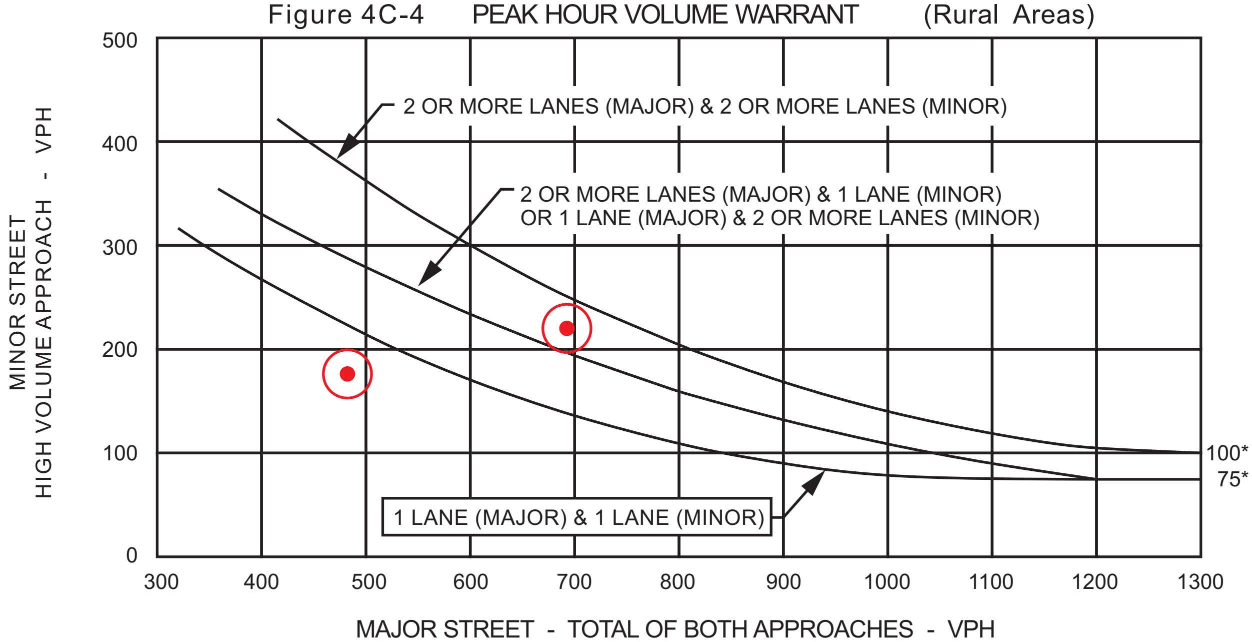
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☒

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		691	484			
Highest Approaches - Minor Street	✓		221	175			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

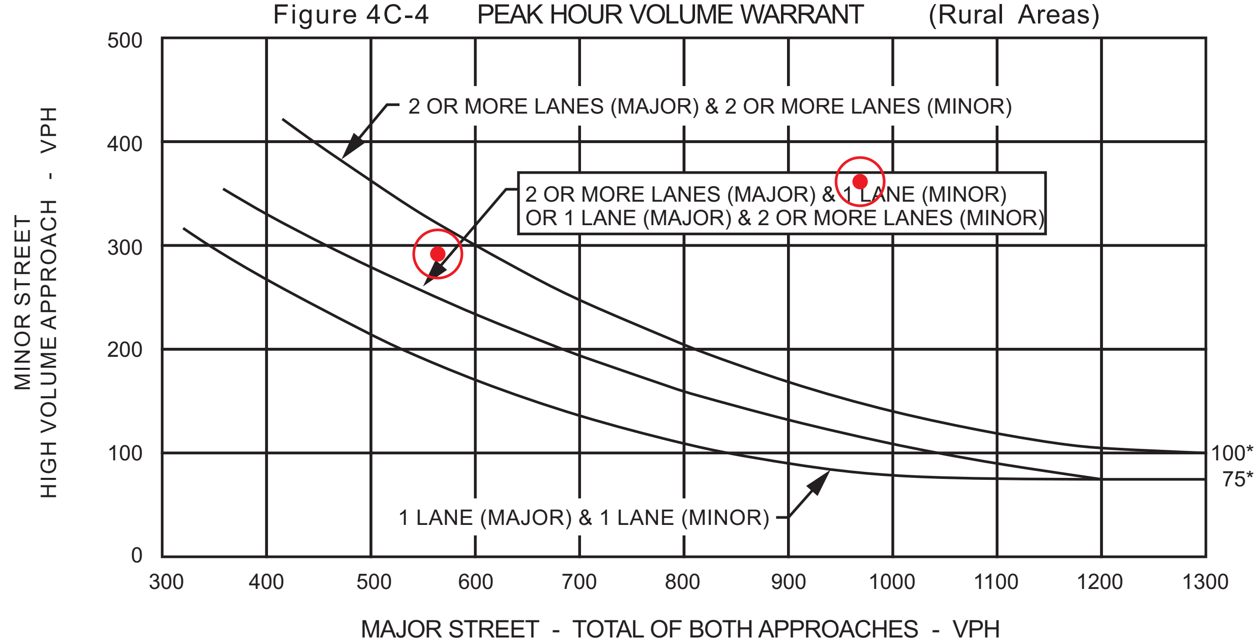
CONDITION: EXISTING (2018)

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	968	564			
Highest Approaches - Minor Street	✓		349	293			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

APPENDIX E

EXISTING (2018) PLUS PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Intersection	
Intersection Delay, s/veh	184.7
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	57	10	25	29	6	77	26	405	12	33	593	97
Future Vol, veh/h	57	10	25	29	6	77	26	405	12	33	593	97
Peak Hour Factor	0.82	0.82	0.82	0.71	0.71	0.71	0.96	0.96	0.96	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	70	12	30	41	8	108	27	422	13	42	751	123
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	16.2	14.5	19	318.3
HCM LOS	C	B	C	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	62%	100%	0%	100%	0%
Vol Thru, %	0%	100%	92%	11%	0%	7%	0%	86%
Vol Right, %	0%	0%	8%	27%	0%	93%	0%	14%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	26	270	147	92	29	83	33	690
LT Vol	26	0	0	57	29	0	33	0
Through Vol	0	270	135	10	0	6	0	593
RT Vol	0	0	12	25	0	77	0	97
Lane Flow Rate	27	281	153	112	41	117	42	873
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.059	0.571	0.308	0.267	0.1	0.25	0.088	1.682
Departure Headway (Hd)	8.996	8.481	8.422	9.938	10.233	9.037	7.542	6.932
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	401	428	430	364	352	400	474	524
Service Time	6.696	6.181	6.122	7.638	7.933	6.737	5.305	4.694
HCM Lane V/C Ratio	0.067	0.657	0.356	0.308	0.116	0.292	0.089	1.666
HCM Control Delay	12.3	21.9	14.8	16.2	14.1	14.7	11	333
HCM Lane LOS	B	C	B	C	B	B	B	F
HCM 95th-tile Q	0.2	3.5	1.3	1.1	0.3	1	0.3	50.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	101	290	100	218	507	67	177	349	122	35	407	239
v/c Ratio	0.37	0.68	0.22	0.84	0.64	0.15	0.70	0.41	0.15	0.31	0.29	0.31
Control Delay	52.0	45.4	3.2	77.7	40.9	0.7	65.1	23.8	1.1	57.1	23.7	4.3
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	52.0	45.4	3.2	77.7	40.9	0.7	65.1	23.8	1.1	57.1	23.7	4.3
Queue Length 50th (ft)	34	181	0	76	166	0	61	165	0	23	97	0
Queue Length 95th (ft)	61	243	13	#156	211	0	#111	277	4	60	157	53
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	281	631	614	258	1199	625	258	859	828	133	1399	770
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.46	0.16	0.84	0.42	0.11	0.69	0.41	0.15	0.26	0.29	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	241	83	192	446	59	152	300	105	33	387	227
Future Volume (veh/h)	84	241	83	192	446	59	152	300	105	33	387	227
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	290	100	218	507	67	177	349	122	35	407	239
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.86	0.86	0.86	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	241	392	332	268	792	353	240	839	711	66	1444	644
Arrive On Green	0.07	0.21	0.21	0.08	0.22	0.22	0.07	0.45	0.45	0.04	0.41	0.41
Sat Flow, veh/h	3456	1870	1581	3456	3554	1585	3456	1870	1585	1781	3554	1585
Grp Volume(v), veh/h	101	290	100	218	507	67	177	349	122	35	407	239
Grp Sat Flow(s),veh/h/ln	1728	1870	1581	1728	1777	1585	1728	1870	1585	1781	1777	1585
Q Serve(g_s), s	2.9	15.0	5.5	6.4	13.4	2.9	5.2	13.1	4.8	2.0	7.9	7.5
Cycle Q Clear(g_c), s	2.9	15.0	5.5	6.4	13.4	2.9	5.2	13.1	4.8	2.0	7.9	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	241	392	332	268	792	353	240	839	711	66	1444	644
V/C Ratio(X)	0.42	0.74	0.30	0.81	0.64	0.19	0.74	0.42	0.17	0.53	0.28	0.37
Avail Cap(c_a), veh/h	268	652	551	268	1238	552	268	839	711	138	1444	644
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	38.2	34.5	46.9	36.4	21.7	47.2	19.3	17.0	48.9	20.6	10.2
Incr Delay (d2), s/veh	0.4	10.0	1.9	16.3	3.3	1.0	7.5	1.5	0.5	2.5	0.5	1.6
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	1.2	7.6	2.2	3.3	5.9	1.4	2.4	5.6	1.7	0.9	3.1	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.5	48.2	36.4	63.3	39.7	22.7	54.7	20.8	17.5	51.4	21.0	11.8
LnGrp LOS	D	D	D	E	D	C	D	C	B	D	C	B
Approach Vol, veh/h		491			792			648			681	
Approach Delay, s/veh		45.4			44.7			29.4			19.4	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.9	48.0	13.1	28.3	9.5	52.4	13.9	27.6
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	* 5.9
Max Green Setting (Gmax), s	8.0	42.0	8.0	36.0	8.0	38.0	8.0	* 36
Max Q Clear Time (g_c+I1), s	7.2	9.9	4.9	15.4	4.0	15.1	8.4	17.0
Green Ext Time (p_c), s	0.0	7.1	0.0	7.5	0.0	4.6	0.0	4.5

Intersection Summary	
HCM 6th Ctrl Delay	34.5
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	122	106	381	44	379	94	198	637
v/c Ratio	0.12	0.27	0.55	0.66	0.24	0.70	0.18	1.01	0.96
Control Delay	38.9	23.4	49.3	24.9	40.1	36.5	3.6	106.2	56.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.9	23.4	49.3	24.9	40.1	36.5	3.6	106.2	56.8
Queue Length 50th (ft)	9	46	45	114	18	146	0	89	~335
Queue Length 95th (ft)	32	71	82	138	54	#331	14	#269	#703
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	197	894	197	856	197	538	536	197	667
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.14	0.54	0.45	0.22	0.70	0.18	1.01	0.96

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	84	10	67	114	126	36	307	76	166	426	109
Future Volume (veh/h)	17	84	10	67	114	126	36	307	76	166	426	109
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	109	13	106	181	200	44	379	94	198	507	130
Peak Hour Factor	0.77	0.77	0.77	0.63	0.63	0.63	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	69	404	48	163	241	266	111	523	442	192	466	120
Arrive On Green	0.04	0.25	0.25	0.09	0.30	0.30	0.06	0.28	0.28	0.11	0.33	0.33
Sat Flow, veh/h	1767	1627	194	1767	800	884	1767	1856	1567	1767	1424	365
Grp Volume(v), veh/h	22	0	122	106	0	381	44	379	94	198	0	637
Grp Sat Flow(s),veh/h/ln	1767	0	1821	1767	0	1684	1767	1856	1567	1767	0	1789
Q Serve(g_s), s	0.9	0.0	4.2	4.5	0.0	15.9	1.9	14.4	3.6	8.5	0.0	25.6
Cycle Q Clear(g_c), s	0.9	0.0	4.2	4.5	0.0	15.9	1.9	14.4	3.6	8.5	0.0	25.6
Prop In Lane	1.00		0.11	1.00		0.52	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	69	0	452	163	0	508	111	523	442	192	0	586
V/C Ratio(X)	0.32	0.00	0.27	0.65	0.00	0.75	0.40	0.72	0.21	1.03	0.00	1.09
Avail Cap(c_a), veh/h	192	0	863	192	0	798	192	523	442	192	0	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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.5	0.0	23.7	34.2	0.0	24.6	35.1	25.3	21.4	34.8	0.0	26.2
Incr Delay (d2), s/veh	1.0	0.0	0.9	3.5	0.0	6.0	0.8	8.5	1.1	72.7	0.0	62.9
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(50%),veh/ln	0.4	0.0	1.8	2.0	0.0	6.7	0.8	6.9	1.3	7.3	0.0	19.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.5	0.0	24.5	37.7	0.0	30.7	36.0	33.8	22.5	107.4	0.0	89.2
LnGrp LOS	D	A	C	D	A	C	D	C	C	F	A	F
Approach Vol, veh/h		144			487			517			835	
Approach Delay, s/veh		26.5			32.2			31.9			93.5	
Approach LOS		C			C			C			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.9	32.3	7.0	29.8	12.5	28.7	11.2	25.7
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0
Max Q Clear Time (g_c+I1), s	3.9	27.6	2.9	17.9	10.5	16.4	6.5	6.2
Green Ext Time (p_c), s	0.0	0.0	0.0	4.5	0.0	2.3	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	57.5
HCM 6th LOS	E

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	64	328	125	50	481
Future Vol, veh/h	51	64	328	125	50	481
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	76	76	93	93	82	82
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	67	84	353	134	61	587

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1129	420	0	0	487	0
Stage 1	420	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Critical Hdwy	6.46	6.26	-	-	4.16	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	-	-	2.254	-
Pot Cap-1 Maneuver	222	625	-	-	1056	-
Stage 1	654	-	-	-	-	-
Stage 2	481	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	203	625	-	-	1056	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	440	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.4	0	0.8
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	325	1056	-
HCM Lane V/C Ratio	-	-	0.466	0.058	-
HCM Control Delay (s)	-	-	25.4	8.6	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	2.4	0.2	-

Intersection	
Intersection Delay, s/veh	85.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	79	98	17	145	193	23	13	349	44	6	422	109
Future Vol, veh/h	79	98	17	145	193	23	13	349	44	6	422	109
Peak Hour Factor	0.75	0.75	0.75	0.87	0.87	0.87	0.95	0.95	0.95	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	105	131	23	167	222	26	14	367	46	6	449	116
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	33.6	84.4	93.2	103.6
HCM LOS	D	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	3%	41%	40%	1%	0%
Vol Thru, %	86%	51%	53%	99%	0%
Vol Right, %	11%	9%	6%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	406	194	361	428	109
LT Vol	13	79	145	6	0
Through Vol	349	98	193	422	0
RT Vol	44	17	23	0	109
Lane Flow Rate	427	259	415	455	116
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.056	0.689	1.025	1.157	0.271
Departure Headway (Hd)	9.434	10.437	9.47	9.488	8.75
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	389	349	386	387	413
Service Time	7.434	8.437	7.47	7.188	6.45
HCM Lane V/C Ratio	1.098	0.742	1.075	1.176	0.281
HCM Control Delay	93.2	33.6	84.4	126.2	14.7
HCM Lane LOS	F	D	F	F	B
HCM 95th-tile Q	13.7	4.9	12.7	17.1	1.1

Intersection	
Intersection Delay, s/veh	54.2
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	58	57	39	99	109	42	29	285	29	26	492	45
Future Vol, veh/h	58	57	39	99	109	42	29	285	29	26	492	45
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	74	73	50	111	122	47	32	313	32	27	518	47
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	15.5	19.6	28.6	99.7
HCM LOS	C	C	D	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	8%	50%	0%	48%	0%	5%
Vol Thru, %	83%	50%	0%	52%	0%	87%
Vol Right, %	8%	0%	100%	0%	100%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	343	115	39	208	42	563
LT Vol	29	58	0	99	0	26
Through Vol	285	57	0	109	0	492
RT Vol	29	0	39	0	42	45
Lane Flow Rate	377	147	50	234	47	593
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.74	0.354	0.107	0.541	0.097	1.115
Departure Headway (Hd)	7.405	9.126	8.13	8.776	7.798	6.771
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	490	397	444	414	462	539
Service Time	5.405	6.826	5.83	6.476	5.498	4.825
HCM Lane V/C Ratio	0.769	0.37	0.113	0.565	0.102	1.1
HCM Control Delay	28.6	16.7	11.8	21.3	11.3	99.7
HCM Lane LOS	D	C	B	C	B	F
HCM 95th-tile Q	6.1	1.6	0.4	3.1	0.3	19.1

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	0	1	22	0	5	0	296	4	5	755	0
Future Vol, veh/h	0	0	1	22	0	5	0	296	4	5	755	0
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	25	25	25	79	79	79	90	90	90	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	4	28	0	6	0	329	4	6	848	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1194	1193	848	1193	1191	331	848	0	0	333	0	0
Stage 1	860	860	-	331	331	-	-	-	-	-	-	-
Stage 2	334	333	-	862	860	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	163	186	360	163	187	708	785	-	-	1221	-	-
Stage 1	349	371	-	680	643	-	-	-	-	-	-	-
Stage 2	678	642	-	348	371	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	160	184	360	160	185	708	785	-	-	1221	-	-
Mov Cap-2 Maneuver	160	184	-	160	185	-	-	-	-	-	-	-
Stage 1	349	368	-	680	643	-	-	-	-	-	-	-
Stage 2	672	642	-	341	368	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	28.5	0	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	785	-	-	360	187	1221	-	-
HCM Lane V/C Ratio	-	-	-	0.011	0.183	0.005	-	-
HCM Control Delay (s)	0	-	-	15.1	28.5	8	0	-
HCM Lane LOS	A	-	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.6	0	-	-

Intersection	
Int Delay, s/veh	10.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	240	23	46	290	7	1	37	47	28	101	236
Future Vol, veh/h	65	240	23	46	290	7	1	37	47	28	101	236
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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	82	82	82	64	64	63	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	76	279	27	56	354	9	2	58	75	30	107	251

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	363	0	0	306	0	0	1095	920	293	982	929	359
Stage 1	-	-	-	-	-	-	445	445	-	471	471	-
Stage 2	-	-	-	-	-	-	650	475	-	511	458	-
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	1196	-	-	1255	-	-	191	271	746	228	268	685
Stage 1	-	-	-	-	-	-	592	575	-	573	560	-
Stage 2	-	-	-	-	-	-	458	557	-	545	567	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1196	-	-	1255	-	-	72	240	746	153	237	685
Mov Cap-2 Maneuver	-	-	-	-	-	-	72	240	-	153	237	-
Stage 1	-	-	-	-	-	-	554	538	-	536	529	-
Stage 2	-	-	-	-	-	-	218	526	-	410	531	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	1.1	20.2	25.8
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	370	1196	-	-	1255	-	-	212	685
HCM Lane V/C Ratio	0.362	0.063	-	-	0.045	-	-	0.647	0.367
HCM Control Delay (s)	20.2	8.2	-	-	8	0	-	48.7	13.3
HCM Lane LOS	C	A	-	-	A	A	-	E	B
HCM 95th %tile Q(veh)	1.6	0.2	-	-	0.1	-	-	3.9	1.7

Intersection	
Intersection Delay, s/veh	45.5
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	212	98	12	0	98	13	24	221	2	19	263	216
Future Vol, veh/h	212	98	12	0	98	13	24	221	2	19	263	216
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.79	0.79	0.79	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	233	108	13	0	105	14	30	280	3	23	313	257
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	27	14.2	21.2	75.7
HCM LOS	D	B	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	66%	0%	4%
Vol Thru, %	89%	30%	88%	53%
Vol Right, %	1%	4%	12%	43%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	247	322	111	498
LT Vol	24	212	0	19
Through Vol	221	98	98	263
RT Vol	2	12	13	216
Lane Flow Rate	313	354	119	593
Geometry Grp	1	1	1	1
Degree of Util (X)	0.616	0.716	0.266	1.047
Departure Headway (Hd)	7.255	7.441	8.234	6.359
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	500	488	439	575
Service Time	5.255	5.441	6.234	4.359
HCM Lane V/C Ratio	0.626	0.725	0.271	1.031
HCM Control Delay	21.2	27	14.2	75.7
HCM Lane LOS	C	D	B	F
HCM 95th-tile Q	4.1	5.7	1.1	16.7

Intersection	
Intersection Delay, s/veh	47.7
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	59	18	76	158	33	16	153	14	42	423	47
Future Vol, veh/h	30	59	18	76	158	33	16	153	14	42	423	47
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.73	0.73	0.73	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	36	71	22	101	211	44	22	210	19	50	504	56
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	13.8	23.9	16.5	81.7
HCM LOS	B	C	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	28%	28%	8%
Vol Thru, %	84%	55%	59%	83%
Vol Right, %	8%	17%	12%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	183	107	267	512
LT Vol	16	30	76	42
Through Vol	153	59	158	423
RT Vol	14	18	33	47
Lane Flow Rate	251	129	356	610
Geometry Grp	1	1	1	1
Degree of Util (X)	0.477	0.27	0.678	1.068
Departure Headway (Hd)	7.156	7.918	7.132	6.305
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	506	456	509	579
Service Time	5.156	5.918	5.132	4.305
HCM Lane V/C Ratio	0.496	0.283	0.699	1.054
HCM Control Delay	16.5	13.8	23.9	81.7
HCM Lane LOS	C	B	C	F
HCM 95th-tile Q	2.5	1.1	5.1	17.7

Intersection	
Intersection Delay, s/veh	30.4
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	103	7	98	232	25	68	155	111	25	240	392
Future Vol, veh/h	46	103	7	98	232	25	68	155	111	25	240	392
Peak Hour Factor	0.90	0.90	0.90	0.80	0.80	0.80	0.69	0.69	0.69	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	114	8	123	290	31	99	225	161	30	289	472
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	16.1	29.6	29.6	48.9
HCM LOS	C	D	D	E

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	30%	0%	100%	0%	100%	0%	9%	0%
Vol Thru, %	70%	0%	0%	94%	0%	90%	91%	0%
Vol Right, %	0%	100%	0%	6%	0%	10%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	223	111	46	110	98	257	265	392
LT Vol	68	0	46	0	98	0	25	0
Through Vol	155	0	0	103	0	232	240	0
RT Vol	0	111	0	7	0	25	0	392
Lane Flow Rate	323	161	51	122	122	321	319	472
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.787	0.352	0.143	0.324	0.312	0.767	0.725	0.972
Departure Headway (Hd)	8.768	7.883	10.104	9.534	9.287	8.697	8.293	7.519
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	417	458	356	379	390	418	437	486
Service Time	6.468	5.583	7.82	7.249	6.987	6.397	5.993	5.219
HCM Lane V/C Ratio	0.775	0.352	0.143	0.322	0.313	0.768	0.73	0.971
HCM Control Delay	37	14.8	14.5	16.8	16.1	34.8	30	61.6
HCM Lane LOS	E	B	B	C	C	D	D	F
HCM 95th-tile Q	6.8	1.6	0.5	1.4	1.3	6.4	5.7	12.4

Intersection	
Intersection Delay, s/veh	17.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	24	23	6	7	46	29	502	24	60	317	37
Future Vol, veh/h	24	24	23	6	7	46	29	502	24	60	317	37
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	29	29	28	7	8	50	30	523	25	65	345	40
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	12.2	11	16	20.4
HCM LOS	B	B	C	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	34%	100%	0%	100%	0%
Vol Thru, %	0%	100%	87%	34%	0%	13%	0%	90%
Vol Right, %	0%	0%	13%	32%	0%	87%	0%	10%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	29	335	191	71	6	53	60	354
LT Vol	29	0	0	24	6	0	60	0
Through Vol	0	335	167	24	0	7	0	317
RT Vol	0	0	24	23	0	46	0	37
Lane Flow Rate	30	349	199	86	7	58	65	385
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.057	0.611	0.344	0.184	0.015	0.117	0.126	0.684
Departure Headway (Hd)	6.817	6.311	6.222	7.751	8.437	7.308	6.981	6.402
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	523	568	574	465	427	493	511	562
Service Time	4.595	4.088	4	5.451	6.141	5.012	4.761	4.181
HCM Lane V/C Ratio	0.057	0.614	0.347	0.185	0.016	0.118	0.127	0.685
HCM Control Delay	10	18.6	12.3	12.2	11.3	11	10.8	22
HCM Lane LOS	A	C	B	B	B	B	B	C
HCM 95th-tile Q	0.2	4.1	1.5	0.7	0	0.4	0.4	5.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	170	442	80	120	181	39	116	410	175	84	235	74
v/c Ratio	0.27	0.81	0.14	0.60	0.31	0.10	0.58	0.60	0.26	0.82	0.19	0.11
Control Delay	40.3	46.5	0.5	61.9	38.1	0.5	60.9	31.7	7.6	100.4	24.1	0.4
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	40.3	46.5	0.5	61.9	38.1	0.5	60.9	31.7	7.6	100.4	24.1	0.4
Queue Length 50th (ft)	47	269	0	41	59	0	39	222	15	57	56	0
Queue Length 95th (ft)	#110	347	0	#75	72	0	#74	339	63	#146	87	0
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	635	632	635	199	1201	635	199	687	672	103	1270	650
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.70	0.13	0.60	0.15	0.06	0.58	0.60	0.26	0.82	0.19	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	367	66	106	159	34	108	381	163	74	207	65
Future Volume (veh/h)	141	367	66	106	159	34	108	381	163	74	207	65
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	170	442	80	120	181	39	116	410	175	84	235	74
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	845	532	451	198	346	154	197	697	591	106	1298	577
Arrive On Green	0.24	0.28	0.28	0.06	0.10	0.10	0.06	0.37	0.37	0.06	0.37	0.37
Sat Flow, veh/h	3456	1870	1585	3456	3554	1585	3456	1870	1585	1781	3554	1581
Grp Volume(v), veh/h	170	442	80	120	181	39	116	410	175	84	235	74
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1728	1777	1585	1728	1870	1585	1781	1777	1581
Q Serve(g_s), s	4.0	22.4	2.9	3.4	4.9	1.9	3.3	17.8	5.7	4.7	4.6	1.4
Cycle Q Clear(g_c), s	4.0	22.4	2.9	3.4	4.9	1.9	3.3	17.8	5.7	4.7	4.6	1.4
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	845	532	451	198	346	154	197	697	591	106	1298	577
V/C Ratio(X)	0.20	0.83	0.18	0.61	0.52	0.25	0.59	0.59	0.30	0.80	0.18	0.13
Avail Cap(c_a), veh/h	845	646	548	205	1228	548	205	697	591	106	1298	577
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	30.4	33.9	15.6	46.6	43.5	28.0	46.6	25.5	11.7	47.0	21.9	4.0
Incr Delay (d2), s/veh	0.0	12.7	0.7	3.3	4.7	3.3	2.6	3.6	1.3	31.1	0.3	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(50%),veh/ln	1.6	11.5	1.5	1.5	2.3	1.0	1.4	8.1	2.9	2.9	1.8	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.4	46.6	16.3	49.9	48.2	31.3	49.2	29.1	12.9	78.2	22.2	4.4
LnGrp LOS	C	D	B	D	D	C	D	C	B	E	C	A
Approach Vol, veh/h		692			340			701			393	
Approach Delay, s/veh		39.1			46.9			28.4			30.8	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	43.0	30.7	15.2	11.7	43.8	11.7	34.1
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	5.3
Max Green Setting (Gmax), s	6.0	37.0	6.0	35.0	6.0	37.0	6.0	35.0
Max Q Clear Time (g_c+I1), s	5.3	6.6	6.0	6.9	6.7	19.8	5.4	24.4
Green Ext Time (p_c), s	0.0	3.2	0.0	2.9	0.0	5.1	0.0	4.4

Intersection Summary	
HCM 6th Ctrl Delay	35.3
HCM 6th LOS	D

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	89	66	28	60	16	560	52	51	375
v/c Ratio	0.34	0.15	0.12	0.16	0.07	0.63	0.06	0.21	0.37
Control Delay	36.6	14.3	35.1	11.0	35.1	28.6	0.1	35.3	19.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.6	14.3	35.1	11.0	35.1	28.6	0.1	35.3	19.2
Queue Length 50th (ft)	35	11	11	5	6	220	0	20	89
Queue Length 95th (ft)	#114	41	38	24	30	#654	0	68	#384
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	270	1099	254	1048	254	894	826	254	1014
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.06	0.11	0.06	0.06	0.63	0.06	0.20	0.37

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	82	34	27	22	11	36	15	515	48	47	317	32
Future Volume (veh/h)	82	34	27	22	11	36	15	515	48	47	317	32
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	89	37	29	28	14	46	16	560	52	51	341	34
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.92	0.92	0.92	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	181	168	132	88	46	152	55	671	569	135	675	67
Arrive On Green	0.10	0.17	0.17	0.05	0.12	0.12	0.03	0.36	0.36	0.08	0.40	0.40
Sat Flow, veh/h	1781	972	762	1781	383	1260	1781	1870	1585	1781	1673	167
Grp Volume(v), veh/h	89	0	66	28	0	60	16	560	52	51	0	375
Grp Sat Flow(s),veh/h/ln	1781	0	1733	1781	0	1644	1781	1870	1585	1781	0	1840
Q Serve(g_s), s	2.9	0.0	2.0	0.9	0.0	2.0	0.5	16.8	1.3	1.7	0.0	9.4
Cycle Q Clear(g_c), s	2.9	0.0	2.0	0.9	0.0	2.0	0.5	16.8	1.3	1.7	0.0	9.4
Prop In Lane	1.00		0.44	1.00		0.77	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	181	0	300	88	0	199	55	671	569	135	0	743
V/C Ratio(X)	0.49	0.00	0.22	0.32	0.00	0.30	0.29	0.83	0.09	0.38	0.00	0.51
Avail Cap(c_a), veh/h	247	0	1046	247	0	992	247	671	569	247	0	743
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.0	0.0	21.8	28.1	0.0	24.6	29.0	18.0	13.0	27.0	0.0	13.7
Incr Delay (d2), s/veh	0.8	0.0	1.0	0.8	0.0	2.3	1.1	11.7	0.3	0.6	0.0	2.4
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	1.1	0.0	0.8	0.4	0.0	0.8	0.2	8.1	0.4	0.7	0.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.8	0.0	22.8	28.9	0.0	26.9	30.1	29.7	13.3	27.6	0.0	16.1
LnGrp LOS	C	A	C	C	A	C	C	C	B	C	A	B
Approach Vol, veh/h		155			88			628			426	
Approach Delay, s/veh		25.1			27.5			28.3			17.5	
Approach LOS		C			C			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	5.9	31.4	10.2	13.7	8.6	28.7	7.0	16.9				
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3				
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0				
Max Q Clear Time (g_c+I1), s	2.5	11.4	4.9	4.0	3.7	18.8	2.9	4.0				
Green Ext Time (p_c), s	0.0	3.2	0.0	0.6	0.0	1.9	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay			24.3									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	34	550	71	46	318
Future Vol, veh/h	48	34	550	71	46	318
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	89	89	91	91	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	38	604	78	49	342

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1083	643	0	0	682	0
Stage 1	643	-	-	-	-	-
Stage 2	440	-	-	-	-	-
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	240	473	-	-	911	-
Stage 1	523	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	224	473	-	-	911	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	523	-	-	-	-	-
Stage 2	606	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.4	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	287	911	-
HCM Lane V/C Ratio	-	-	0.321	0.054	-
HCM Control Delay (s)	-	-	23.4	9.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.3	0.2	-

Intersection	
Intersection Delay, s/veh	50.9
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	102	98	13	55	57	8	8	522	67	20	288	59
Future Vol, veh/h	102	98	13	55	57	8	8	522	67	20	288	59
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.93	0.93	0.93	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	107	103	14	60	63	9	9	561	72	21	306	63
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	16.6	14	89.9	18.9
HCM LOS	C	B	F	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	1%	48%	46%	6%	0%
Vol Thru, %	87%	46%	47%	94%	0%
Vol Right, %	11%	6%	7%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	597	213	120	308	59
LT Vol	8	102	55	20	0
Through Vol	522	98	57	288	0
RT Vol	67	13	8	0	59
Lane Flow Rate	642	224	132	328	63
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.096	0.448	0.276	0.619	0.106
Departure Headway (Hd)	6.147	7.565	7.955	7.107	6.355
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	597	480	455	511	567
Service Time	4.147	5.565	5.955	4.807	4.055
HCM Lane V/C Ratio	1.075	0.467	0.29	0.642	0.111
HCM Control Delay	89.9	16.6	14	20.7	9.8
HCM Lane LOS	F	C	B	C	A
HCM 95th-tile Q	19.4	2.3	1.1	4.2	0.4

Intersection	
Intersection Delay, s/veh	53.7
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	68	121	34	44	72	34	5	480	46	43	296	29
Future Vol, veh/h	68	121	34	44	72	34	5	480	46	43	296	29
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.86	0.86	0.86	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	73	130	37	48	78	37	6	558	53	48	333	33
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	17.3	14.4	94.3	29.6
HCM LOS	C	B	F	D

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	1%	36%	0%	38%	0%	12%
Vol Thru, %	90%	64%	0%	62%	0%	80%
Vol Right, %	9%	0%	100%	0%	100%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	531	189	34	116	34	368
LT Vol	5	68	0	44	0	43
Through Vol	480	121	0	72	0	296
RT Vol	46	0	34	0	34	29
Lane Flow Rate	617	203	37	126	37	413
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	1.104	0.462	0.074	0.296	0.078	0.77
Departure Headway (Hd)	6.439	8.575	7.659	8.899	7.97	6.973
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	562	423	471	406	452	521
Service Time	4.48	6.275	5.359	6.599	5.67	4.973
HCM Lane V/C Ratio	1.098	0.48	0.079	0.31	0.082	0.793
HCM Control Delay	94.3	18.4	11	15.3	11.3	29.6
HCM Lane LOS	F	C	B	C	B	D
HCM 95th-tile Q	19.2	2.4	0.2	1.2	0.3	6.9

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	2	0	0	22	0	8	1	570	35	2	387	0
Future Vol, veh/h	2	0	0	22	0	8	1	570	35	2	387	0
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	25	25	25	72	72	72	93	93	93	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	0	31	0	11	1	613	38	2	445	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1089	1102	445	1083	1083	632	445	0	0	651	0	0
Stage 1	449	449	-	634	634	-	-	-	-	-	-	-
Stage 2	640	653	-	449	449	-	-	-	-	-	-	-
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	193	212	613	195	217	480	1115	-	-	935	-	-
Stage 1	589	572	-	467	473	-	-	-	-	-	-	-
Stage 2	464	464	-	589	572	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	188	211	613	194	216	480	1115	-	-	935	-	-
Mov Cap-2 Maneuver	188	211	-	194	216	-	-	-	-	-	-	-
Stage 1	588	570	-	467	473	-	-	-	-	-	-	-
Stage 2	453	464	-	587	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25	24	0	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	188	231	935	-	-
HCM Lane V/C Ratio	0.001	-	-	0.043	0.18	0.002	-	-
HCM Control Delay (s)	8.2	0	-	25	24	8.9	0	-
HCM Lane LOS	A	A	-	D	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.6	0	-	-

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	174	219	3	2	124	12	1	30	18	11	13	80
Future Vol, veh/h	174	219	3	2	124	12	1	30	18	11	13	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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	96	96	96	78	78	78	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	200	252	3	2	129	13	1	38	23	14	16	99

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	142	0	0	255	0	0	851	800	254	824	795	136
Stage 1	-	-	-	-	-	-	654	654	-	140	140	-
Stage 2	-	-	-	-	-	-	197	146	-	684	655	-
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	1441	-	-	1310	-	-	280	318	785	292	320	913
Stage 1	-	-	-	-	-	-	456	463	-	863	781	-
Stage 2	-	-	-	-	-	-	805	776	-	439	463	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1441	-	-	1310	-	-	213	273	785	226	275	913
Mov Cap-2 Maneuver	-	-	-	-	-	-	213	273	-	226	275	-
Stage 1	-	-	-	-	-	-	393	399	-	743	779	-
Stage 2	-	-	-	-	-	-	702	774	-	332	399	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.5	0.1	17.3	12.1
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	356	1441	-	-	1310	-	-	250	913
HCM Lane V/C Ratio	0.176	0.139	-	-	0.002	-	-	0.119	0.108
HCM Control Delay (s)	17.3	7.9	-	-	7.8	0	-	21.3	9.4
HCM Lane LOS	C	A	-	-	A	A	-	C	A
HCM 95th %tile Q(veh)	0.6	0.5	-	-	0	-	-	0.4	0.4

Intersection	
Intersection Delay, s/veh	11.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	153	87	13	1	42	15	20	204	2	8	122	72
Future Vol, veh/h	153	87	13	1	42	15	20	204	2	8	122	72
Peak Hour Factor	0.90	0.90	0.90	0.77	0.77	0.77	0.90	0.90	0.90	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	170	97	14	1	55	19	22	227	2	9	133	78
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.3	9.3	11.4	10.5
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	60%	2%	4%
Vol Thru, %	90%	34%	72%	60%
Vol Right, %	1%	5%	26%	36%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	226	253	58	202
LT Vol	20	153	1	8
Through Vol	204	87	42	122
RT Vol	2	13	15	72
Lane Flow Rate	251	281	75	220
Geometry Grp	1	1	1	1
Degree of Util (X)	0.368	0.421	0.115	0.312
Departure Headway (Hd)	5.279	5.391	5.514	5.119
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	681	669	649	703
Service Time	3.311	3.422	3.556	3.152
HCM Lane V/C Ratio	0.369	0.42	0.116	0.313
HCM Control Delay	11.4	12.3	9.3	10.5
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	1.7	2.1	0.4	1.3

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	64	118	13	18	38	7	10	307	33	12	128	14
Future Vol, veh/h	64	118	13	18	38	7	10	307	33	12	128	14
Peak Hour Factor	0.78	0.78	0.78	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	82	151	17	28	58	11	11	337	36	13	139	15
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	12.2	10	14.4	10.5
HCM LOS	B	A	B	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	33%	29%	8%
Vol Thru, %	88%	61%	60%	83%
Vol Right, %	9%	7%	11%	9%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	350	195	63	154
LT Vol	10	64	18	12
Through Vol	307	118	38	128
RT Vol	33	13	7	14
Lane Flow Rate	385	250	97	167
Geometry Grp	1	1	1	1
Degree of Util (X)	0.552	0.39	0.158	0.256
Departure Headway (Hd)	5.165	5.612	5.871	5.502
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	696	640	609	651
Service Time	3.204	3.655	3.926	3.551
HCM Lane V/C Ratio	0.553	0.391	0.159	0.257
HCM Control Delay	14.4	12.2	10	10.5
HCM Lane LOS	B	B	A	B
HCM 95th-tile Q	3.4	1.8	0.6	1

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	158	144	7	16	119	4	6	301	67	11	103	103
Future Vol, veh/h	158	144	7	16	119	4	6	301	67	11	103	103
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.81	0.81	0.81	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	166	152	7	19	140	5	7	372	83	12	110	110
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	13.5	12.9	21	11.4
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	0%	100%	0%	100%	0%	10%	0%
Vol Thru, %	98%	0%	0%	95%	0%	97%	90%	0%
Vol Right, %	0%	100%	0%	5%	0%	3%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	307	67	158	151	16	123	114	103
LT Vol	6	0	158	0	16	0	11	0
Through Vol	301	0	0	144	0	119	103	0
RT Vol	0	67	0	7	0	4	0	103
Lane Flow Rate	379	83	166	159	19	145	121	110
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.701	0.136	0.348	0.308	0.041	0.295	0.239	0.193
Departure Headway (Hd)	6.663	5.94	7.526	6.983	7.872	7.335	7.106	6.341
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	546	607	479	515	455	491	506	565
Service Time	4.363	3.64	5.264	4.72	5.614	5.078	4.846	4.08
HCM Lane V/C Ratio	0.694	0.137	0.347	0.309	0.042	0.295	0.239	0.195
HCM Control Delay	23.5	9.6	14.2	12.8	11	13.1	12.1	10.6
HCM Lane LOS	C	A	B	B	B	B	B	B
HCM 95th-tile Q	5.5	0.5	1.5	1.3	0.1	1.2	0.9	0.7

APPENDIX F

EXISTING (2018) PLUS PROJECT CONDITIONS

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 50 mph

MINOR STREET: DAKOTA Critical Approach Speed 40 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

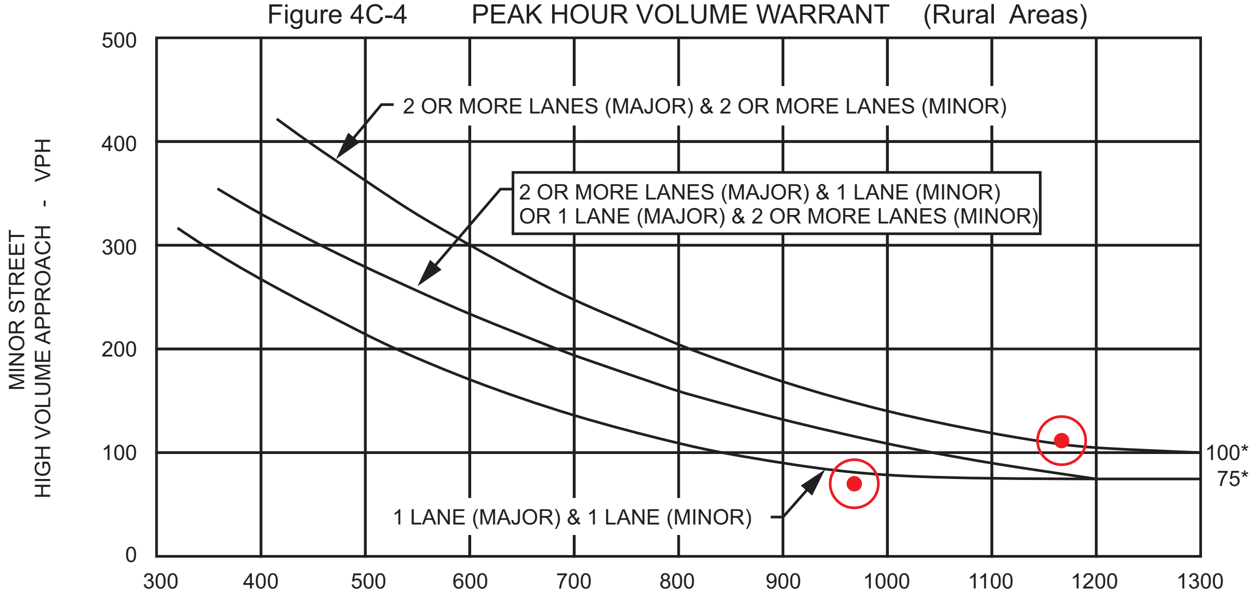
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	1166	969			
Highest Approaches - Minor Street	✓		112	71			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: MCKINLEY Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- ☐

☐ URBAN (U)

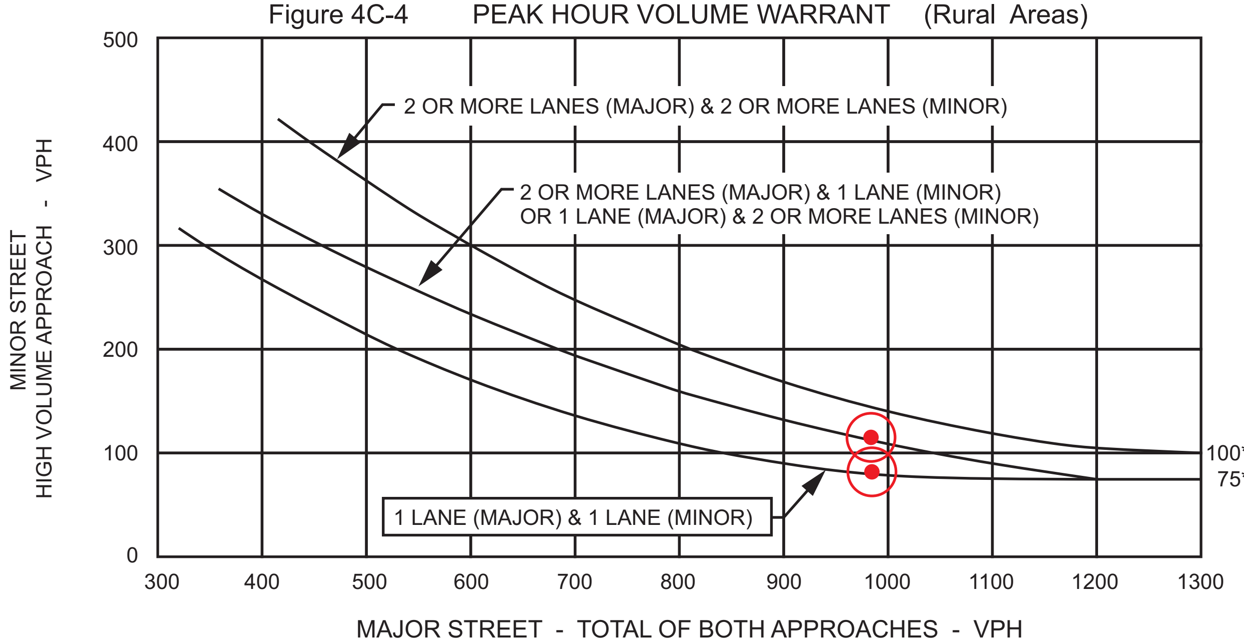
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		984	985			
Highest Approaches - Minor Street	✓		115	82			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

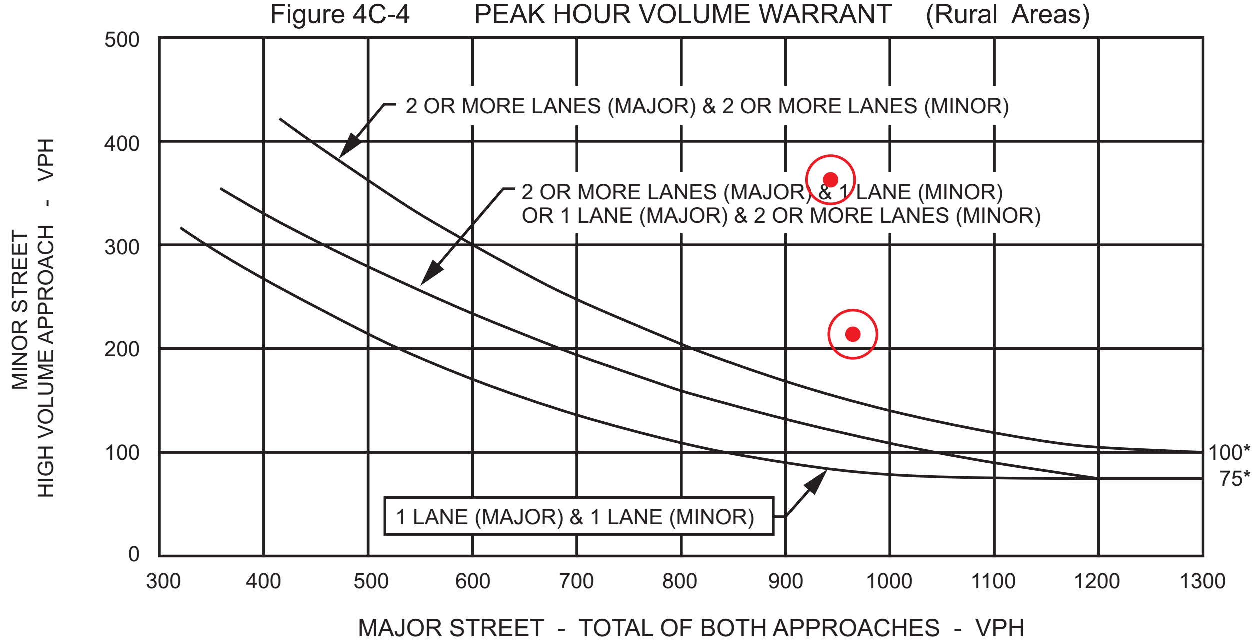
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		943	964			
Highest Approaches - Minor Street	✓		361	213			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: BELMONT Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

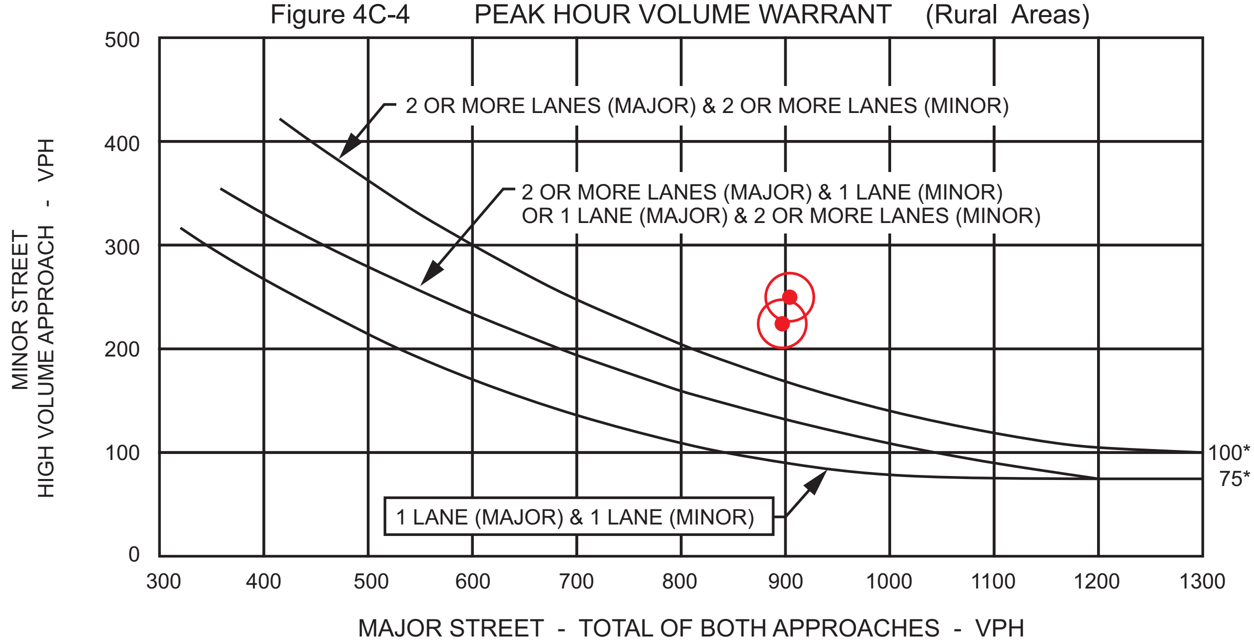
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		906	899			
Highest Approaches - Minor Street	✓		250	223			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: TULARE Critical Approach Speed 50 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

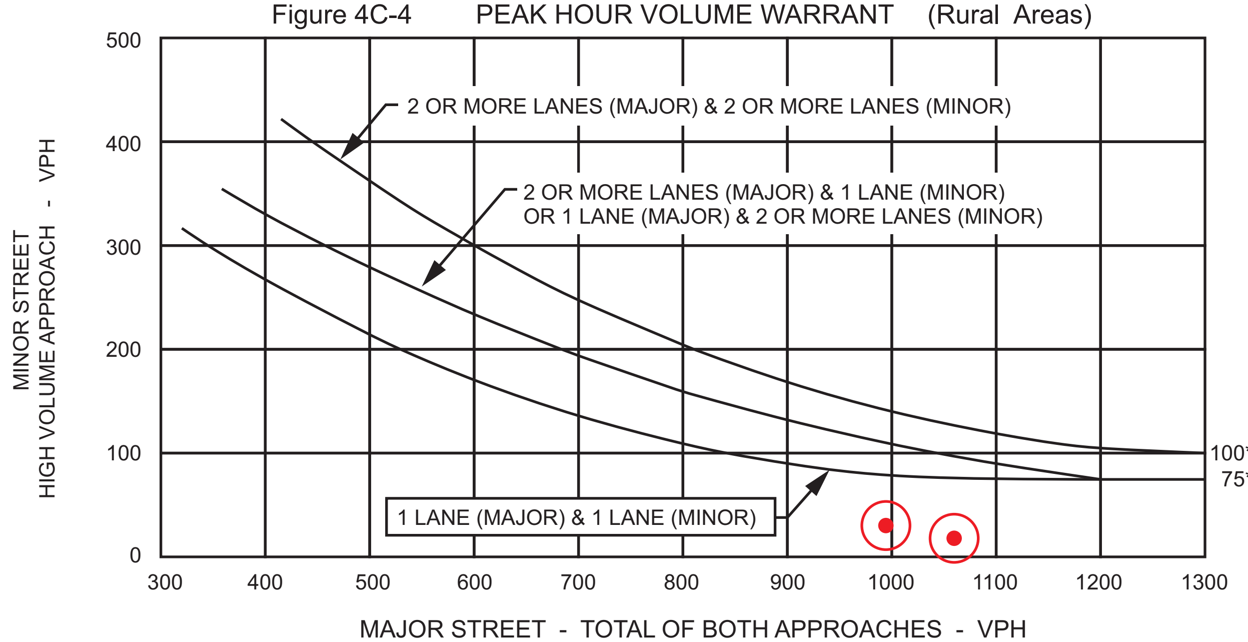
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1059	995			
Highest Approaches - Minor Street	✓		27	30			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: SHIELDS Critical Approach Speed 45 mph

MINOR STREET: LOCAN Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

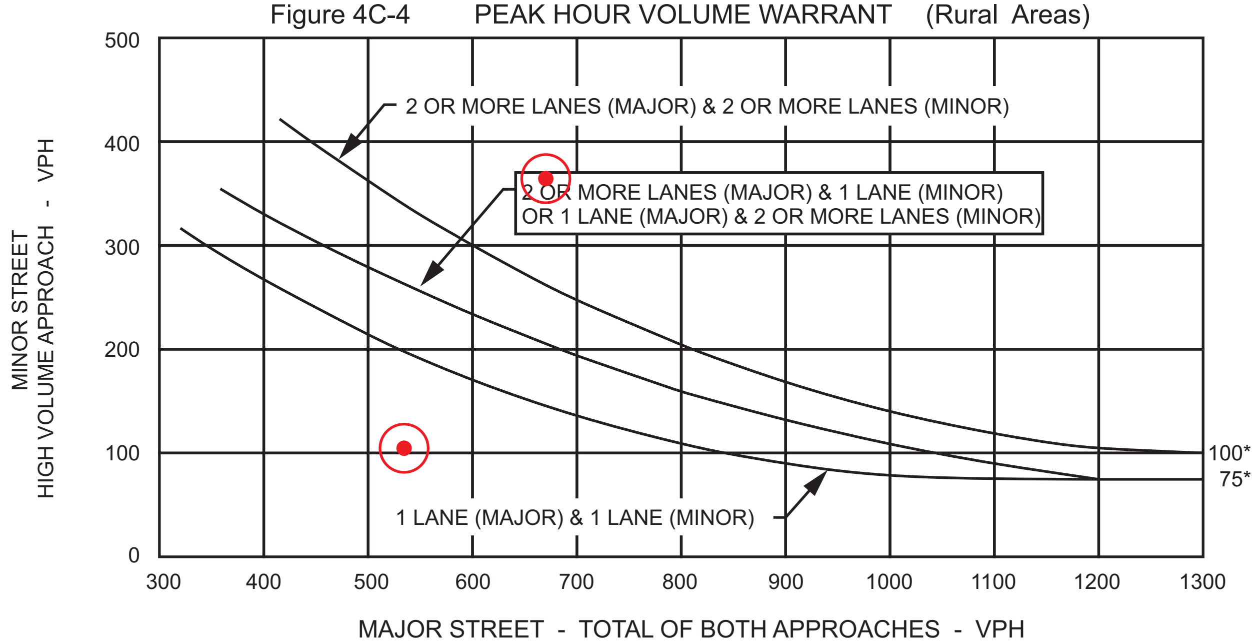
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	671	534			
Highest Approaches - Minor Street	✓		365	104			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: DEWOLF Critical Approach Speed 45 mph

MINOR STREET: SHIELDS Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

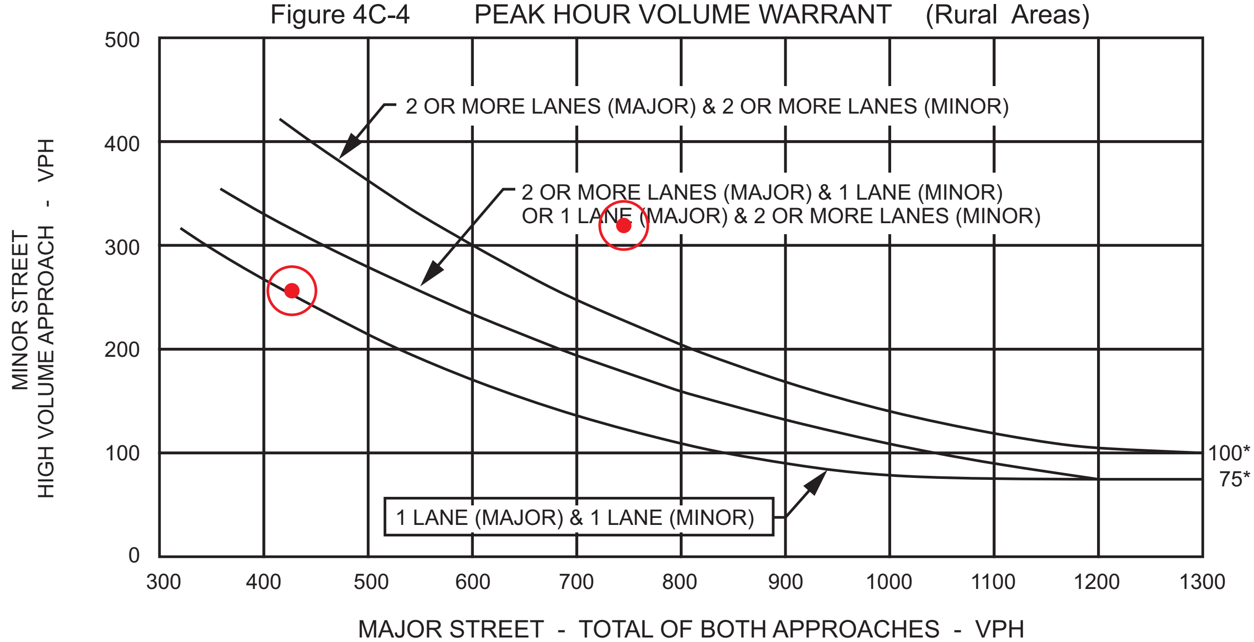
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		745	428			
Highest Approaches - Minor Street	✓		322	253			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: CLINTON Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

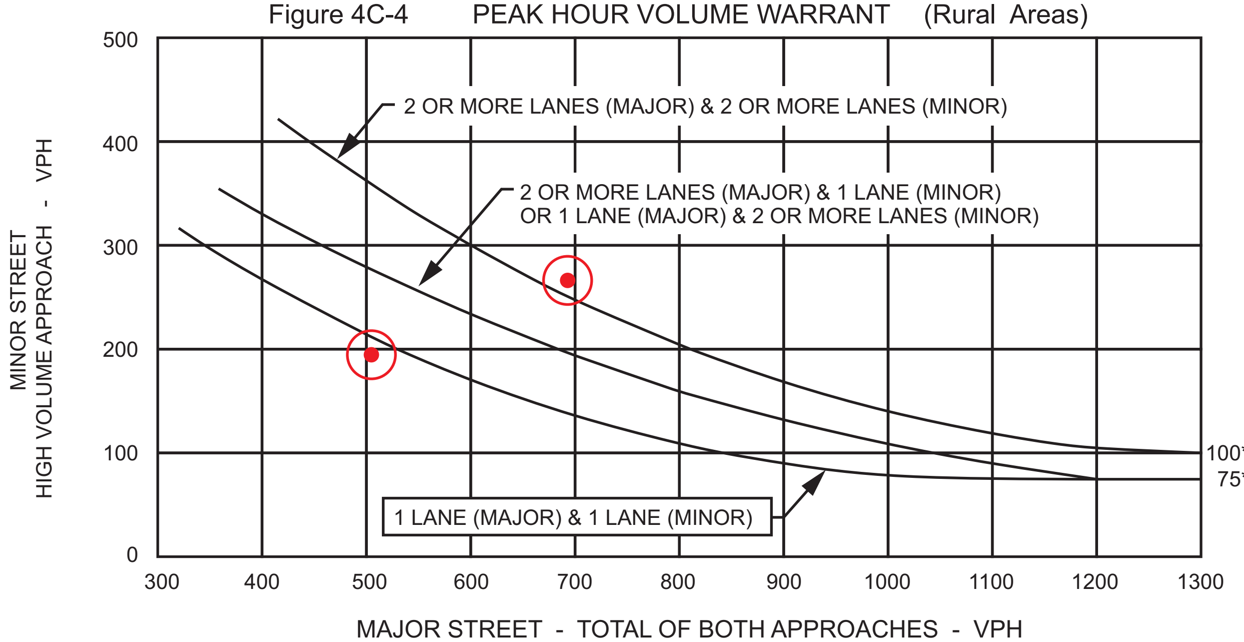
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		695	504			
Highest Approaches - Minor Street	✓		267	195			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

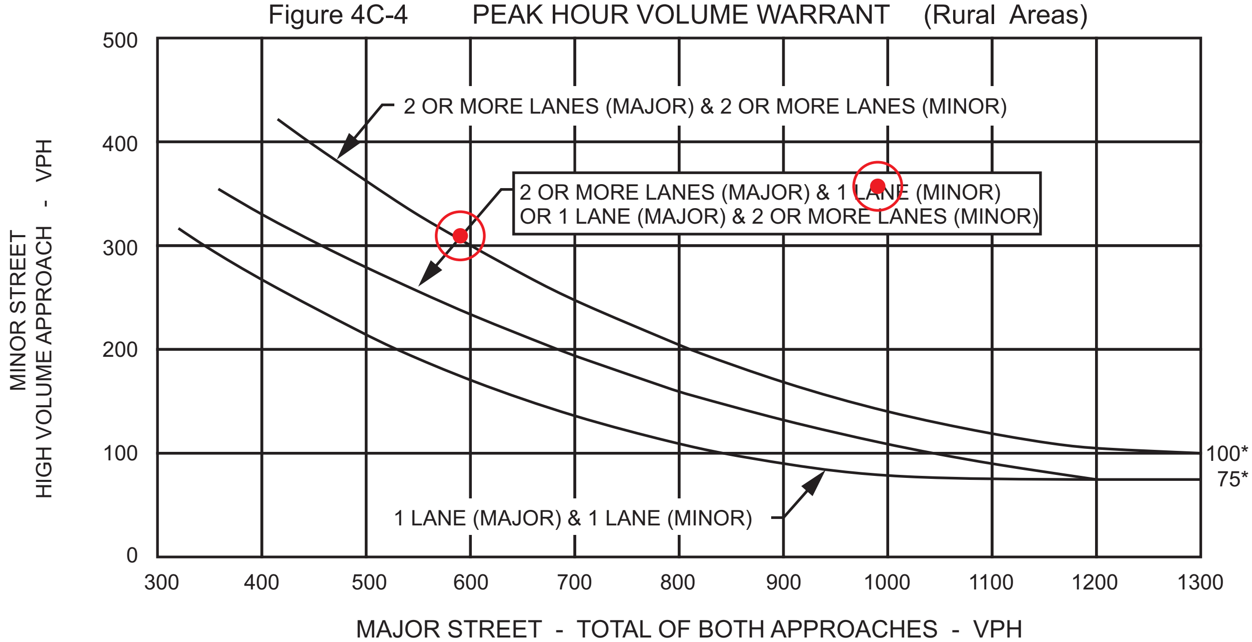
CONDITION: EXISTING (2018) + PROJECT

WARRANT 3 - PeakHour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	991	591			
Highest Approaches - Minor Street	✓		355	309			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

APPENDIX G

MITIGATED EXISTING (2018) PLUS PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	70	42	41	116	27	422	13	42	874
v/c Ratio	0.48	0.16	0.29	0.42	0.19	0.20	0.01	0.30	0.82
Control Delay	60.2	20.2	54.1	14.0	52.0	13.4	0.0	54.3	28.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.2	20.2	54.1	14.0	52.0	13.4	0.0	54.3	28.8
Queue Length 50th (ft)	44	7	26	5	17	71	0	26	472
Queue Length 95th (ft)	#97	32	56	26	53	150	0	63	#829
Internal Link Dist (ft)		165		163		2549			254
Turn Bay Length (ft)	200		200		250		250	255	
Base Capacity (vph)	147	537	143	557	143	2073	954	143	1068
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.08	0.29	0.21	0.19	0.20	0.01	0.29	0.82

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	57	10	25	29	6	77	26	405	12	33	593	97
Future Volume (veh/h)	57	10	25	29	6	77	26	405	12	33	593	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		0.95	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	70	12	30	41	8	108	27	422	12	42	751	123
Peak Hour Factor	0.82	0.82	0.82	0.71	0.71	0.71	0.96	0.96	0.96	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	128	68	170	100	13	181	77	1782	794	101	808	132
Arrive On Green	0.07	0.14	0.14	0.06	0.13	0.13	0.04	0.50	0.50	0.06	0.52	0.52
Sat Flow, veh/h	1781	472	1180	1781	105	1416	1781	3554	1583	1781	1567	257
Grp Volume(v), veh/h	70	0	42	41	0	116	27	422	12	42	0	874
Grp Sat Flow(s),veh/h/ln	1781	0	1652	1781	0	1521	1781	1777	1583	1781	0	1824
Q Serve(g_s), s	3.5	0.0	2.1	2.1	0.0	6.7	1.4	6.3	0.4	2.1	0.0	41.5
Cycle Q Clear(g_c), s	3.5	0.0	2.1	2.1	0.0	6.7	1.4	6.3	0.4	2.1	0.0	41.5
Prop In Lane	1.00		0.71	1.00		0.93	1.00		1.00	1.00		0.14
Lane Grp Cap(c), veh/h	128	0	237	100	0	195	77	1782	794	101	0	940
V/C Ratio(X)	0.55	0.00	0.18	0.41	0.00	0.60	0.35	0.24	0.02	0.41	0.00	0.93
Avail Cap(c_a), veh/h	159	0	555	155	0	508	155	2099	935	155	0	1077
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.8	0.0	35.0	42.5	0.0	38.3	43.3	13.1	11.7	42.4	0.0	21.0
Incr Delay (d2), s/veh	3.6	0.0	0.4	2.7	0.0	2.9	2.7	0.1	0.0	2.7	0.0	12.7
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(50%),veh/ln	1.6	0.0	0.8	1.0	0.0	2.6	0.6	2.2	0.1	1.0	0.0	18.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.4	0.0	35.4	45.1	0.0	41.2	46.0	13.2	11.7	45.1	0.0	33.8
LnGrp LOS	D	A	D	D	A	D	D	B	B	D	A	C
Approach Vol, veh/h		112			157			461			916	
Approach Delay, s/veh		41.6			42.2			15.1			34.3	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	52.9	10.3	18.8	9.8	54.2	11.8	17.3
Change Period (Y+Rc), s	5.8	6.2	5.1	5.4	5.8	6.2	5.1	5.4
Max Green Setting (Gmax), s	8.1	55.0	8.1	31.3	8.1	55.0	8.3	31.1
Max Q Clear Time (g_c+I1), s	4.1	8.3	4.1	4.1	3.4	43.5	5.5	8.7
Green Ext Time (p_c), s	0.0	2.7	0.0	0.2	0.0	4.5	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	30.2
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	101	290	100	218	507	67	177	349	122	35	407	239
v/c Ratio	0.34	0.68	0.22	0.77	0.64	0.15	0.70	0.41	0.15	0.32	0.29	0.31
Control Delay	51.4	46.7	3.4	68.6	42.0	0.7	65.5	24.3	1.2	58.6	24.3	4.4
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	51.4	46.7	3.4	68.6	42.0	0.7	65.5	24.3	1.2	58.6	24.3	4.4
Queue Length 50th (ft)	34	186	0	77	171	0	62	170	0	24	100	0
Queue Length 95th (ft)	61	249	14	#147	216	0	#111	280	5	61	160	53
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	302	618	603	288	1211	629	262	857	825	130	1393	768
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.47	0.17	0.76	0.42	0.11	0.68	0.41	0.15	0.27	0.29	0.31

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	84	241	83	192	446	59	152	300	105	33	387	227
Future Volume (veh/h)	84	241	83	192	446	59	152	300	105	33	387	227
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	101	290	100	218	507	67	177	349	122	35	407	239
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.86	0.86	0.86	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	390	330	280	793	354	239	841	713	65	1448	646
Arrive On Green	0.07	0.21	0.21	0.08	0.22	0.22	0.07	0.45	0.45	0.04	0.41	0.41
Sat Flow, veh/h	3456	1870	1581	3456	3554	1585	3456	1870	1585	1781	3554	1585
Grp Volume(v), veh/h	101	290	100	218	507	67	177	349	122	35	407	239
Grp Sat Flow(s),veh/h/ln	1728	1870	1581	1728	1777	1585	1728	1870	1585	1781	1777	1585
Q Serve(g_s), s	2.9	15.2	5.6	6.5	13.5	2.9	5.3	13.2	4.8	2.0	8.0	7.6
Cycle Q Clear(g_c), s	2.9	15.2	5.6	6.5	13.5	2.9	5.3	13.2	4.8	2.0	8.0	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	249	390	330	280	793	354	239	841	713	65	1448	646
V/C Ratio(X)	0.41	0.74	0.30	0.78	0.64	0.19	0.74	0.42	0.17	0.54	0.28	0.37
Avail Cap(c_a), veh/h	264	642	543	300	1258	561	274	841	713	136	1448	646
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	46.5	38.8	35.0	47.2	36.9	22.1	47.9	19.5	17.2	49.6	20.8	10.2
Incr Delay (d2), s/veh	0.4	10.2	2.0	10.2	3.3	1.0	7.1	1.5	0.5	2.5	0.5	1.6
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	1.2	7.8	2.3	3.1	6.0	1.4	2.4	5.7	1.7	0.9	3.2	3.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.9	49.1	37.0	57.4	40.2	23.1	54.9	21.0	17.7	52.2	21.3	11.9
LnGrp LOS	D	D	D	E	D	C	D	C	B	D	C	B
Approach Vol, veh/h		491			792			648			681	
Approach Delay, s/veh		46.2			43.5			29.7			19.6	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	48.7	13.5	28.7	9.5	53.1	14.4	27.8
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	* 5.9
Max Green Setting (Gmax), s	8.3	42.7	8.0	37.1	8.0	44.0	9.1	* 36
Max Q Clear Time (g_c+I1), s	7.3	10.0	4.9	15.5	4.0	15.2	8.5	17.2
Green Ext Time (p_c), s	0.0	7.1	0.0	7.7	0.0	5.0	0.0	4.5

Intersection Summary		
HCM 6th Ctrl Delay		34.3
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	122	106	381	44	379	94	198	637
v/c Ratio	0.14	0.32	0.69	0.71	0.29	0.64	0.16	0.76	0.81
Control Delay	46.6	29.9	67.9	33.3	49.2	35.7	1.4	60.1	36.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.6	29.9	67.9	33.3	49.2	35.7	1.4	60.1	36.2
Queue Length 50th (ft)	11	58	57	159	23	169	0	101	298
Queue Length 95th (ft)	35	86	#93	176	60	315	0	#232	#646
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	154	746	154	716	154	591	593	290	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.16	0.69	0.53	0.29	0.64	0.16	0.68	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	84	10	67	114	126	36	307	76	166	426	109
Future Volume (veh/h)	17	84	10	67	114	126	36	307	76	166	426	109
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	22	109	13	106	181	200	44	379	94	198	507	130
Peak Hour Factor	0.77	0.77	0.77	0.63	0.63	0.63	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	66	394	47	143	228	252	104	590	498	232	556	143
Arrive On Green	0.04	0.24	0.24	0.08	0.29	0.29	0.06	0.32	0.32	0.13	0.39	0.39
Sat Flow, veh/h	1767	1627	194	1767	800	884	1767	1856	1568	1767	1424	365
Grp Volume(v), veh/h	22	0	122	106	0	381	44	379	94	198	0	637
Grp Sat Flow(s),veh/h/ln	1767	0	1821	1767	0	1684	1767	1856	1568	1767	0	1789
Q Serve(g_s), s	1.1	0.0	5.0	5.4	0.0	19.3	2.2	16.1	4.0	10.1	0.0	31.1
Cycle Q Clear(g_c), s	1.1	0.0	5.0	5.4	0.0	19.3	2.2	16.1	4.0	10.1	0.0	31.1
Prop In Lane	1.00		0.11	1.00		0.52	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	66	0	441	143	0	481	104	590	498	232	0	699
V/C Ratio(X)	0.33	0.00	0.28	0.74	0.00	0.79	0.42	0.64	0.19	0.85	0.00	0.91
Avail Cap(c_a), veh/h	153	0	731	153	0	676	153	590	498	288	0	699
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.2	0.0	28.4	41.4	0.0	30.4	41.9	27.0	22.8	39.2	0.0	26.6
Incr Delay (d2), s/veh	1.1	0.0	0.9	13.8	0.0	8.5	1.0	5.3	0.8	15.6	0.0	18.3
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(50%),veh/ln	0.5	0.0	2.2	2.8	0.0	8.5	1.0	7.5	1.5	5.2	0.0	15.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.3	0.0	29.3	55.2	0.0	38.9	42.9	32.3	23.7	54.8	0.0	44.9
LnGrp LOS	D	A	C	E	A	D	D	C	C	D	A	D
Approach Vol, veh/h		144			487			517			835	
Approach Delay, s/veh		31.6			42.4			31.6			47.2	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.4	42.7	7.4	32.6	16.1	36.0	11.5	28.6
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.0	36.0	8.0	37.0	15.0	29.0	8.0	37.0
Max Q Clear Time (g_c+I1), s	4.2	33.1	3.1	21.3	12.1	18.1	7.4	7.0
Green Ext Time (p_c), s	0.0	1.8	0.0	4.0	0.1	3.9	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	40.8
HCM 6th LOS	D

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	64	328	125	50	481
Future Vol, veh/h	51	64	328	125	50	481
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	76	76	93	93	82	82
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	67	84	353	134	61	587

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1129	420	0	0	487	0
Stage 1	420	-	-	-	-	-
Stage 2	709	-	-	-	-	-
Critical Hdwy	6.46	6.26	-	-	4.16	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	-	-	2.254	-
Pot Cap-1 Maneuver	222	625	-	-	1056	-
Stage 1	654	-	-	-	-	-
Stage 2	481	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	203	625	-	-	1056	-
Mov Cap-2 Maneuver	203	-	-	-	-	-
Stage 1	654	-	-	-	-	-
Stage 2	440	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.4	0	0.8
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	325	1056	-
HCM Lane V/C Ratio	-	-	0.466	0.058	-
HCM Control Delay (s)	-	-	25.4	8.6	0
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	2.4	0.2	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	105	154	167	248	14	413	6	449	116
v/c Ratio	0.49	0.43	0.64	0.52	0.07	0.60	0.03	0.65	0.17
Control Delay	41.2	27.3	44.4	27.5	34.5	25.2	34.3	26.8	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	27.3	44.4	27.5	34.5	25.2	34.3	26.8	2.7
Queue Length 50th (ft)	40	52	63	89	5	123	2	140	0
Queue Length 95th (ft)	96	96	#205	178	27	#389	16	#440	21
Internal Link Dist (ft)		2568		478		2539		2603	
Turn Bay Length (ft)	200		200		250		250		250
Base Capacity (vph)	224	734	267	781	202	684	202	691	685
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.21	0.63	0.32	0.07	0.60	0.03	0.65	0.17

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	98	17	145	193	23	13	349	44	6	422	109
Future Volume (veh/h)	79	98	17	145	193	23	13	349	44	6	422	109
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	105	131	23	167	222	26	14	367	46	6	449	116
Peak Hour Factor	0.75	0.75	0.75	0.87	0.87	0.87	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	175	241	42	207	285	33	48	623	78	22	689	584
Arrive On Green	0.10	0.16	0.16	0.12	0.18	0.18	0.03	0.39	0.39	0.01	0.37	0.37
Sat Flow, veh/h	1753	1525	268	1753	1617	189	1753	1604	201	1753	1841	1560
Grp Volume(v), veh/h	105	0	154	167	0	248	14	0	413	6	449	116
Grp Sat Flow(s),veh/h/ln	1753	0	1793	1753	0	1807	1753	0	1805	1753	1841	1560
Q Serve(g_s), s	4.0	0.0	5.5	6.5	0.0	9.1	0.5	0.0	12.6	0.2	14.0	3.5
Cycle Q Clear(g_c), s	4.0	0.0	5.5	6.5	0.0	9.1	0.5	0.0	12.6	0.2	14.0	3.5
Prop In Lane	1.00		0.15	1.00		0.10	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	175	0	284	207	0	319	48	0	702	22	689	584
V/C Ratio(X)	0.60	0.00	0.54	0.81	0.00	0.78	0.29	0.00	0.59	0.27	0.65	0.20
Avail Cap(c_a), veh/h	224	0	722	267	0	772	202	0	702	202	689	584
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	0.0	26.9	29.9	0.0	27.3	33.1	0.0	16.8	34.0	18.0	14.7
Incr Delay (d2), s/veh	3.3	0.0	1.6	13.1	0.0	4.1	3.3	0.0	3.6	6.5	4.8	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	1.7	0.0	2.3	3.2	0.0	3.9	0.3	0.0	5.1	0.1	6.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.2	0.0	28.5	42.9	0.0	31.4	36.5	0.0	20.4	40.4	22.8	15.5
LnGrp LOS	C	A	C	D	A	C	D	A	C	D	C	B
Approach Vol, veh/h		259			415			427			571	
Approach Delay, s/veh		30.4			36.1			21.0			21.5	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.3	32.8	13.6	16.8	7.3	31.8	12.3	18.1
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	26.0	10.6	28.0	8.0	26.0	8.9	29.7
Max Q Clear Time (g_c+I1), s	2.2	14.6	8.5	7.5	2.5	16.0	6.0	11.1
Green Ext Time (p_c), s	0.0	1.7	0.1	0.7	0.0	2.1	0.1	1.2

Intersection Summary	
HCM 6th Ctrl Delay	26.3
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	73	50	111	122	47	32	345	27	565
v/c Ratio	0.35	0.23	0.12	0.51	0.38	0.12	0.15	0.43	0.13	0.70
Control Delay	39.9	29.3	0.6	45.1	31.6	0.6	37.1	19.6	37.0	26.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.9	29.3	0.6	45.1	31.6	0.6	37.1	19.6	37.0	26.4
Queue Length 50th (ft)	28	27	0	44	46	0	12	86	10	167
Queue Length 95th (ft)	76	60	0	#150	104	0	47	258	42	#536
Internal Link Dist (ft)		507			663			2371		2539
Turn Bay Length (ft)	250		250	250		250	250		250	
Base Capacity (vph)	212	690	684	216	693	686	209	858	209	857
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.11	0.07	0.51	0.18	0.07	0.15	0.40	0.13	0.66

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	57	39	99	109	42	29	285	29	26	492	45
Future Volume (veh/h)	58	57	39	99	109	42	29	285	29	26	492	45
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	74	73	50	111	122	47	32	313	32	27	518	47
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	162	233	198	191	264	223	96	606	62	84	601	54
Arrive On Green	0.09	0.13	0.13	0.11	0.14	0.14	0.05	0.37	0.37	0.05	0.36	0.36
Sat Flow, veh/h	1767	1856	1572	1767	1856	1572	1767	1656	169	1767	1673	152
Grp Volume(v), veh/h	74	73	50	111	122	47	32	0	345	27	0	565
Grp Sat Flow(s),veh/h/ln	1767	1856	1572	1767	1856	1572	1767	0	1825	1767	0	1824
Q Serve(g_s), s	2.5	2.3	1.8	3.8	3.8	1.7	1.1	0.0	9.4	0.9	0.0	18.3
Cycle Q Clear(g_c), s	2.5	2.3	1.8	3.8	3.8	1.7	1.1	0.0	9.4	0.9	0.0	18.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.09	1.00		0.08
Lane Grp Cap(c), veh/h	162	233	198	191	264	223	96	0	667	84	0	655
V/C Ratio(X)	0.46	0.31	0.25	0.58	0.46	0.21	0.33	0.00	0.52	0.32	0.00	0.86
Avail Cap(c_a), veh/h	225	730	619	228	733	621	223	0	902	223	0	902
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	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.3	25.3	25.1	27.0	25.0	24.1	28.9	0.0	15.8	29.2	0.0	18.9
Incr Delay (d2), s/veh	2.0	0.8	0.7	2.8	1.3	0.5	2.0	0.0	0.6	2.2	0.0	6.5
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(50%),veh/ln	1.0	0.9	0.6	1.6	1.6	0.6	0.5	0.0	3.4	0.4	0.0	7.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	26.0	25.7	29.7	26.3	24.6	30.9	0.0	16.4	31.4	0.0	25.4
LnGrp LOS	C	C	C	C	C	C	C	A	B	C	A	C
Approach Vol, veh/h		197			280			377			592	
Approach Delay, s/veh		27.2			27.4			17.6			25.6	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	29.0	12.3	13.8	8.9	28.6	11.2	14.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	31.4	8.2	25.0	8.0	31.4	8.1	25.1
Max Q Clear Time (g_c+I1), s	2.9	11.4	5.8	4.3	3.1	20.3	4.5	5.8
Green Ext Time (p_c), s	0.0	1.8	0.0	0.4	0.0	2.5	0.0	0.6

Intersection Summary		
HCM 6th Ctrl Delay		24.1
HCM 6th LOS		C

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	0	1	22	0	5	0	296	4	5	755	0
Future Vol, veh/h	0	0	1	22	0	5	0	296	4	5	755	0
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	25	25	25	79	79	79	90	90	90	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	4	28	0	6	0	329	4	6	848	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1194	1193	848	1193	1191	331	848	0	0	333	0	0
Stage 1	860	860	-	331	331	-	-	-	-	-	-	-
Stage 2	334	333	-	862	860	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	163	186	360	163	187	708	785	-	-	1221	-	-
Stage 1	349	371	-	680	643	-	-	-	-	-	-	-
Stage 2	678	642	-	348	371	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	160	184	360	160	185	708	785	-	-	1221	-	-
Mov Cap-2 Maneuver	160	184	-	160	185	-	-	-	-	-	-	-
Stage 1	349	368	-	680	643	-	-	-	-	-	-	-
Stage 2	672	642	-	341	368	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15.1	28.5	0	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	785	-	-	360	187	1221	-	-
HCM Lane V/C Ratio	-	-	-	0.011	0.183	0.005	-	-
HCM Control Delay (s)	0	-	-	15.1	28.5	8	0	-
HCM Lane LOS	A	-	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.6	0	-	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	76	306	56	363	2	133	30	107	251
v/c Ratio	0.23	0.49	0.18	0.60	0.01	0.31	0.10	0.22	0.42
Control Delay	31.8	20.8	32.8	24.2	34.0	16.5	33.1	22.3	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	20.8	32.8	24.2	34.0	16.5	33.1	22.3	6.1
Queue Length 50th (ft)	21	70	15	88	1	18	8	30	0
Queue Length 95th (ft)	84	212	65	249	6	44	45	94	58
Internal Link Dist (ft)		2528		2598		168		294	
Turn Bay Length (ft)	250		250		200		273		273
Base Capacity (vph)	372	1218	310	1183	310	971	310	1029	987
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.25	0.18	0.31	0.01	0.14	0.10	0.10	0.25

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	240	23	46	290	7	1	37	47	28	101	236
Future Volume (veh/h)	65	240	23	46	290	7	1	37	47	28	101	236
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	76	279	27	56	354	9	2	58	75	30	107	251
Peak Hour Factor	0.86	0.86	0.86	0.82	0.82	0.82	0.64	0.64	0.63	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	182	438	42	151	457	12	8	118	153	96	391	331
Arrive On Green	0.10	0.26	0.26	0.08	0.25	0.25	0.00	0.16	0.16	0.05	0.21	0.21
Sat Flow, veh/h	1781	1679	162	1781	1816	46	1781	740	958	1781	1870	1585
Grp Volume(v), veh/h	76	0	306	56	0	363	2	0	133	30	107	251
Grp Sat Flow(s),veh/h/ln	1781	0	1841	1781	0	1862	1781	0	1698	1781	1870	1585
Q Serve(g_s), s	2.1	0.0	7.8	1.6	0.0	9.5	0.1	0.0	3.8	0.9	2.5	7.8
Cycle Q Clear(g_c), s	2.1	0.0	7.8	1.6	0.0	9.5	0.1	0.0	3.8	0.9	2.5	7.8
Prop In Lane	1.00		0.09	1.00		0.02	1.00		0.56	1.00		1.00
Lane Grp Cap(c), veh/h	182	0	481	151	0	469	8	0	271	96	391	331
V/C Ratio(X)	0.42	0.00	0.64	0.37	0.00	0.77	0.26	0.00	0.49	0.31	0.27	0.76
Avail Cap(c_a), veh/h	325	0	1084	271	0	1039	271	0	812	271	895	758
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.2	0.0	17.2	22.8	0.0	18.3	26.1	0.0	20.2	24.0	17.5	19.6
Incr Delay (d2), s/veh	1.5	0.0	1.4	1.5	0.0	2.8	16.4	0.0	1.4	1.8	0.4	3.6
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	0.8	0.0	2.9	0.6	0.0	3.6	0.1	0.0	1.4	0.4	0.9	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.7	0.0	18.6	24.3	0.0	21.1	42.5	0.0	21.6	25.8	17.9	23.1
LnGrp LOS	C	A	B	C	A	C	D	A	C	C	B	C
Approach Vol, veh/h		382			419			135			388	
Approach Delay, s/veh		19.7			21.5			21.9			21.9	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.2	14.2	10.3	20.0	5.6	16.8	10.8	19.5
Change Period (Y+Rc), s	5.4	5.8	5.8	* 6.2	5.4	5.8	5.4	6.2
Max Green Setting (Gmax), s	8.0	25.2	8.0	* 31	8.0	25.2	9.6	29.4
Max Q Clear Time (g_c+I1), s	2.9	5.8	3.6	9.8	2.1	9.8	4.1	11.5
Green Ext Time (p_c), s	0.0	0.6	0.0	1.5	0.0	1.2	0.1	1.7

Intersection Summary	
HCM 6th Ctrl Delay	21.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	233	121	119	30	283	23	570
v/c Ratio	0.73	0.18	0.40	0.16	0.36	0.12	0.76
Control Delay	50.3	16.7	34.2	41.7	22.1	41.4	30.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.3	16.7	34.2	41.7	22.1	41.4	30.8
Queue Length 50th (ft)	102	32	48	13	84	10	197
Queue Length 95th (ft)	#317	79	108	43	202	38	#535
Internal Link Dist (ft)		2598	234		299		264
Turn Bay Length (ft)	250			200		200	
Base Capacity (vph)	319	862	674	185	779	185	750
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.14	0.18	0.16	0.36	0.12	0.76

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	212	98	12	0	98	13	24	221	2	19	263	216
Future Volume (veh/h)	212	98	12	0	98	13	24	221	2	19	263	216
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	233	108	13	0	105	14	30	280	3	23	313	257
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.79	0.79	0.79	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	563	68	2	176	23	89	695	7	73	349	286
Arrive On Green	0.16	0.34	0.34	0.00	0.11	0.11	0.05	0.38	0.38	0.04	0.37	0.37
Sat Flow, veh/h	1781	1638	197	1781	1616	215	1781	1847	20	1781	950	780
Grp Volume(v), veh/h	233	0	121	0	0	119	30	0	283	23	0	570
Grp Sat Flow(s),veh/h/ln	1781	0	1835	1781	0	1832	1781	0	1867	1781	0	1730
Q Serve(g_s), s	9.3	0.0	3.4	0.0	0.0	4.5	1.2	0.0	8.1	0.9	0.0	22.6
Cycle Q Clear(g_c), s	9.3	0.0	3.4	0.0	0.0	4.5	1.2	0.0	8.1	0.9	0.0	22.6
Prop In Lane	1.00		0.11	1.00		0.12	1.00		0.01	1.00		0.45
Lane Grp Cap(c), veh/h	277	0	631	2	0	200	89	0	702	73	0	635
V/C Ratio(X)	0.84	0.00	0.19	0.00	0.00	0.60	0.34	0.00	0.40	0.32	0.00	0.90
Avail Cap(c_a), veh/h	338	0	852	196	0	704	196	0	821	196	0	760
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	0.00	1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.9	0.0	16.8	0.0	0.0	30.9	33.4	0.0	16.7	33.9	0.0	21.8
Incr Delay (d2), s/veh	14.8	0.0	0.1	0.0	0.0	2.8	2.2	0.0	0.4	2.4	0.0	12.0
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	4.7	0.0	1.3	0.0	0.0	2.0	0.5	0.0	3.1	0.4	0.0	10.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.6	0.0	16.9	0.0	0.0	33.7	35.6	0.0	17.1	36.4	0.0	33.8
LnGrp LOS	D	A	B	A	A	C	D	A	B	D	A	C
Approach Vol, veh/h		354			119			313			593	
Approach Delay, s/veh		35.2			33.7			18.9			33.9	
Approach LOS		D			C			B			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.4	33.2	0.0	31.2	9.0	32.5	17.1	14.1				
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.4	5.8	5.8	6.2				
Max Green Setting (Gmax), s	8.0	32.0	8.0	33.8	8.0	32.0	13.8	28.0				
Max Q Clear Time (g_c+I1), s	2.9	10.1	0.0	5.4	3.2	24.6	11.3	6.5				
Green Ext Time (p_c), s	0.0	1.4	0.0	0.5	0.0	2.1	0.2	0.5				
Intersection Summary												
HCM 6th Ctrl Delay			30.8									
HCM 6th LOS			C									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	36	93	101	255	22	229	50	560
v/c Ratio	0.16	0.26	0.45	0.49	0.10	0.33	0.23	0.73
Control Delay	35.5	23.2	41.4	25.5	35.1	21.9	36.2	29.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	23.2	41.4	25.5	35.1	21.9	36.2	29.6
Queue Length 50th (ft)	12	25	34	63	7	72	16	150
Queue Length 95th (ft)	45	64	90	150	28	130	58	#485
Internal Link Dist (ft)		176		2597		70		117
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	221	713	224	719	221	765	221	765
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.13	0.45	0.35	0.10	0.30	0.23	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	59	18	76	158	33	16	153	14	42	423	47
Future Volume (veh/h)	30	59	18	76	158	33	16	153	14	42	423	47
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	36	71	22	101	211	44	22	210	19	50	504	56
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.73	0.73	0.73	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	187	58	191	276	58	73	532	48	133	577	64
Arrive On Green	0.06	0.14	0.14	0.11	0.18	0.18	0.04	0.32	0.32	0.07	0.35	0.35
Sat Flow, veh/h	1781	1370	424	1781	1501	313	1781	1690	153	1781	1654	184
Grp Volume(v), veh/h	36	0	93	101	0	255	22	0	229	50	0	560
Grp Sat Flow(s),veh/h/ln	1781	0	1794	1781	0	1814	1781	0	1843	1781	0	1837
Q Serve(g_s), s	1.2	0.0	2.9	3.3	0.0	8.2	0.7	0.0	5.9	1.6	0.0	17.5
Cycle Q Clear(g_c), s	1.2	0.0	2.9	3.3	0.0	8.2	0.7	0.0	5.9	1.6	0.0	17.5
Prop In Lane	1.00		0.24	1.00		0.17	1.00		0.08	1.00		0.10
Lane Grp Cap(c), veh/h	107	0	245	191	0	334	73	0	581	133	0	641
V/C Ratio(X)	0.34	0.00	0.38	0.53	0.00	0.76	0.30	0.00	0.39	0.37	0.00	0.87
Avail Cap(c_a), veh/h	233	0	733	236	0	745	233	0	799	233	0	796
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	24.0	25.8	0.0	23.7	28.5	0.0	16.4	26.9	0.0	18.6
Incr Delay (d2), s/veh	1.8	0.0	1.0	2.3	0.0	3.6	2.3	0.0	0.4	1.7	0.0	8.9
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(50%),veh/ln	0.5	0.0	1.2	1.4	0.0	3.4	0.3	0.0	2.2	0.7	0.0	7.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.4	0.0	25.0	28.1	0.0	27.3	30.8	0.0	16.8	28.7	0.0	27.6
LnGrp LOS	C	A	C	C	A	C	C	A	B	C	A	C
Approach Vol, veh/h		129			356			251			610	
Approach Delay, s/veh		26.2			27.6			18.0			27.7	
Approach LOS		C			C			B			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	25.1	12.0	14.1	7.9	27.1	9.1	17.1				
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8				
Max Green Setting (Gmax), s	8.0	26.5	8.1	25.0	8.0	26.5	8.0	25.1				
Max Q Clear Time (g_c+I1), s	3.6	7.9	5.3	4.9	2.7	19.5	3.2	10.2				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.3	0.0	1.9	0.0	1.1				
Intersection Summary												
HCM 6th Ctrl Delay			25.7									
HCM 6th LOS			C									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	51	122	123	321	99	225	161	30	289	472
v/c Ratio	0.20	0.27	0.44	0.59	0.39	0.35	0.25	0.12	0.59	0.63
Control Delay	38.2	26.3	41.3	28.7	41.1	22.8	5.7	37.4	31.3	7.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.2	26.3	41.3	28.7	41.1	22.8	5.7	37.4	31.3	7.6
Queue Length 50th (ft)	22	46	55	136	45	66	0	13	121	6
Queue Length 95th (ft)	67	99	#122	208	84	130	17	42	209	55
Internal Link Dist (ft)		2563		2568		323			652	
Turn Bay Length (ft)	200		200		200		200	200		424
Base Capacity (vph)	250	910	306	940	268	921	864	250	874	984
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.13	0.40	0.34	0.37	0.24	0.19	0.12	0.33	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	103	7	98	232	25	68	155	111	25	240	392
Future Volume (veh/h)	46	103	7	98	232	25	68	155	111	25	240	392
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	51	114	8	122	290	31	99	225	161	30	289	472
Peak Hour Factor	0.90	0.90	0.90	0.80	0.80	0.80	0.69	0.69	0.69	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	125	311	22	176	354	38	166	694	588	88	612	519
Arrive On Green	0.07	0.18	0.18	0.10	0.21	0.21	0.09	0.37	0.37	0.05	0.33	0.33
Sat Flow, veh/h	1781	1727	121	1781	1661	178	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	51	0	122	122	0	321	99	225	161	30	289	472
Grp Sat Flow(s),veh/h/ln	1781	0	1849	1781	0	1838	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.0	0.0	4.3	4.9	0.0	12.4	4.0	6.4	5.3	1.2	9.2	21.3
Cycle Q Clear(g_c), s	2.0	0.0	4.3	4.9	0.0	12.4	4.0	6.4	5.3	1.2	9.2	21.3
Prop In Lane	1.00		0.07	1.00		0.10	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	125	0	333	176	0	391	166	694	588	88	612	519
V/C Ratio(X)	0.41	0.00	0.37	0.69	0.00	0.82	0.59	0.32	0.27	0.34	0.47	0.91
Avail Cap(c_a), veh/h	191	0	694	234	0	732	205	694	588	191	667	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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	0.0	26.8	32.5	0.0	28.0	32.5	16.8	16.4	34.3	20.0	24.0
Incr Delay (d2), s/veh	2.1	0.0	0.7	5.6	0.0	4.3	3.4	0.3	0.2	2.2	0.6	17.9
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(50%),veh/ln	0.9	0.0	1.8	2.3	0.0	5.4	1.8	2.5	1.7	0.5	3.6	9.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.4	0.0	27.5	38.1	0.0	32.3	35.8	17.0	16.7	36.5	20.5	42.0
LnGrp LOS	D	A	C	D	A	C	D	B	B	D	C	D
Approach Vol, veh/h		173			443			485			791	
Approach Delay, s/veh		29.8			33.9			20.7			33.9	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	33.5	12.8	19.2	12.4	30.2	10.3	21.7
Change Period (Y+Rc), s	5.4	5.8	5.4	* 5.8	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	8.0	27.2	9.8	* 28	8.6	26.6	8.0	29.7
Max Q Clear Time (g_c+I1), s	3.2	8.4	6.9	6.3	6.0	23.3	4.0	14.4
Green Ext Time (p_c), s	0.0	1.5	0.1	0.5	0.0	1.2	0.0	1.5

Intersection Summary		
HCM 6th Ctrl Delay		30.2
HCM 6th LOS		C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	29	57	7	58	30	523	25	65	385
v/c Ratio	0.22	0.19	0.05	0.25	0.22	0.24	0.02	0.36	0.32
Control Delay	51.6	21.2	48.7	15.6	62.7	6.2	0.0	50.5	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.6	21.2	48.7	15.6	62.7	6.2	0.0	50.5	15.6
Queue Length 50th (ft)	20	17	5	5	23	6	0	43	135
Queue Length 95th (ft)	45	41	20	36	m34	190	m0	82	326
Internal Link Dist (ft)		165		163		2549			254
Turn Bay Length (ft)	200		200		250		250	255	
Base Capacity (vph)	145	520	130	493	136	2213	1040	194	1223
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.11	0.05	0.12	0.22	0.24	0.02	0.34	0.31

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	24	23	6	7	46	29	502	24	60	317	37
Future Volume (veh/h)	24	24	23	6	7	46	29	502	24	60	317	37
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	29	29	28	7	8	50	30	523	25	65	345	40
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	76	90	86	25	16	99	78	677	295	864	1045	121
Arrive On Green	0.04	0.10	0.10	0.01	0.07	0.07	0.01	0.06	0.06	0.48	0.64	0.64
Sat Flow, veh/h	1781	874	844	1781	223	1396	1781	3554	1550	1781	1645	191
Grp Volume(v), veh/h	29	0	57	7	0	58	30	523	25	65	0	385
Grp Sat Flow(s),veh/h/ln	1781	0	1718	1781	0	1619	1781	1777	1550	1781	0	1836
Q Serve(g_s), s	1.7	0.0	3.4	0.4	0.0	3.8	1.8	15.9	1.4	2.1	0.0	10.6
Cycle Q Clear(g_c), s	1.7	0.0	3.4	0.4	0.0	3.8	1.8	15.9	1.4	2.1	0.0	10.6
Prop In Lane	1.00		0.49	1.00		0.86	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	76	0	176	25	0	115	78	677	295	864	0	1167
V/C Ratio(X)	0.38	0.00	0.32	0.28	0.00	0.50	0.39	0.77	0.08	0.08	0.00	0.33
Avail Cap(c_a), veh/h	144	0	497	131	0	456	133	1208	527	864	0	1167
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.76	0.76	0.76	1.00	0.00	1.00
Uniform Delay (d), s/veh	51.2	0.0	45.8	53.7	0.0	49.2	52.7	49.2	31.1	15.1	0.0	9.3
Incr Delay (d2), s/veh	3.1	0.0	1.1	6.0	0.0	3.4	2.4	6.5	0.4	0.0	0.0	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	0.8	0.0	1.5	0.2	0.0	1.6	0.9	8.1	0.7	0.8	0.0	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.3	0.0	46.9	59.7	0.0	52.6	55.1	55.7	31.6	15.2	0.0	10.0
LnGrp LOS	D	A	D	E	A	D	E	E	C	B	A	B
Approach Vol, veh/h		86			65			578			450	
Approach Delay, s/veh		49.4			53.4			54.6			10.8	
Approach LOS		D			D			D			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	59.5	27.1	6.6	16.7	10.6	76.1	10.1	13.2
Change Period (Y+Rc), s	6.2	* 6.2	5.1	5.4	5.8	6.2	5.4	* 5.4
Max Green Setting (Gmax), s	10.2	* 37	8.1	31.8	8.2	39.4	8.9	* 31
Max Q Clear Time (g_c+I1), s	4.1	17.9	2.4	5.4	3.8	12.6	3.7	5.8
Green Ext Time (p_c), s	0.0	3.0	0.0	0.2	0.0	2.1	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	37.4
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	170	442	80	120	181	39	116	410	175	84	235	74
v/c Ratio	0.77	0.81	0.14	0.57	0.18	0.07	0.59	0.59	0.24	0.71	0.18	0.10
Control Delay	73.6	48.5	0.5	61.4	28.9	0.2	63.5	33.3	2.9	82.0	18.5	1.7
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	73.6	48.5	0.5	61.4	28.9	0.2	63.5	33.3	2.9	82.0	18.5	1.7
Queue Length 50th (ft)	61	284	0	42	48	0	42	242	0	60	65	5
Queue Length 95th (ft)	#100	351	0	#76	74	0	#76	351	30	#142	23	0
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	221	609	622	211	1126	609	196	691	717	122	1316	709
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.73	0.13	0.57	0.16	0.06	0.59	0.59	0.24	0.69	0.18	0.10

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	141	367	66	106	159	34	108	381	163	74	207	65
Future Volume (veh/h)	141	367	66	106	159	34	108	381	163	74	207	65
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	170	442	80	120	181	39	116	410	175	84	235	74
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	223	521	441	184	929	414	183	748	634	107	1415	630
Arrive On Green	0.06	0.28	0.28	0.05	0.26	0.26	0.05	0.40	0.40	0.02	0.13	0.13
Sat Flow, veh/h	3456	1870	1585	3456	3554	1585	3456	1870	1585	1781	3554	1581
Grp Volume(v), veh/h	170	442	80	120	181	39	116	410	175	84	235	74
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1728	1777	1585	1728	1870	1585	1781	1777	1581
Q Serve(g_s), s	5.3	24.6	3.3	3.7	4.4	2.0	3.6	18.5	6.0	5.2	6.5	4.5
Cycle Q Clear(g_c), s	5.3	24.6	3.3	3.7	4.4	2.0	3.6	18.5	6.0	5.2	6.5	4.5
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	223	521	441	184	929	414	183	748	634	107	1415	630
V/C Ratio(X)	0.76	0.85	0.18	0.65	0.19	0.09	0.63	0.55	0.28	0.78	0.17	0.12
Avail Cap(c_a), veh/h	223	612	519	192	1131	504	188	748	634	118	1415	630
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.97	0.97	0.97	0.81	0.81	0.81	0.96	0.96	0.96
Uniform Delay (d), s/veh	50.6	37.5	18.1	51.1	31.6	30.8	51.0	25.3	11.9	53.2	31.6	30.7
Incr Delay (d2), s/veh	13.0	14.5	0.8	5.4	0.4	0.4	3.9	2.3	0.9	22.3	0.2	0.4
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	2.6	12.8	1.6	1.7	1.9	0.8	1.6	8.2	2.9	3.0	2.8	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.6	52.0	18.9	56.5	32.0	31.1	55.0	27.7	12.8	75.5	31.8	31.1
LnGrp LOS	E	D	B	E	C	C	D	C	B	E	C	C
Approach Vol, veh/h		692			340			701			393	
Approach Delay, s/veh		51.0			40.5			28.5			41.0	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	49.8	13.0	34.7	12.3	50.0	11.7	35.9
Change Period (Y+Rc), s	6.7	6.0	5.9	* 5.9	5.7	6.0	5.9	5.3
Max Green Setting (Gmax), s	6.0	38.0	7.1	* 35	7.3	37.7	6.1	36.0
Max Q Clear Time (g_c+I1), s	5.6	8.5	7.3	6.4	7.2	20.5	5.7	26.6
Green Ext Time (p_c), s	0.0	3.2	0.0	3.0	0.0	5.1	0.0	4.1

Intersection Summary	
HCM 6th Ctrl Delay	40.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	89	66	28	60	16	560	52	51	375
v/c Ratio	0.37	0.16	0.13	0.17	0.07	0.59	0.06	0.23	0.35
Control Delay	39.8	15.4	37.1	11.6	37.0	26.0	0.1	37.7	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	15.4	37.1	11.6	37.0	26.0	0.1	37.7	17.8
Queue Length 50th (ft)	37	12	11	6	6	220	0	21	89
Queue Length 95th (ft)	#124	43	38	25	31	#631	0	69	#356
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	242	1027	223	981	223	948	865	223	1058
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.06	0.13	0.06	0.07	0.59	0.06	0.23	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	82	34	27	22	11	36	15	515	48	47	317	32
Future Volume (veh/h)	82	34	27	22	11	36	15	515	48	47	317	32
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	89	37	29	28	14	46	16	560	52	51	341	34
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.92	0.92	0.92	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	174	159	124	87	44	144	55	739	626	131	733	73
Arrive On Green	0.10	0.16	0.16	0.05	0.11	0.11	0.03	0.40	0.40	0.07	0.44	0.44
Sat Flow, veh/h	1781	972	762	1781	383	1260	1781	1870	1585	1781	1673	167
Grp Volume(v), veh/h	89	0	66	28	0	60	16	560	52	51	0	375
Grp Sat Flow(s),veh/h/ln	1781	0	1733	1781	0	1644	1781	1870	1585	1781	0	1840
Q Serve(g_s), s	3.1	0.0	2.2	1.0	0.0	2.2	0.6	17.0	1.3	1.8	0.0	9.5
Cycle Q Clear(g_c), s	3.1	0.0	2.2	1.0	0.0	2.2	0.6	17.0	1.3	1.8	0.0	9.5
Prop In Lane	1.00		0.44	1.00		0.77	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	174	0	283	87	0	188	55	739	626	131	0	806
V/C Ratio(X)	0.51	0.00	0.23	0.32	0.00	0.32	0.29	0.76	0.08	0.39	0.00	0.47
Avail Cap(c_a), veh/h	217	0	975	217	0	924	217	739	626	217	0	806
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.2	0.0	23.9	30.2	0.0	26.8	31.2	17.2	12.4	29.1	0.0	13.0
Incr Delay (d2), s/veh	0.9	0.0	1.2	0.8	0.0	2.7	1.1	7.1	0.3	0.7	0.0	1.9
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(50%),veh/ln	1.3	0.0	0.9	0.4	0.0	0.9	0.2	7.5	0.4	0.7	0.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.1	0.0	25.1	31.0	0.0	29.4	32.3	24.3	12.7	29.8	0.0	15.0
LnGrp LOS	C	A	C	C	A	C	C	C	B	C	A	B
Approach Vol, veh/h		155			88			628			426	
Approach Delay, s/veh		27.4			30.0			23.6			16.7	
Approach LOS		C			C			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.0	35.5	10.4	13.8	8.9	32.7	7.2	17.0				
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3				
Max Green Setting (Gmax), s	8.0	26.0	8.0	37.0	8.0	26.0	8.0	37.0				
Max Q Clear Time (g_c+I1), s	2.6	11.5	5.1	4.2	3.8	19.0	3.0	4.2				
Green Ext Time (p_c), s	0.0	3.9	0.0	0.6	0.0	3.7	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay			22.2									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	34	550	71	46	318
Future Vol, veh/h	48	34	550	71	46	318
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	89	89	91	91	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	38	604	78	49	342

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1083	643	0	0	682	0
Stage 1	643	-	-	-	-	-
Stage 2	440	-	-	-	-	-
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	240	473	-	-	911	-
Stage 1	523	-	-	-	-	-
Stage 2	649	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	224	473	-	-	911	-
Mov Cap-2 Maneuver	224	-	-	-	-	-
Stage 1	523	-	-	-	-	-
Stage 2	606	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.4	0	1.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	287	911	-
HCM Lane V/C Ratio	-	-	0.321	0.054	-
HCM Control Delay (s)	-	-	23.4	9.2	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	1.3	0.2	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	107	117	60	72	9	633	21	306	63
v/c Ratio	0.47	0.34	0.26	0.21	0.04	0.63	0.09	0.28	0.06
Control Delay	41.8	27.7	36.9	24.8	35.8	24.6	36.0	15.6	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	27.7	36.9	24.8	35.8	24.6	36.0	15.6	0.1
Queue Length 50th (ft)	39	39	21	22	3	187	7	72	0
Queue Length 95th (ft)	#147	94	75	61	20	#662	35	238	0
Internal Link Dist (ft)		2568		478		2539		2603	
Turn Bay Length (ft)	200		200		250		250		250
Base Capacity (vph)	230	825	227	825	227	997	227	1075	979
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.14	0.26	0.09	0.04	0.63	0.09	0.28	0.06

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	102	98	13	55	57	8	8	522	67	20	288	59
Future Volume (veh/h)	102	98	13	55	57	8	8	522	67	20	288	59
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	107	103	14	60	63	9	9	561	72	21	306	63
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.93	0.93	0.93	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	189	237	32	146	196	28	33	625	80	69	758	642
Arrive On Green	0.11	0.15	0.15	0.08	0.12	0.12	0.02	0.38	0.38	0.04	0.41	0.41
Sat Flow, veh/h	1781	1612	219	1781	1601	229	1781	1624	208	1781	1870	1585
Grp Volume(v), veh/h	107	0	117	60	0	72	9	0	633	21	306	63
Grp Sat Flow(s),veh/h/ln	1781	0	1831	1781	0	1829	1781	0	1833	1781	1870	1585
Q Serve(g_s), s	3.7	0.0	3.8	2.1	0.0	2.3	0.3	0.0	20.9	0.7	7.5	1.6
Cycle Q Clear(g_c), s	3.7	0.0	3.8	2.1	0.0	2.3	0.3	0.0	20.9	0.7	7.5	1.6
Prop In Lane	1.00		0.12	1.00		0.13	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	189	0	269	146	0	224	33	0	705	69	758	642
V/C Ratio(X)	0.57	0.00	0.44	0.41	0.00	0.32	0.27	0.00	0.90	0.30	0.40	0.10
Avail Cap(c_a), veh/h	221	0	796	221	0	795	221	0	813	221	830	704
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.4	0.0	25.1	28.1	0.0	25.8	31.2	0.0	18.6	30.1	13.6	11.9
Incr Delay (d2), s/veh	2.7	0.0	1.1	1.9	0.0	0.8	4.4	0.0	11.6	2.4	0.3	0.1
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(50%),veh/ln	1.6	0.0	1.5	0.9	0.0	1.0	0.2	0.0	9.5	0.3	2.7	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.1	0.0	26.2	30.0	0.0	26.6	35.6	0.0	30.2	32.5	14.0	11.9
LnGrp LOS	C	A	C	C	A	C	D	A	C	C	B	B
Approach Vol, veh/h		224			132			642			390	
Approach Delay, s/veh		28.0			28.1			30.3			14.6	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	30.6	10.7	15.3	6.6	31.9	12.2	13.7
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	28.6	8.0	28.0	8.0	28.6	8.0	28.0
Max Q Clear Time (g_c+I1), s	2.7	22.9	4.1	5.8	2.3	9.5	5.7	4.3
Green Ext Time (p_c), s	0.0	1.9	0.0	0.5	0.0	1.7	0.0	0.3

Intersection Summary		
HCM 6th Ctrl Delay		25.3
HCM 6th LOS		C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	73	130	37	48	78	37	6	611	48	366
v/c Ratio	0.35	0.33	0.08	0.23	0.25	0.09	0.03	0.64	0.23	0.34
Control Delay	41.6	30.9	0.4	39.5	31.2	0.5	37.6	26.4	39.5	15.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	30.9	0.4	39.5	31.2	0.5	37.6	26.4	39.5	15.9
Queue Length 50th (ft)	35	62	0	23	36	0	3	273	23	93
Queue Length 95th (ft)	88	111	0	63	73	0	15	#549	63	269
Internal Link Dist (ft)		507			663			2371		2539
Turn Bay Length (ft)	250		250	250		250	250		250	
Base Capacity (vph)	209	684	667	207	681	678	207	961	207	1081
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.19	0.06	0.23	0.11	0.05	0.03	0.64	0.23	0.34

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	121	34	44	72	34	5	480	46	43	296	29
Future Volume (veh/h)	68	121	34	44	72	34	5	480	46	43	296	29
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		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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	130	37	48	78	37	6	558	53	48	333	33
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	262	217	127	227	192	22	635	60	127	730	72
Arrive On Green	0.09	0.14	0.14	0.07	0.12	0.12	0.01	0.38	0.38	0.07	0.44	0.44
Sat Flow, veh/h	1781	1870	1549	1781	1870	1585	1781	1682	160	1781	1675	166
Grp Volume(v), veh/h	73	130	37	48	78	37	6	0	611	48	0	366
Grp Sat Flow(s),veh/h/ln	1781	1870	1549	1781	1870	1585	1781	0	1842	1781	0	1840
Q Serve(g_s), s	2.6	4.2	1.4	1.7	2.5	1.4	0.2	0.0	20.3	1.7	0.0	9.2
Cycle Q Clear(g_c), s	2.6	4.2	1.4	1.7	2.5	1.4	0.2	0.0	20.3	1.7	0.0	9.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.09	1.00		0.09
Lane Grp Cap(c), veh/h	160	262	217	127	227	192	22	0	695	127	0	802
V/C Ratio(X)	0.46	0.50	0.17	0.38	0.34	0.19	0.27	0.00	0.88	0.38	0.00	0.46
Avail Cap(c_a), veh/h	219	714	591	217	711	602	217	0	882	217	0	881
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	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.4	26.2	24.9	29.2	26.5	26.0	32.2	0.0	19.1	29.2	0.0	13.1
Incr Delay (d2), s/veh	2.0	1.5	0.4	1.9	0.9	0.5	6.2	0.0	8.4	1.9	0.0	0.4
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	1.1	1.8	0.5	0.7	1.1	0.5	0.1	0.0	8.8	0.7	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.5	27.6	25.3	31.0	27.4	26.5	38.3	0.0	27.5	31.0	0.0	13.5
LnGrp LOS	C	C	C	C	C	C	D	A	C	C	A	B
Approach Vol, veh/h		240			163			617			414	
Approach Delay, s/veh		28.1			28.3			27.6			15.5	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	30.6	10.1	15.0	6.2	34.5	11.3	13.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	31.5	8.0	25.1	8.0	31.5	8.1	25.0
Max Q Clear Time (g_c+I1), s	3.7	22.3	3.7	6.2	2.2	11.2	4.6	4.5
Green Ext Time (p_c), s	0.0	2.5	0.0	0.6	0.0	1.9	0.0	0.4

Intersection Summary		
HCM 6th Ctrl Delay		24.3
HCM 6th LOS		C

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	2	0	0	22	0	8	1	570	35	2	387	0
Future Vol, veh/h	2	0	0	22	0	8	1	570	35	2	387	0
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	25	25	25	72	72	72	93	93	93	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	0	31	0	11	1	613	38	2	445	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1089	1102	445	1083	1083	632	445	0	0	651	0	0
Stage 1	449	449	-	634	634	-	-	-	-	-	-	-
Stage 2	640	653	-	449	449	-	-	-	-	-	-	-
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	193	212	613	195	217	480	1115	-	-	935	-	-
Stage 1	589	572	-	467	473	-	-	-	-	-	-	-
Stage 2	464	464	-	589	572	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	188	211	613	194	216	480	1115	-	-	935	-	-
Mov Cap-2 Maneuver	188	211	-	194	216	-	-	-	-	-	-	-
Stage 1	588	570	-	467	473	-	-	-	-	-	-	-
Stage 2	453	464	-	587	570	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25	24	0	0
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	188	231	935	-	-
HCM Lane V/C Ratio	0.001	-	-	0.043	0.18	0.002	-	-
HCM Control Delay (s)	8.2	0	-	25	24	8.9	0	-
HCM Lane LOS	A	A	-	D	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.6	0	-	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	200	255	2	142	1	61	14	16	99
v/c Ratio	0.46	0.29	0.01	0.34	0.00	0.16	0.05	0.04	0.21
Control Delay	29.0	13.6	27.5	21.5	29.0	15.8	28.5	21.2	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.0	13.6	27.5	21.5	29.0	15.8	28.5	21.2	1.8
Queue Length 50th (ft)	44	28	1	31	0	8	3	4	0
Queue Length 95th (ft)	#245	191	8	113	5	40	24	21	0
Internal Link Dist (ft)		2528		2598		168		294	
Turn Bay Length (ft)	250		250		200		273		273
Base Capacity (vph)	434	1262	322	1129	310	973	310	1021	942
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.20	0.01	0.13	0.00	0.06	0.05	0.02	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	174	219	3	2	124	12	1	30	18	11	13	80
Future Volume (veh/h)	174	219	3	2	124	12	1	30	18	11	13	80
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	200	252	3	2	129	12	1	38	23	14	16	99
Peak Hour Factor	0.87	0.87	0.87	0.96	0.96	0.96	0.78	0.78	0.78	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	274	359	4	235	277	26	4	180	109	51	374	317
Arrive On Green	0.15	0.19	0.19	0.13	0.16	0.16	0.00	0.17	0.17	0.03	0.20	0.20
Sat Flow, veh/h	1781	1844	22	1781	1685	157	1781	1091	660	1781	1870	1585
Grp Volume(v), veh/h	200	0	255	2	0	141	1	0	61	14	16	99
Grp Sat Flow(s),veh/h/ln	1781	0	1866	1781	0	1842	1781	0	1751	1781	1870	1585
Q Serve(g_s), s	5.2	0.0	6.2	0.0	0.0	3.4	0.0	0.0	1.5	0.4	0.3	1.3
Cycle Q Clear(g_c), s	5.2	0.0	6.2	0.0	0.0	3.4	0.0	0.0	1.5	0.4	0.3	1.3
Prop In Lane	1.00		0.01	1.00		0.09	1.00		0.38	1.00		1.00
Lane Grp Cap(c), veh/h	274	0	363	235	0	303	4	0	290	51	374	317
V/C Ratio(X)	0.73	0.00	0.70	0.01	0.00	0.47	0.25	0.00	0.21	0.28	0.04	0.31
Avail Cap(c_a), veh/h	412	0	1203	294	0	1066	294	0	905	294	966	819
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.5	0.0	18.2	18.2	0.0	18.3	24.1	0.0	17.5	23.0	15.6	4.3
Incr Delay (d2), s/veh	3.7	0.0	2.5	0.0	0.0	1.1	30.9	0.0	0.4	2.9	0.0	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	2.0	0.0	2.4	0.0	0.0	1.2	0.0	0.0	0.5	0.2	0.1	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.2	0.0	20.6	18.3	0.0	19.4	55.0	0.0	17.8	25.9	15.7	4.8
LnGrp LOS	C	A	C	B	A	B	D	A	B	C	B	A
Approach Vol, veh/h		455			143			62			129	
Approach Delay, s/veh		21.8			19.4			18.4			8.5	
Approach LOS		C			B			B			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.2	13.8	12.2	15.2	5.5	15.5	13.3	14.2
Change Period (Y+Rc), s	5.8	* 5.8	5.8	5.8	5.4	5.8	5.8	* 6.2
Max Green Setting (Gmax), s	8.0	* 25	8.0	31.2	8.0	25.0	11.2	* 28
Max Q Clear Time (g_c+I1), s	2.4	3.5	2.0	8.2	2.0	3.3	7.2	5.4
Green Ext Time (p_c), s	0.0	0.2	0.0	1.3	0.0	0.3	0.2	0.6

Intersection Summary	
HCM 6th Ctrl Delay	18.9
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	170	111	1	74	22	229	9	211
v/c Ratio	0.44	0.16	0.00	0.18	0.07	0.40	0.03	0.37
Control Delay	29.9	13.7	30.0	17.1	29.1	21.4	29.4	18.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.9	13.7	30.0	17.1	29.1	21.4	29.4	18.7
Queue Length 50th (ft)	40	13	0	13	5	55	2	42
Queue Length 95th (ft)	#222	88	4	47	37	187	20	157
Internal Link Dist (ft)		2598		234		299		264
Turn Bay Length (ft)	250		250		200		200	
Base Capacity (vph)	394	1209	317	1103	309	1110	309	1062
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.09	0.00	0.07	0.07	0.21	0.03	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	153	87	13	1	42	15	20	204	2	8	122	72
Future Volume (veh/h)	153	87	13	1	42	15	20	204	2	8	122	72
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	170	97	14	1	55	19	22	227	2	9	133	78
Peak Hour Factor	0.90	0.90	0.90	0.77	0.77	0.77	0.90	0.90	0.90	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	265	263	38	229	202	70	75	367	3	34	193	113
Arrive On Green	0.15	0.16	0.16	0.13	0.15	0.15	0.04	0.20	0.20	0.02	0.17	0.17
Sat Flow, veh/h	1781	1598	231	1781	1329	459	1781	1851	16	1781	1105	648
Grp Volume(v), veh/h	170	0	111	1	0	74	22	0	229	9	0	211
Grp Sat Flow(s),veh/h/ln	1781	0	1829	1781	0	1788	1781	0	1867	1781	0	1754
Q Serve(g_s), s	4.3	0.0	2.6	0.0	0.0	1.8	0.6	0.0	5.4	0.2	0.0	5.4
Cycle Q Clear(g_c), s	4.3	0.0	2.6	0.0	0.0	1.8	0.6	0.0	5.4	0.2	0.0	5.4
Prop In Lane	1.00		0.13	1.00		0.26	1.00		0.01	1.00		0.37
Lane Grp Cap(c), veh/h	265	0	301	229	0	272	75	0	370	34	0	306
V/C Ratio(X)	0.64	0.00	0.37	0.00	0.00	0.27	0.29	0.00	0.62	0.27	0.00	0.69
Avail Cap(c_a), veh/h	377	0	1147	296	0	1039	296	0	993	296	0	932
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.3	0.0	17.9	18.3	0.0	18.0	22.4	0.0	17.7	23.3	0.0	18.7
Incr Delay (d2), s/veh	2.6	0.0	0.8	0.0	0.0	0.5	2.1	0.0	1.7	4.2	0.0	2.8
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	1.6	0.0	0.9	0.0	0.0	0.6	0.3	0.0	2.0	0.1	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	21.8	0.0	18.6	18.3	0.0	18.6	24.5	0.0	19.3	27.5	0.0	21.4
LnGrp LOS	C	A	B	B	A	B	C	A	B	C	A	C
Approach Vol, veh/h		281			75			251			220	
Approach Delay, s/veh		20.6			18.6			19.8			21.7	
Approach LOS		C			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.3	15.3	12.4	14.1	7.4	14.2	13.0	13.5
Change Period (Y+Rc), s	5.4	5.8	6.2	* 6.2	5.4	5.8	5.8	6.2
Max Green Setting (Gmax), s	8.0	25.6	8.0	* 30	8.0	25.6	10.2	28.0
Max Q Clear Time (g_c+I1), s	2.2	7.4	2.0	4.6	2.6	7.4	6.3	3.8
Green Ext Time (p_c), s	0.0	1.0	0.0	0.5	0.0	1.0	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	20.4
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	82	168	28	69	11	373	13	154
v/c Ratio	0.28	0.33	0.09	0.17	0.04	0.54	0.04	0.23
Control Delay	29.3	19.3	29.0	18.6	29.2	20.9	29.2	17.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.3	19.3	29.0	18.6	29.2	20.9	29.2	17.1
Queue Length 50th (ft)	20	25	7	14	3	86	3	30
Queue Length 95th (ft)	78	108	29	39	22	284	25	115
Internal Link Dist (ft)		176		2597		70		117
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	304	971	296	957	296	1018	296	1015
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.17	0.09	0.07	0.04	0.37	0.04	0.15

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	64	118	13	18	38	7	10	307	33	12	128	14
Future Volume (veh/h)	64	118	13	18	38	7	10	307	33	12	128	14
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		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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	82	151	17	28	58	11	11	337	36	13	139	15
Peak Hour Factor	0.78	0.78	0.78	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	194	351	40	92	238	45	40	436	47	47	441	48
Arrive On Green	0.11	0.21	0.21	0.05	0.16	0.16	0.02	0.26	0.26	0.03	0.27	0.27
Sat Flow, veh/h	1781	1651	186	1781	1528	290	1781	1661	177	1781	1655	179
Grp Volume(v), veh/h	82	0	168	28	0	69	11	0	373	13	0	154
Grp Sat Flow(s),veh/h/ln	1781	0	1837	1781	0	1818	1781	0	1838	1781	0	1834
Q Serve(g_s), s	2.2	0.0	4.0	0.8	0.0	1.7	0.3	0.0	9.4	0.4	0.0	3.4
Cycle Q Clear(g_c), s	2.2	0.0	4.0	0.8	0.0	1.7	0.3	0.0	9.4	0.4	0.0	3.4
Prop In Lane	1.00		0.10	1.00		0.16	1.00		0.10	1.00		0.10
Lane Grp Cap(c), veh/h	194	0	391	92	0	283	40	0	482	47	0	488
V/C Ratio(X)	0.42	0.00	0.43	0.31	0.00	0.24	0.27	0.00	0.77	0.28	0.00	0.32
Avail Cap(c_a), veh/h	291	0	924	284	0	907	284	0	968	284	0	966
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	20.9	0.0	17.1	22.9	0.0	18.6	24.1	0.0	17.1	23.9	0.0	14.7
Incr Delay (d2), s/veh	1.5	0.0	0.7	1.8	0.0	0.4	3.6	0.0	2.7	3.1	0.0	0.4
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	0.8	0.0	1.4	0.3	0.0	0.6	0.2	0.0	3.5	0.2	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.3	0.0	17.8	24.8	0.0	19.0	27.7	0.0	19.8	27.1	0.0	15.1
LnGrp LOS	C	A	B	C	A	B	C	A	B	C	A	B
Approach Vol, veh/h		250			97			384			167	
Approach Delay, s/veh		19.3			20.7			20.0			16.0	
Approach LOS		B			C			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.7	19.0	8.0	16.5	6.5	19.1	10.8	13.6				
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8				
Max Green Setting (Gmax), s	8.0	26.4	8.0	25.2	8.0	26.4	8.2	25.0				
Max Q Clear Time (g_c+I1), s	2.4	11.4	2.8	6.0	2.3	5.4	4.2	3.7				
Green Ext Time (p_c), s	0.0	1.7	0.0	0.7	0.0	0.7	0.0	0.2				
Intersection Summary												
HCM 6th Ctrl Delay			19.1									
HCM 6th LOS			B									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	166	159	19	145	7	372	83	12	110	110
v/c Ratio	0.47	0.21	0.07	0.35	0.03	0.64	0.14	0.04	0.19	0.18
Control Delay	32.7	14.1	31.8	24.8	31.8	27.1	0.5	31.7	20.3	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.7	14.1	31.8	24.8	31.8	27.1	0.5	31.7	20.3	2.6
Queue Length 50th (ft)	48	26	6	42	2	105	0	3	27	0
Queue Length 95th (ft)	#196	117	31	109	16	271	0	24	96	17
Internal Link Dist (ft)		2562		2568		323			652	
Turn Bay Length (ft)	200		200		200		200	200		424
Base Capacity (vph)	411	1150	276	1013	276	909	852	276	909	852
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.14	0.07	0.14	0.03	0.41	0.10	0.04	0.12	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	144	7	16	119	4	6	301	67	11	103	103
Future Volume (veh/h)	158	144	7	16	119	4	6	301	67	11	103	103
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	166	152	7	19	140	5	7	372	83	12	110	110
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.81	0.81	0.81	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	442	20	66	273	10	26	484	410	44	502	425
Arrive On Green	0.14	0.25	0.25	0.04	0.15	0.15	0.01	0.26	0.26	0.02	0.27	0.27
Sat Flow, veh/h	1781	1774	82	1781	1795	64	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	166	0	159	19	0	145	7	372	83	12	110	110
Grp Sat Flow(s),veh/h/ln	1781	0	1856	1781	0	1859	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	4.6	0.0	3.7	0.5	0.0	3.7	0.2	9.6	2.1	0.3	2.4	2.8
Cycle Q Clear(g_c), s	4.6	0.0	3.7	0.5	0.0	3.7	0.2	9.6	2.1	0.3	2.4	2.8
Prop In Lane	1.00		0.04	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	249	0	463	66	0	283	26	484	410	44	502	425
V/C Ratio(X)	0.67	0.00	0.34	0.29	0.00	0.51	0.27	0.77	0.20	0.28	0.22	0.26
Avail Cap(c_a), veh/h	407	0	1141	274	0	1000	274	899	762	274	899	762
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.2	0.0	16.0	24.4	0.0	20.3	25.4	17.8	15.1	24.9	14.8	15.0
Incr Delay (d2), s/veh	3.1	0.0	0.4	2.4	0.0	1.4	5.3	2.6	0.2	3.4	0.2	0.3
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(50%),veh/ln	1.9	0.0	1.4	0.2	0.0	1.5	0.1	3.7	0.7	0.2	0.8	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.3	0.0	16.5	26.8	0.0	21.7	30.6	20.5	15.3	28.3	15.0	15.3
LnGrp LOS	C	A	B	C	A	C	C	C	B	C	B	B
Approach Vol, veh/h		325			164			462			232	
Approach Delay, s/veh		20.5			22.3			19.7			15.8	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.7	19.3	7.3	18.8	6.2	19.8	12.4	13.7
Change Period (Y+Rc), s	5.4	5.8	5.4	* 5.8	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	8.0	25.0	8.0	* 32	8.0	25.0	11.9	28.0
Max Q Clear Time (g_c+I1), s	2.3	11.6	2.5	5.7	2.2	4.8	6.6	5.7
Green Ext Time (p_c), s	0.0	1.9	0.0	0.8	0.0	0.8	0.2	0.6

Intersection Summary		
HCM 6th Ctrl Delay		19.5
HCM 6th LOS		B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

APPENDIX H

EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Intersection	
Intersection Delay, s/veh	358.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	10	33	41	6	77	36	517	17	33	785	104
Future Vol, veh/h	70	10	33	41	6	77	36	517	17	33	785	104
Peak Hour Factor	0.82	0.82	0.82	0.71	0.71	0.71	0.96	0.96	0.96	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	85	12	40	58	8	108	38	539	18	42	994	132
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB			WB			NB			SB		
Opposing Approach	WB			EB			SB			NB		
Opposing Lanes	2			1			2			3		
Conflicting Approach Left	SB			NB			EB			WB		
Conflicting Lanes Left	2			3			1			2		
Conflicting Approach Right	NB			SB			WB			EB		
Conflicting Lanes Right	3			2			2			1		
HCM Control Delay	20.3			17.2			29.9			617.3		
HCM LOS	C			C			D			F		

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	62%	100%	0%	100%	0%
Vol Thru, %	0%	100%	91%	9%	0%	7%	0%	88%
Vol Right, %	0%	0%	9%	29%	0%	93%	0%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	345	189	113	41	83	33	889
LT Vol	36	0	0	70	41	0	33	0
Through Vol	0	345	172	10	0	6	0	785
RT Vol	0	0	17	33	0	77	0	104
Lane Flow Rate	38	359	197	138	58	117	42	1125
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.084	0.756	0.412	0.345	0.15	0.266	0.095	2.37
Departure Headway (Hd)	10.374	9.852	9.787	11.628	12.021	10.798	8.18	7.583
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	348	370	371	311	300	336	437	484
Service Time	8.074	7.552	7.487	9.328	9.721	8.498	5.961	5.364
HCM Lane V/C Ratio	0.109	0.97	0.531	0.444	0.193	0.348	0.096	2.324
HCM Control Delay	14	37.4	19.2	20.3	16.8	17.4	11.8	639.8
HCM Lane LOS	B	E	C	C	C	C	B	F
HCM 95th-tile Q	0.3	6	2	1.5	0.5	1.1	0.3	85.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	141	400	137	268	850	76	110	449	169	55	552	298
v/c Ratio	0.62	0.75	0.25	1.12	0.83	0.14	0.50	0.60	0.23	0.49	0.42	0.41
Control Delay	65.2	46.5	6.5	142.2	45.6	0.7	60.6	33.3	3.7	68.0	29.0	9.1
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	65.2	46.5	6.5	142.2	45.6	0.7	60.6	33.3	3.7	68.0	29.0	9.1
Queue Length 50th (ft)	54	268	1	~123	310	0	42	283	0	41	167	36
Queue Length 95th (ft)	81	344	37	#204	376	1	69	376	32	85	218	106
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	240	587	580	240	1116	592	240	745	743	124	1302	726
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.68	0.24	1.12	0.76	0.13	0.46	0.60	0.23	0.44	0.42	0.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	332	114	236	748	67	95	386	145	52	524	283
Future Volume (veh/h)	117	332	114	236	748	67	95	386	145	52	524	283
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	141	400	137	268	850	76	110	449	169	55	552	298
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.86	0.86	0.86	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	521	441	248	1060	473	180	738	625	78	1341	598
Arrive On Green	0.06	0.28	0.28	0.07	0.30	0.30	0.05	0.39	0.39	0.04	0.38	0.38
Sat Flow, veh/h	3456	1870	1582	3456	3554	1585	3456	1870	1585	1781	3554	1585
Grp Volume(v), veh/h	141	400	137	268	850	76	110	449	169	55	552	298
Grp Sat Flow(s),veh/h/ln	1728	1870	1582	1728	1777	1585	1728	1870	1585	1781	1777	1585
Q Serve(g_s), s	4.5	21.8	7.6	8.0	24.6	3.1	3.5	21.3	8.0	3.4	12.7	11.8
Cycle Q Clear(g_c), s	4.5	21.8	7.6	8.0	24.6	3.1	3.5	21.3	8.0	3.4	12.7	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	199	521	441	248	1060	473	180	738	625	78	1341	598
V/C Ratio(X)	0.71	0.77	0.31	1.08	0.80	0.16	0.61	0.61	0.27	0.70	0.41	0.50
Avail Cap(c_a), veh/h	248	605	512	248	1149	513	248	738	625	128	1341	598
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	51.5	36.8	31.7	51.7	36.0	18.3	51.7	26.9	22.9	52.5	25.6	14.4
Incr Delay (d2), s/veh	4.4	9.3	1.5	79.7	5.9	0.6	1.3	3.7	1.1	4.2	0.9	3.0
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	2.0	10.9	3.0	6.1	11.0	1.5	1.5	9.7	3.1	1.6	5.2	4.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.9	46.1	33.2	131.4	41.9	18.9	52.9	30.6	23.9	56.7	26.5	17.3
LnGrp LOS	E	D	C	F	D	B	D	C	C	E	C	B
Approach Vol, veh/h		678			1194			728			905	
Approach Delay, s/veh		45.5			60.5			32.4			25.3	
Approach LOS		D			E			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	48.0	12.3	38.5	10.6	49.9	13.9	36.9
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	* 5.9
Max Green Setting (Gmax), s	8.0	42.0	8.0	36.0	8.0	38.0	8.0	* 36
Max Q Clear Time (g_c+I1), s	5.5	14.7	6.5	26.6	5.4	23.3	10.0	23.8
Green Ext Time (p_c), s	0.0	9.3	0.0	6.6	0.0	5.1	0.0	4.9

Intersection Summary	
HCM 6th Ctrl Delay	42.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	35	153	106	497	53	515	94	258	772
v/c Ratio	0.20	0.28	0.60	0.81	0.30	1.03	0.19	1.41	1.23
Control Delay	42.7	21.0	55.3	32.4	44.5	83.2	3.7	246.2	147.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.7	21.0	55.3	32.4	44.5	83.2	3.7	246.2	147.5
Queue Length 50th (ft)	19	56	59	213	29	~343	0	~208	~650
Queue Length 95th (ft)	43	84	82	185	62	#506	14	#356	#880
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	183	823	183	800	183	500	507	183	627
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.19	0.58	0.62	0.29	1.03	0.19	1.41	1.23

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	27	94	24	67	128	185	43	417	76	217	548	101
Future Volume (veh/h)	27	94	24	67	128	185	43	417	76	217	548	101
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	35	122	31	106	203	294	53	515	94	258	652	120
Peak Hour Factor	0.77	0.77	0.77	0.63	0.63	0.63	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	93	460	117	150	241	349	117	470	397	173	434	80
Arrive On Green	0.05	0.32	0.32	0.08	0.35	0.35	0.07	0.25	0.25	0.10	0.28	0.28
Sat Flow, veh/h	1767	1428	363	1767	681	986	1767	1856	1566	1767	1524	280
Grp Volume(v), veh/h	35	0	153	106	0	497	53	515	94	258	0	772
Grp Sat Flow(s),veh/h/ln	1767	0	1790	1767	0	1666	1767	1856	1566	1767	0	1804
Q Serve(g_s), s	1.7	0.0	5.5	5.1	0.0	23.8	2.5	22.0	4.1	8.5	0.0	24.7
Cycle Q Clear(g_c), s	1.7	0.0	5.5	5.1	0.0	23.8	2.5	22.0	4.1	8.5	0.0	24.7
Prop In Lane	1.00		0.20	1.00		0.59	1.00		1.00	1.00		0.16
Lane Grp Cap(c), veh/h	93	0	577	150	0	591	117	470	397	173	0	514
V/C Ratio(X)	0.38	0.00	0.27	0.71	0.00	0.84	0.45	1.10	0.24	1.49	0.00	1.50
Avail Cap(c_a), veh/h	173	0	763	173	0	710	173	470	397	173	0	514
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	0.0	21.8	38.7	0.0	25.8	39.0	32.4	25.8	39.2	0.0	31.1
Incr Delay (d2), s/veh	0.9	0.0	0.7	7.8	0.0	10.7	1.0	70.0	1.4	249.3	0.0	236.4
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	0.7	0.0	2.2	2.4	0.0	10.4	1.1	18.2	1.6	15.5	0.0	43.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.7	0.0	22.5	46.5	0.0	36.4	40.0	102.4	27.2	288.5	0.0	267.5
LnGrp LOS	D	A	C	D	A	D	D	F	C	F	A	F
Approach Vol, veh/h		188			603			662			1030	
Approach Delay, s/veh		25.9			38.2			86.7			272.7	
Approach LOS		C			D			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	31.4	8.6	37.1	12.5	28.7	11.4	34.3
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0
Max Q Clear Time (g_c+I1), s	4.5	26.7	3.7	25.8	10.5	24.0	7.1	7.5
Green Ext Time (p_c), s	0.0	0.0	0.0	4.4	0.0	0.0	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	147.5
HCM 6th LOS	F

Intersection						
Int Delay, s/veh	6.3					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	88	420	125	66	598
Future Vol, veh/h	51	88	420	125	66	598
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	76	76	93	93	82	82
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	67	116	452	134	80	729

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1408	519	0	0	586	0
Stage 1	519	-	-	-	-	-
Stage 2	889	-	-	-	-	-
Critical Hdwy	6.46	6.26	-	-	4.16	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	-	-	2.254	-
Pot Cap-1 Maneuver	150	549	-	-	969	-
Stage 1	589	-	-	-	-	-
Stage 2	395	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	129	549	-	-	969	-
Mov Cap-2 Maneuver	129	-	-	-	-	-
Stage 1	589	-	-	-	-	-
Stage 2	340	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	50.6	0	0.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	250	969	-
HCM Lane V/C Ratio	-	-	0.732	0.083	-
HCM Control Delay (s)	-	-	50.6	9.1	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	5.1	0.3	-

Intersection	
Intersection Delay, s/veh	141.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	96	98	17	145	193	28	13	419	44	9	512	131
Future Vol, veh/h	96	98	17	145	193	28	13	419	44	9	512	131
Peak Hour Factor	0.75	0.75	0.75	0.87	0.87	0.87	0.95	0.95	0.95	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	128	131	23	167	222	32	14	441	46	10	545	139
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	43.3	98.3	167.8	189.3
HCM LOS	E	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	3%	45%	40%	2%	0%
Vol Thru, %	88%	46%	53%	98%	0%
Vol Right, %	9%	8%	8%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	476	211	366	521	131
LT Vol	13	96	145	9	0
Through Vol	419	98	193	512	0
RT Vol	44	17	28	0	131
Lane Flow Rate	501	281	421	554	139
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.261	0.758	1.057	1.423	0.33
Departure Headway (Hd)	10.135	11.599	10.543	10.128	9.385
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	361	315	349	366	386
Service Time	8.135	9.599	8.543	7.828	7.085
HCM Lane V/C Ratio	1.388	0.892	1.206	1.514	0.36
HCM Control Delay	167.8	43.3	98.3	232.7	16.6
HCM Lane LOS	F	E	F	F	C
HCM 95th-tile Q	20	5.8	12.9	26.1	1.4

Intersection	
Intersection Delay, s/veh	104.3
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	68	60	41	99	111	51	29	337	29	31	577	45
Future Vol, veh/h	68	60	41	99	111	51	29	337	29	31	577	45
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	87	77	53	111	125	57	32	370	32	33	607	47
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	17.8	21.9	45.4	204
HCM LOS	C	C	E	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	7%	53%	0%	47%	0%	5%
Vol Thru, %	85%	47%	0%	53%	0%	88%
Vol Right, %	7%	0%	100%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	395	128	41	210	51	653
LT Vol	29	68	0	99	0	31
Through Vol	337	60	0	111	0	577
RT Vol	29	0	41	0	51	45
Lane Flow Rate	434	164	53	236	57	687
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.871	0.409	0.117	0.569	0.123	1.379
Departure Headway (Hd)	8.083	9.953	8.936	9.575	8.592	7.224
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	451	364	404	380	420	509
Service Time	6.083	7.653	6.636	7.275	6.292	5.255
HCM Lane V/C Ratio	0.962	0.451	0.131	0.621	0.136	1.35
HCM Control Delay	45.4	19.4	12.8	24.2	12.5	204
HCM Lane LOS	E	C	B	C	B	F
HCM 95th-tile Q	9	1.9	0.4	3.4	0.4	31.6

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	0	1	22	0	6	0	345	4	5	841	0
Future Vol, veh/h	0	0	1	22	0	6	0	345	4	5	841	0
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	25	25	25	79	79	79	90	90	90	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	4	28	0	8	0	383	4	6	945	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1346	1344	945	1344	1342	385	945	0	0	387	0	0
Stage 1	957	957	-	385	385	-	-	-	-	-	-	-
Stage 2	389	387	-	959	957	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	128	151	316	128	151	660	722	-	-	1166	-	-
Stage 1	308	335	-	636	609	-	-	-	-	-	-	-
Stage 2	633	608	-	308	335	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	125	149	316	125	149	660	722	-	-	1166	-	-
Mov Cap-2 Maneuver	125	149	-	125	149	-	-	-	-	-	-	-
Stage 1	308	331	-	636	609	-	-	-	-	-	-	-
Stage 2	626	608	-	301	331	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.5	36	0	0
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	722	-	-	316	151	1166	-	-
HCM Lane V/C Ratio	-	-	-	0.013	0.235	0.005	-	-
HCM Control Delay (s)	0	-	-	16.5	36	8.1	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.9	0	-	-

Intersection	
Int Delay, s/veh	87.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	136	331	24	53	482	45	10	52	57	30	110	383
Future Vol, veh/h	136	331	24	53	482	45	10	52	57	30	110	383
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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	82	82	82	64	64	63	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	158	385	28	65	588	55	16	81	90	32	117	407

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	643	0	0	413	0	0	1723	1488	399	1547	1475	616
Stage 1	-	-	-	-	-	-	715	715	-	746	746	-
Stage 2	-	-	-	-	-	-	1008	773	-	801	729	-
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	942	-	-	1146	-	-	70	124	651	93	126	491
Stage 1	-	-	-	-	-	-	422	434	-	405	421	-
Stage 2	-	-	-	-	-	-	290	409	-	378	428	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	942	-	-	1146	-	-	-	94	651	~ 18	~ 96	491
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	94	-	~ 18	~ 96	-
Stage 1	-	-	-	-	-	-	351	361	-	337	384	-
Stage 2	-	-	-	-	-	-	31	373	-	210	356	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.7	0.8		$ 313.6
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	942	-	-	1146	-	-	50	491
HCM Lane V/C Ratio	-	0.168	-	-	0.056	-	-	2.979	0.83
HCM Control Delay (s)	-	9.6	-	-	8.3	0	-	$ +1065.1	38.9
HCM Lane LOS	-	A	-	-	A	A	-	F	E
HCM 95th %tile Q(veh)	-	0.6	-	-	0.2	-	-	15.9	8.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	150.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	246	168	11	2	239	15	25	221	2	20	263	307
Future Vol, veh/h	246	168	11	2	239	15	25	221	2	20	263	307
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.79	0.79	0.79	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	270	185	12	2	257	16	32	280	3	24	313	365
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	102	34.2	40.6	278.3
HCM LOS	F	D	E	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	58%	1%	3%
Vol Thru, %	89%	40%	93%	45%
Vol Right, %	1%	3%	6%	52%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	248	425	256	590
LT Vol	25	246	2	20
Through Vol	221	168	239	263
RT Vol	2	11	15	307
Lane Flow Rate	314	467	275	702
Geometry Grp	1	1	1	1
Degree of Util (X)	0.765	1.08	0.683	1.545
Departure Headway (Hd)	10.463	9.782	10.821	8.329
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	348	374	336	442
Service Time	8.463	7.782	8.821	6.329
HCM Lane V/C Ratio	0.902	1.249	0.818	1.588
HCM Control Delay	40.6	102	34.2	278.3
HCM Lane LOS	E	F	D	F
HCM 95th-tile Q	6.1	14.2	4.8	36.3

Intersection	
Intersection Delay, s/veh	92.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	50	80	25	83	191	47	18	153	18	47	443	70
Future Vol, veh/h	50	80	25	83	191	47	18	153	18	47	443	70
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.73	0.73	0.73	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	96	30	111	255	63	25	210	25	56	527	83
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	18.5	44	21.4	172.6
HCM LOS	C	E	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	32%	26%	8%
Vol Thru, %	81%	52%	60%	79%
Vol Right, %	10%	16%	15%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	189	155	321	560
LT Vol	18	50	83	47
Through Vol	153	80	191	443
RT Vol	18	25	47	70
Lane Flow Rate	259	187	428	667
Geometry Grp	1	1	1	1
Degree of Util (X)	0.555	0.421	0.863	1.304
Departure Headway (Hd)	8.432	9.062	8.026	7.044
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	430	400	454	513
Service Time	6.432	7.062	6.026	5.107
HCM Lane V/C Ratio	0.602	0.468	0.943	1.3
HCM Control Delay	21.4	18.5	44	172.6
HCM Lane LOS	C	C	E	F
HCM 95th-tile Q	3.3	2	8.8	28.1

Intersection	
Intersection Delay, s/veh	39
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	115	7	100	249	26	68	150	114	27	230	384
Future Vol, veh/h	46	115	7	100	249	26	68	150	114	27	230	384
Peak Hour Factor	0.90	0.90	0.90	0.80	0.80	0.80	0.69	0.69	0.69	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	128	8	125	311	33	99	217	165	33	277	463
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	17	36.2	29.8	51.8
HCM LOS	C	E	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	31%	0%	100%	0%	100%	0%	11%	0%
Vol Thru, %	69%	0%	0%	94%	0%	91%	89%	0%
Vol Right, %	0%	100%	0%	6%	0%	9%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	218	114	46	122	100	275	257	384
LT Vol	68	0	46	0	100	0	27	0
Through Vol	150	0	0	115	0	249	230	0
RT Vol	0	114	0	7	0	26	0	384
Lane Flow Rate	316	165	51	136	125	344	310	463
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.784	0.369	0.145	0.363	0.325	0.839	0.727	0.986
Departure Headway (Hd)	8.928	8.038	10.199	9.632	9.372	8.783	8.454	7.674
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	404	448	352	374	386	416	427	472
Service Time	6.676	5.786	7.949	7.382	7.072	6.483	6.201	5.421
HCM Lane V/C Ratio	0.782	0.368	0.145	0.364	0.324	0.827	0.726	0.981
HCM Control Delay	37.4	15.4	14.7	17.8	16.5	43.3	30.7	65.9
HCM Lane LOS	E	C	B	C	C	E	D	F
HCM 95th-tile Q	6.7	1.7	0.5	1.6	1.4	8	5.7	12.7

Intersection	
Intersection Delay, s/veh	39.4
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	24	33	9	7	46	36	614	32	60	411	56
Future Vol, veh/h	40	24	33	9	7	46	36	614	32	60	411	56
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	29	40	10	8	50	38	640	33	65	447	61
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	14.9	12.5	28.4	61.3
HCM LOS	B	B	D	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	41%	100%	0%	100%	0%
Vol Thru, %	0%	100%	86%	25%	0%	13%	0%	88%
Vol Right, %	0%	0%	14%	34%	0%	87%	0%	12%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	409	237	97	9	53	60	467
LT Vol	36	0	0	40	9	0	60	0
Through Vol	0	409	205	24	0	7	0	411
RT Vol	0	0	32	33	0	46	0	56
Lane Flow Rate	38	426	247	117	10	58	65	508
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.079	0.84	0.479	0.283	0.026	0.135	0.14	1.004
Departure Headway (Hd)	7.599	7.09	6.994	8.727	9.661	8.44	7.711	7.118
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	471	512	515	411	373	423	465	508
Service Time	5.351	4.842	4.745	6.495	7.361	6.216	5.46	4.866
HCM Lane V/C Ratio	0.081	0.832	0.48	0.285	0.027	0.137	0.14	1
HCM Control Delay	11	37.1	16.1	14.9	12.6	12.5	11.7	67.7
HCM Lane LOS	B	E	C	B	B	B	B	F
HCM 95th-tile Q	0.3	8.5	2.6	1.1	0.1	0.5	0.5	13.9

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	211	630	116	125	366	56	102	492	177	70	344	101
v/c Ratio	0.34	1.04	0.19	0.66	0.52	0.13	0.54	0.71	0.26	0.71	0.28	0.16
Control Delay	43.3	84.9	2.8	66.9	40.2	0.6	60.4	36.4	7.7	87.2	26.6	2.2
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	43.3	84.9	2.8	66.9	40.2	0.6	60.4	36.4	7.7	87.2	26.6	2.2
Queue Length 50th (ft)	64	~473	0	44	123	0	36	297	16	49	90	0
Queue Length 95th (ft)	#144	#603	16	#79	136	0	64	425	64	#118	124	14
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	617	604	613	190	1147	613	190	696	679	98	1213	627
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	1.04	0.19	0.66	0.32	0.09	0.54	0.71	0.26	0.71	0.28	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	523	96	110	322	49	95	458	165	62	303	89
Future Volume (veh/h)	175	523	96	110	322	49	95	458	165	62	303	89
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	211	630	116	125	366	56	102	492	177	70	344	101
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	737	609	516	188	593	264	184	667	565	90	1223	544
Arrive On Green	0.21	0.33	0.33	0.05	0.17	0.17	0.05	0.36	0.36	0.05	0.34	0.34
Sat Flow, veh/h	3456	1870	1585	3456	3554	1585	3456	1870	1585	1781	3554	1581
Grp Volume(v), veh/h	211	630	116	125	366	56	102	492	177	70	344	101
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1728	1777	1585	1728	1870	1585	1781	1777	1581
Q Serve(g_s), s	5.5	35.0	4.3	3.8	10.3	2.7	3.1	24.7	6.5	4.2	7.6	2.4
Cycle Q Clear(g_c), s	5.5	35.0	4.3	3.8	10.3	2.7	3.1	24.7	6.5	4.2	7.6	2.4
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	737	609	516	188	593	264	184	667	565	90	1223	544
V/C Ratio(X)	0.29	1.03	0.22	0.66	0.62	0.21	0.56	0.74	0.31	0.78	0.28	0.19
Avail Cap(c_a), veh/h	737	609	516	193	1157	516	193	667	565	99	1223	544
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	35.4	36.2	15.1	49.8	41.6	25.8	49.6	30.2	13.8	50.4	25.6	6.3
Incr Delay (d2), s/veh	0.1	45.6	0.8	6.4	4.0	1.5	1.6	7.2	1.4	25.8	0.6	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	2.2	22.7	2.2	1.8	4.7	1.3	1.3	11.8	3.2	2.4	3.1	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.5	81.8	15.9	56.2	45.6	27.3	51.3	37.4	15.3	76.2	26.2	7.1
LnGrp LOS	D	F	B	E	D	C	D	D	B	E	C	A
Approach Vol, veh/h		957			547			771			515	
Approach Delay, s/veh		63.6			46.1			34.1			29.2	
Approach LOS		E			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.4	43.0	28.8	23.2	11.1	44.3	11.8	40.3
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	5.3
Max Green Setting (Gmax), s	6.0	37.0	6.0	35.0	6.0	37.0	6.0	35.0
Max Q Clear Time (g_c+I1), s	5.1	9.6	7.5	12.3	6.2	26.7	5.8	37.0
Green Ext Time (p_c), s	0.0	4.7	0.0	5.6	0.0	4.4	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	45.7
HCM 6th LOS	D

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	77	86	28	80	45	663	52	34	513
v/c Ratio	0.29	0.18	0.11	0.20	0.17	0.58	0.05	0.13	0.49
Control Delay	35.5	13.6	35.1	11.1	34.7	25.9	0.1	34.8	25.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.5	13.6	35.1	11.1	34.7	25.9	0.1	34.8	25.0
Queue Length 50th (ft)	30	13	11	8	17	199	0	13	195
Queue Length 95th (ft)	93	48	38	29	61	#798	0	50	#593
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	279	1157	279	1114	279	1134	1013	279	1056
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.07	0.10	0.07	0.16	0.58	0.05	0.12	0.49

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	41	38	22	16	46	41	610	48	32	436	41
Future Volume (veh/h)	71	41	38	22	16	46	41	610	48	32	436	41
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	77	45	41	28	21	59	45	663	52	34	469	44
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.92	0.92	0.92	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	171	156	142	88	55	154	125	701	594	102	610	57
Arrive On Green	0.10	0.17	0.17	0.05	0.13	0.13	0.07	0.37	0.37	0.06	0.36	0.36
Sat Flow, veh/h	1781	901	821	1781	433	1218	1781	1870	1585	1781	1684	158
Grp Volume(v), veh/h	77	0	86	28	0	80	45	663	52	34	0	513
Grp Sat Flow(s),veh/h/ln	1781	0	1723	1781	0	1651	1781	1870	1585	1781	0	1842
Q Serve(g_s), s	2.5	0.0	2.6	0.9	0.0	2.7	1.5	20.9	1.3	1.1	0.0	15.0
Cycle Q Clear(g_c), s	2.5	0.0	2.6	0.9	0.0	2.7	1.5	20.9	1.3	1.1	0.0	15.0
Prop In Lane	1.00		0.48	1.00		0.74	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	171	0	298	88	0	209	125	701	594	102	0	667
V/C Ratio(X)	0.45	0.00	0.29	0.32	0.00	0.38	0.36	0.95	0.09	0.33	0.00	0.77
Avail Cap(c_a), veh/h	249	0	1049	249	0	1005	249	701	594	249	0	667
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.0	0.0	21.9	27.9	0.0	24.4	27.0	18.4	12.3	27.5	0.0	17.1
Incr Delay (d2), s/veh	0.7	0.0	1.5	0.8	0.0	3.1	0.7	23.1	0.3	0.7	0.0	8.3
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(50%),veh/ln	1.0	0.0	1.1	0.4	0.0	1.1	0.6	11.7	0.4	0.4	0.0	6.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	26.7	0.0	23.3	28.6	0.0	27.5	27.6	41.6	12.6	28.2	0.0	25.5
LnGrp LOS	C	A	C	C	A	C	C	D	B	C	A	C
Approach Vol, veh/h		163			108			760			547	
Approach Delay, s/veh		24.9			27.8			38.8			25.7	
Approach LOS		C			C			D			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.3	28.7	9.8	14.0	7.5	29.5	7.0	16.8				
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3				
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0				
Max Q Clear Time (g_c+I1), s	3.5	17.0	4.5	4.7	3.1	22.9	2.9	4.6				
Green Ext Time (p_c), s	0.0	2.4	0.0	0.9	0.0	0.0	0.0	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			32.0									
HCM 6th LOS			C									

Intersection	
Int Delay, s/veh	3.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	43	659	71	63	425
Future Vol, veh/h	48	43	659	71	63	425
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	89	89	91	91	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	48	724	78	68	457

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1356	763	0	0	802	0
Stage 1	763	-	-	-	-	-
Stage 2	593	-	-	-	-	-
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	165	404	-	-	822	-
Stage 1	460	-	-	-	-	-
Stage 2	552	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	147	404	-	-	822	-
Mov Cap-2 Maneuver	147	-	-	-	-	-
Stage 1	460	-	-	-	-	-
Stage 2	491	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	37.4	0	1.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	210	822	-
HCM Lane V/C Ratio	-	-	0.487	0.082	-
HCM Control Delay (s)	-	-	37.4	9.8	0
HCM Lane LOS	-	-	E	A	A
HCM 95th %tile Q(veh)	-	-	2.4	0.3	-

Intersection	
Intersection Delay, s/veh	102.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	113	98	13	55	57	10	8	616	67	28	374	70
Future Vol, veh/h	113	98	13	55	57	10	8	616	67	28	374	70
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.93	0.93	0.93	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	119	103	14	60	63	11	9	662	72	30	398	74
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	19.3	15.7	190.9	33.5
HCM LOS	C	C	F	D

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	1%	50%	45%	7%	0%
Vol Thru, %	89%	44%	47%	93%	0%
Vol Right, %	10%	6%	8%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	691	224	122	402	70
LT Vol	8	113	55	28	0
Through Vol	616	98	57	374	0
RT Vol	67	13	10	0	70
Lane Flow Rate	743	236	134	428	74
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.354	0.494	0.301	0.829	0.129
Departure Headway (Hd)	6.56	8.407	8.943	7.591	6.833
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	557	431	405	479	528
Service Time	4.57	6.407	6.943	5.291	4.533
HCM Lane V/C Ratio	1.334	0.548	0.331	0.894	0.14
HCM Control Delay	190.9	19.3	15.7	37.5	10.5
HCM Lane LOS	F	C	C	E	B
HCM 95th-tile Q	32.7	2.7	1.2	8.1	0.4

Intersection	
Intersection Delay, s/veh	113.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	68	125	35	44	78	41	6	567	46	51	370	34
Future Vol, veh/h	68	125	35	44	78	41	6	567	46	51	370	34
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.86	0.86	0.86	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	73	134	38	48	85	45	7	659	53	57	416	38
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	19.6	16	204.6	64.1
HCM LOS	C	C	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	1%	35%	0%	36%	0%	11%
Vol Thru, %	92%	65%	0%	64%	0%	81%
Vol Right, %	7%	0%	100%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	619	193	35	122	41	455
LT Vol	6	68	0	44	0	51
Through Vol	567	125	0	78	0	370
RT Vol	46	0	35	0	41	34
Lane Flow Rate	720	208	38	133	45	511
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	1.383	0.494	0.08	0.326	0.099	0.98
Departure Headway (Hd)	6.915	9.449	8.529	9.811	8.884	7.577
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	525	384	423	369	406	481
Service Time	4.967	7.149	6.229	7.511	6.584	5.577
HCM Lane V/C Ratio	1.371	0.542	0.09	0.36	0.111	1.062
HCM Control Delay	204.6	21	12	17.2	12.6	64.1
HCM Lane LOS	F	C	B	C	B	F
HCM 95th-tile Q	32.9	2.6	0.3	1.4	0.3	12.6

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	2	0	0	22	0	11	1	653	35	2	461	0
Future Vol, veh/h	2	0	0	22	0	11	1	653	35	2	461	0
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	25	25	25	72	72	72	93	93	93	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	0	31	0	15	1	702	38	2	530	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1265	1276	530	1257	1257	721	530	0	0	740	0	0
Stage 1	534	534	-	723	723	-	-	-	-	-	-	-
Stage 2	731	742	-	534	534	-	-	-	-	-	-	-
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	146	167	549	148	171	427	1037	-	-	867	-	-
Stage 1	530	524	-	417	431	-	-	-	-	-	-	-
Stage 2	413	422	-	530	524	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	140	166	549	147	170	427	1037	-	-	867	-	-
Mov Cap-2 Maneuver	140	166	-	147	170	-	-	-	-	-	-	-
Stage 1	529	522	-	416	430	-	-	-	-	-	-	-
Stage 2	397	421	-	528	522	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	32.3	30.2	0	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1037	-	-	140	188	867	-	-
HCM Lane V/C Ratio	0.001	-	-	0.057	0.244	0.003	-	-
HCM Control Delay (s)	8.5	0	-	32.3	30.2	9.2	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.9	0	-	-

Intersection												
Int Delay, s/veh	9											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	208	378	5	14	235	22	7	44	24	13	26	156
Future Vol, veh/h	208	378	5	14	235	22	7	44	24	13	26	156
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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	96	96	96	78	78	78	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	239	434	6	15	245	23	9	56	31	16	32	193

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	440	0	0	1314	1213	437	1246	1205	257
Stage 1	-	-	-	-	-	-	915	915	-	287	287	-
Stage 2	-	-	-	-	-	-	399	298	-	959	918	-
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	1296	-	-	1120	-	-	135	182	620	151	184	782
Stage 1	-	-	-	-	-	-	327	352	-	720	674	-
Stage 2	-	-	-	-	-	-	627	667	-	309	350	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	1120	-	-	72	146	620	86	148	782
Mov Cap-2 Maneuver	-	-	-	-	-	-	72	146	-	86	148	-
Stage 1	-	-	-	-	-	-	267	287	-	588	663	-
Stage 2	-	-	-	-	-	-	443	656	-	192	286	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3	0.4	49.6	19.8
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	172	1296	-	-	1120	-	-	119	782
HCM Lane V/C Ratio	0.559	0.184	-	-	0.013	-	-	0.405	0.246
HCM Control Delay (s)	49.6	8.4	-	-	8.3	0	-	54.4	11.1
HCM Lane LOS	E	A	-	-	A	A	-	F	B
HCM 95th %tile Q(veh)	2.9	0.7	-	-	0	-	-	1.7	1

Intersection	
Intersection Delay, s/veh	20.9
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	203	205	13	2	126	18	23	205	2	10	122	115
Future Vol, veh/h	203	205	13	2	126	18	23	205	2	10	122	115
Peak Hour Factor	0.90	0.90	0.90	0.77	0.77	0.77	0.90	0.90	0.90	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	226	228	14	3	164	23	26	228	2	11	133	125
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	30	13.4	15.8	15.3
HCM LOS	D	B	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	48%	1%	4%
Vol Thru, %	89%	49%	86%	49%
Vol Right, %	1%	3%	12%	47%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	230	421	146	247
LT Vol	23	203	2	10
Through Vol	205	205	126	122
RT Vol	2	13	18	115
Lane Flow Rate	256	468	190	268
Geometry Grp	1	1	1	1
Degree of Util (X)	0.477	0.804	0.352	0.479
Departure Headway (Hd)	6.715	6.184	6.675	6.42
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	534	585	535	558
Service Time	4.791	4.247	4.759	4.494
HCM Lane V/C Ratio	0.479	0.8	0.355	0.48
HCM Control Delay	15.8	30	13.4	15.3
HCM Lane LOS	C	D	B	C
HCM 95th-tile Q	2.5	7.9	1.6	2.6

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	91	148	20	17	61	16	11	307	24	23	142	30
Future Vol, veh/h	91	148	20	17	61	16	11	307	24	23	142	30
Peak Hour Factor	0.78	0.78	0.78	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	117	190	26	26	94	25	12	337	26	25	154	33
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	16.6	11.7	17.7	12.6
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	35%	18%	12%
Vol Thru, %	90%	57%	65%	73%
Vol Right, %	7%	8%	17%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	342	259	94	195
LT Vol	11	91	17	23
Through Vol	307	148	61	142
RT Vol	24	20	16	30
Lane Flow Rate	376	332	145	212
Geometry Grp	1	1	1	1
Degree of Util (X)	0.612	0.56	0.257	0.361
Departure Headway (Hd)	5.859	6.068	6.392	6.13
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	616	594	561	585
Service Time	3.879	4.091	4.445	4.179
HCM Lane V/C Ratio	0.61	0.559	0.258	0.362
HCM Control Delay	17.7	16.6	11.7	12.6
HCM Lane LOS	C	C	B	B
HCM 95th-tile Q	4.2	3.5	1	1.6

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	153	7	14	128	6	6	291	66	12	99	96
Future Vol, veh/h	148	153	7	14	128	6	6	291	66	12	99	96
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.81	0.81	0.81	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	156	161	7	16	151	7	7	359	81	13	105	102
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	13.4	13.1	20	11.3
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	0%	100%	0%	100%	0%	11%	0%
Vol Thru, %	98%	0%	0%	96%	0%	96%	89%	0%
Vol Right, %	0%	100%	0%	4%	0%	4%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	297	66	148	160	14	134	111	96
LT Vol	6	0	148	0	14	0	12	0
Through Vol	291	0	0	153	0	128	99	0
RT Vol	0	66	0	7	0	6	0	96
Lane Flow Rate	367	81	156	168	16	158	118	102
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.679	0.134	0.324	0.325	0.036	0.317	0.233	0.18
Departure Headway (Hd)	6.665	5.942	7.482	6.94	7.791	7.247	7.109	6.337
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	546	607	481	519	460	497	505	566
Service Time	4.365	3.642	5.221	4.679	5.535	4.99	4.851	4.079
HCM Lane V/C Ratio	0.672	0.133	0.324	0.324	0.035	0.318	0.234	0.18
HCM Control Delay	22.3	9.6	13.8	13	10.8	13.3	12	10.5
HCM Lane LOS	C	A	B	B	B	B	B	B
HCM 95th-tile Q	5.1	0.5	1.4	1.4	0.1	1.3	0.9	0.7

APPENDIX I

EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS CONDITIONS

SIGNAL WARRANTS

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 50 mph

MINOR STREET: DAKOTA Critical Approach Speed 40 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

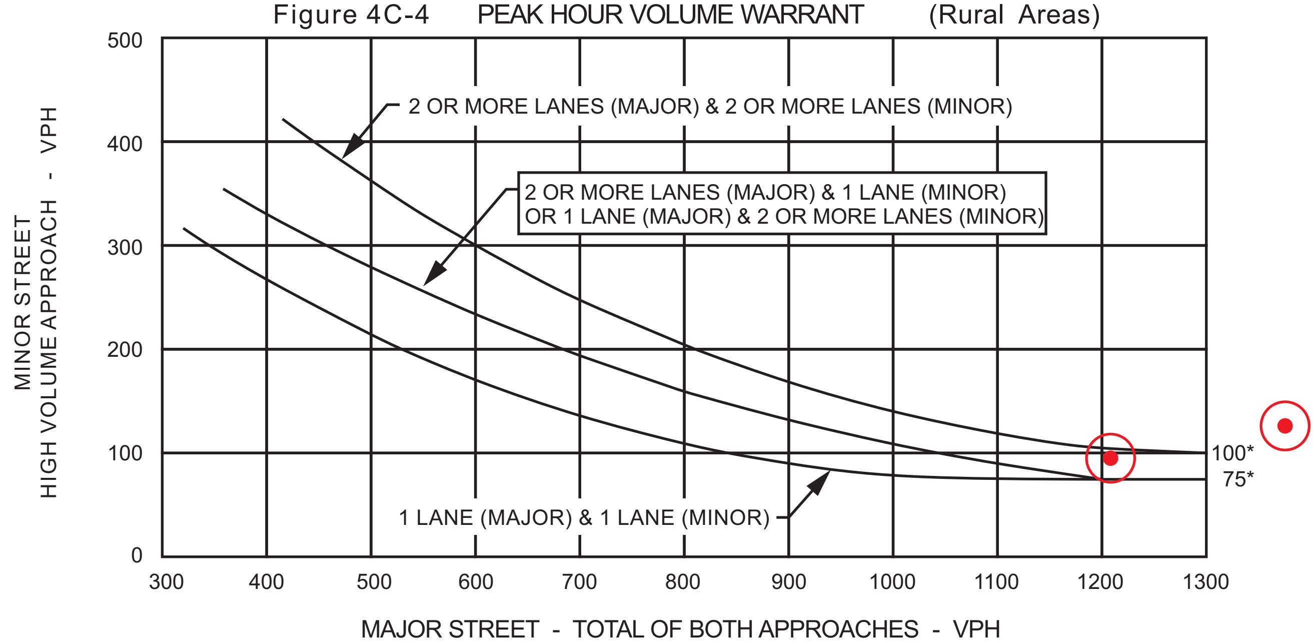
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	1492	1209			
Highest Approaches - Minor Street	✓		124	97			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: MCKINLEY Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

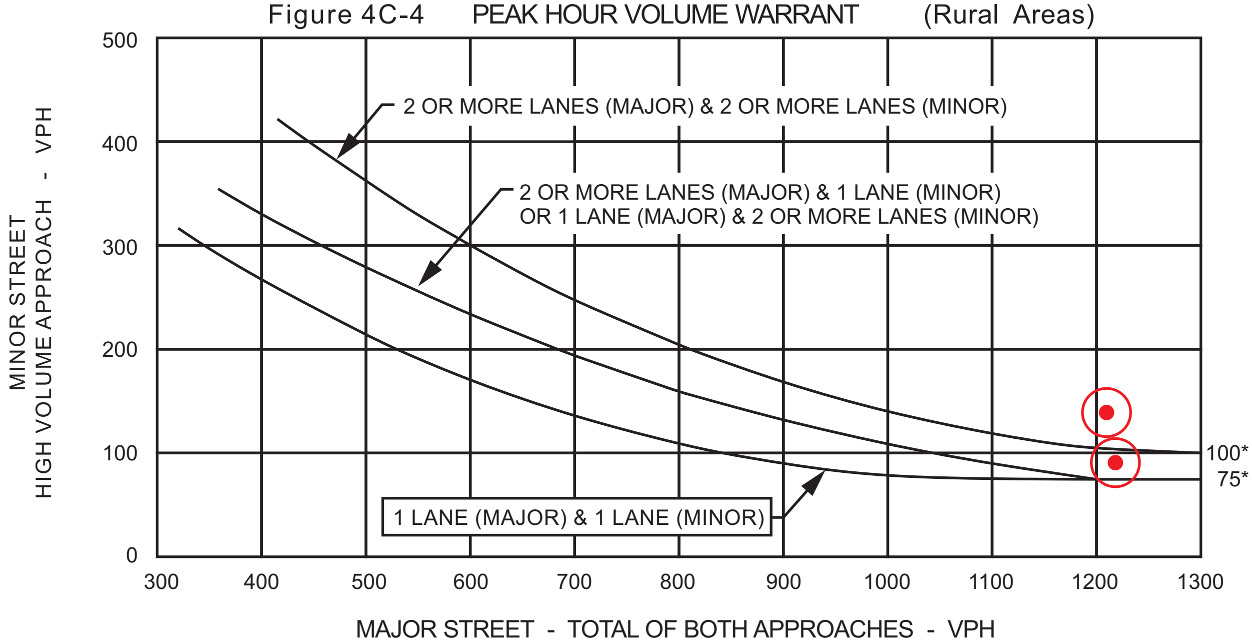
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1209	1218			
Highest Approaches - Minor Street	✓		139	91			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

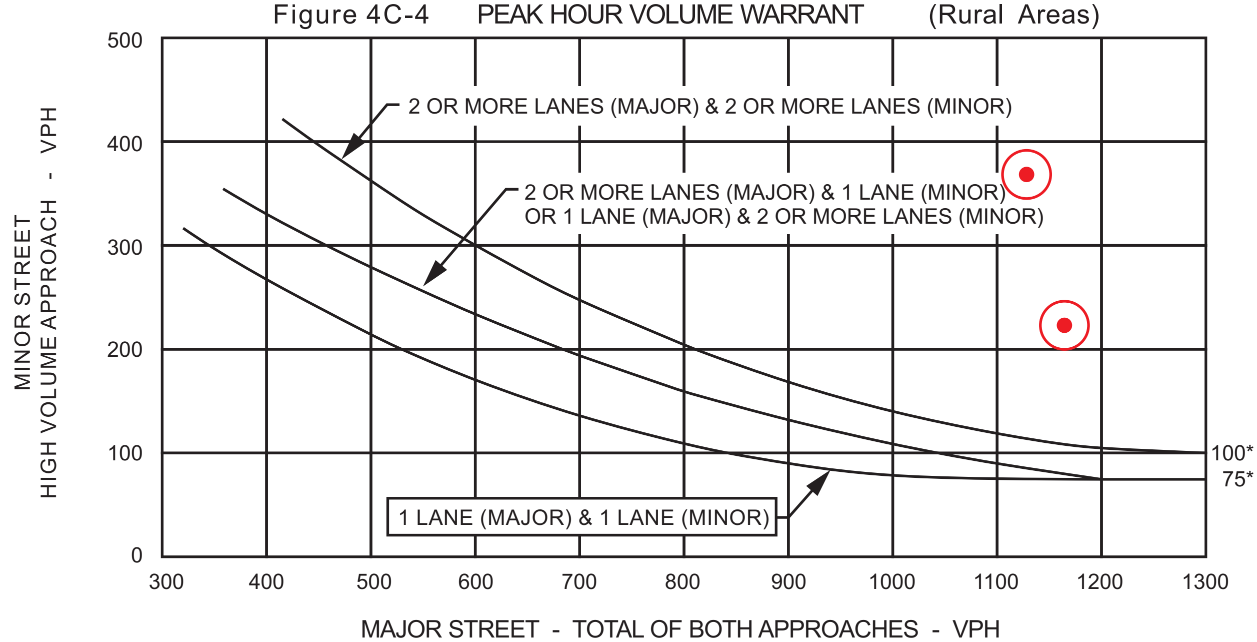
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1128	1163			
Highest Approaches - Minor Street	✓		366	224			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: BELMONT Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- ☐

☐ URBAN (U)

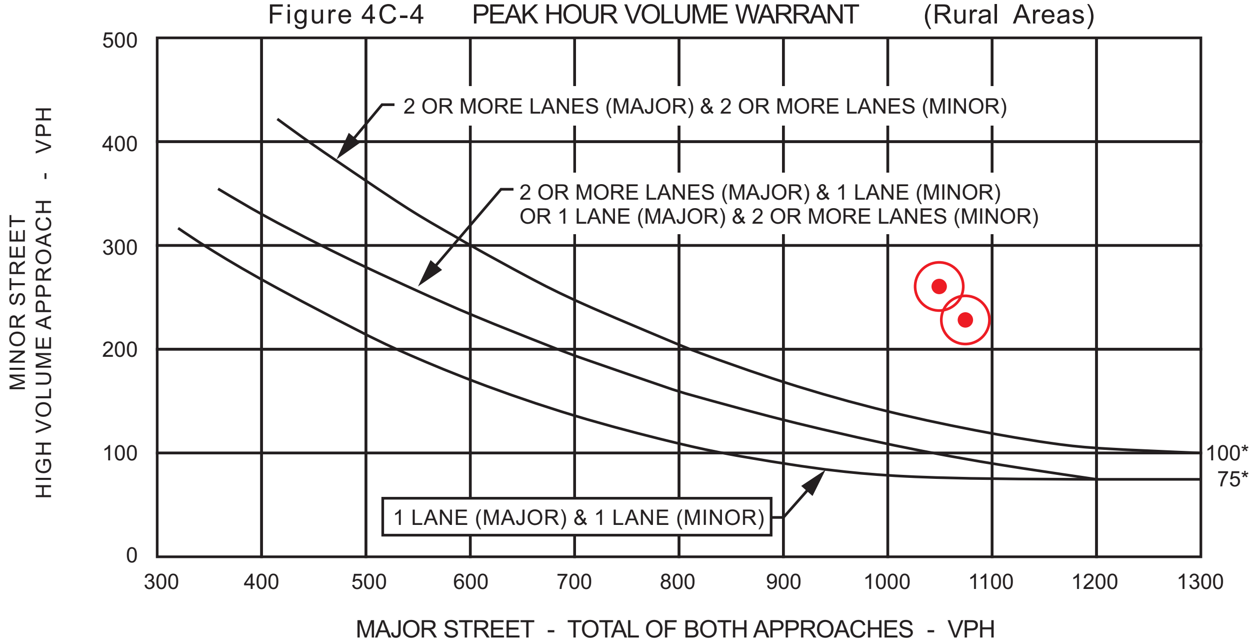
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1048	1074			
Highest Approaches - Minor Street	✓		261	228			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: TULARE Critical Approach Speed 50 mph

Critical speed of major street traffic > 40 mph ---------------- [X] RURAL (R)

or

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

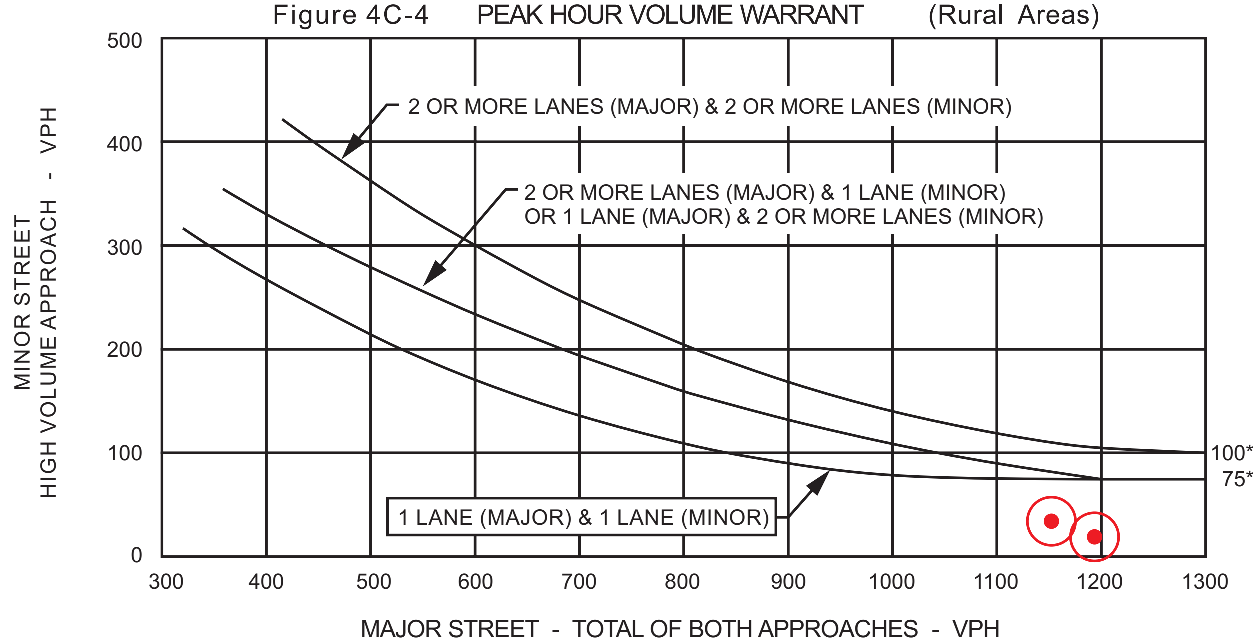
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1194	1152			
Highest Approaches - Minor Street	✓		28	33			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: SHIELDS Critical Approach Speed 45 mph

MINOR STREET: LOCAN Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

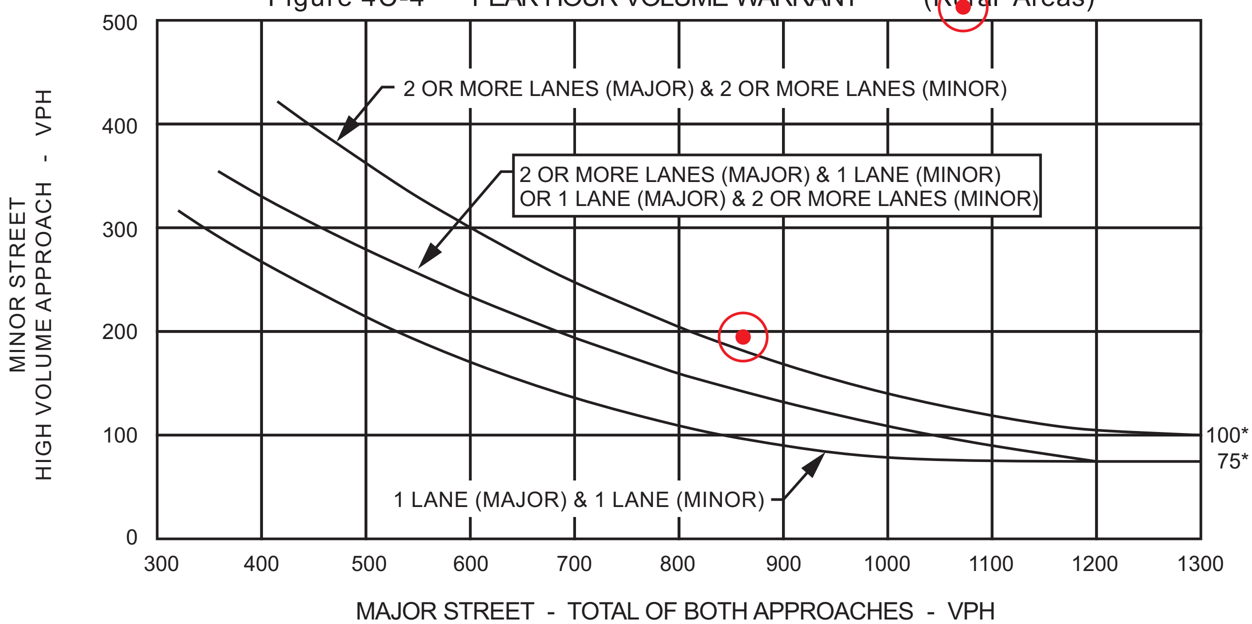
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	1071	862			
Highest Approaches - Minor Street	✓		523	195			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: DEWOLF/SHIELDS Critical Approach Speed 45 mph

MINOR STREET: SHIELDS/DEWOLF Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

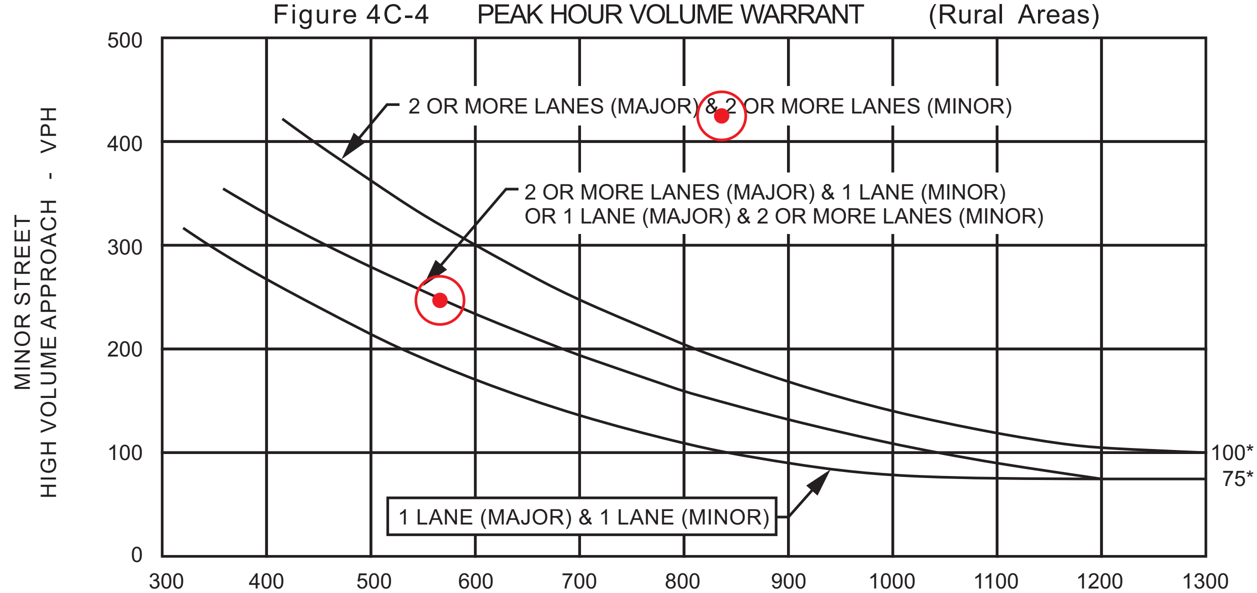
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		838	567			
Highest Approaches - Minor Street	✓		425	247			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: CLINTON Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

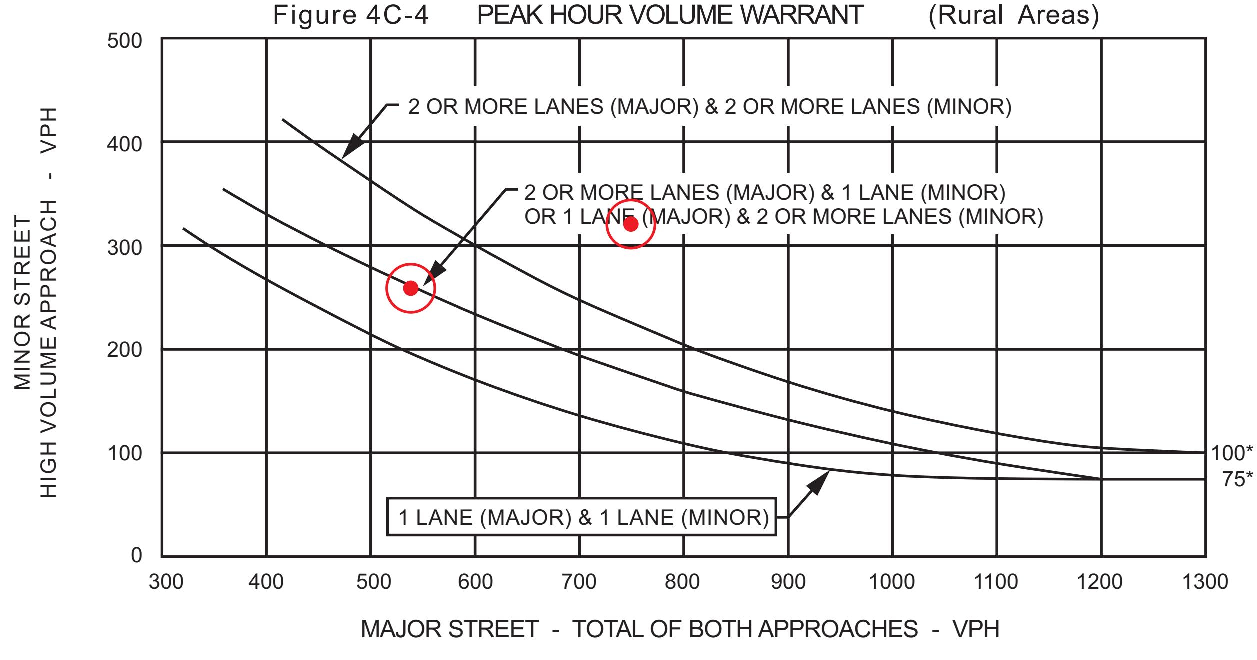
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		749	537			
Highest Approaches - Minor Street	✓		321	259			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

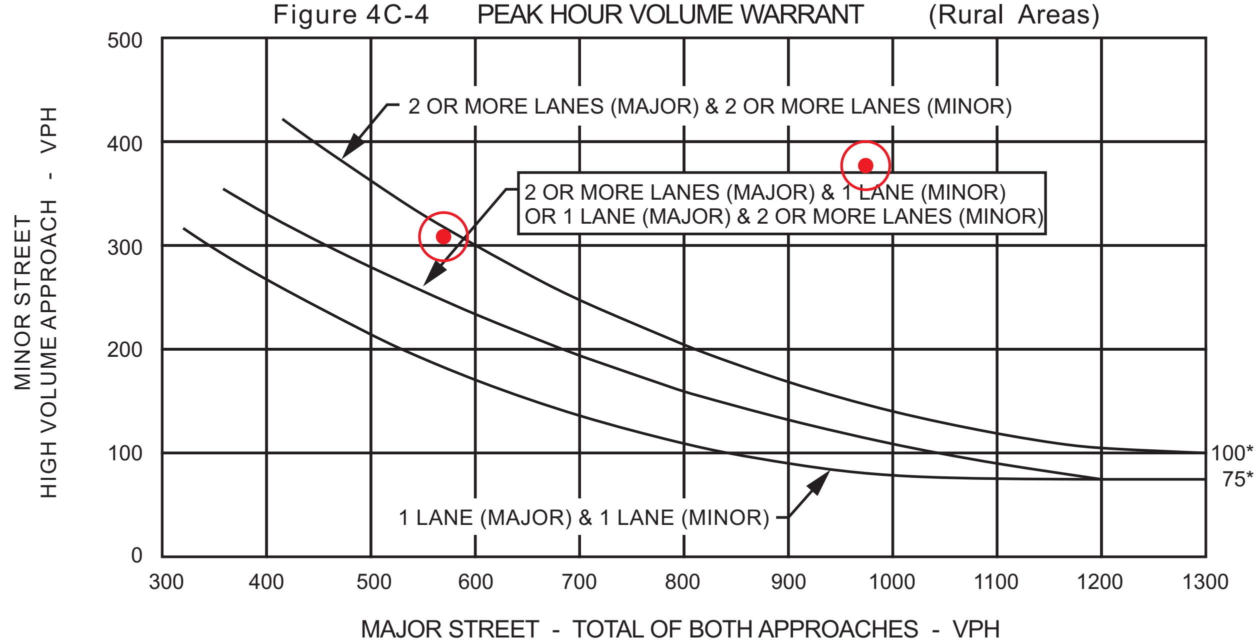
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	973	570			
Highest Approaches - Minor Street	✓		375	308			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

APPENDIX J

EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Intersection	
Intersection Delay, s/veh	376.1
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	70	10	33	41	6	77	36	556	17	33	801	104
Future Vol, veh/h	70	10	33	41	6	77	36	556	17	33	801	104
Peak Hour Factor	0.82	0.82	0.82	0.71	0.71	0.71	0.96	0.96	0.96	0.79	0.79	0.79
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	85	12	40	58	8	108	38	579	18	42	1014	132
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	20.8	17.6	34.7	652.5
HCM LOS	C	C	D	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	62%	100%	0%	100%	0%
Vol Thru, %	0%	100%	92%	9%	0%	7%	0%	89%
Vol Right, %	0%	0%	8%	29%	0%	93%	0%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	371	202	113	41	83	33	905
LT Vol	36	0	0	70	41	0	33	0
Through Vol	0	371	185	10	0	6	0	801
RT Vol	0	0	17	33	0	77	0	104
Lane Flow Rate	38	386	211	138	58	117	42	1146
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.084	0.815	0.441	0.349	0.152	0.27	0.096	2.45
Departure Headway (Hd)	10.52	9.998	9.936	11.879	12.274	11.047	8.295	7.699
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	343	367	365	305	294	327	430	481
Service Time	8.22	7.698	7.636	9.579	9.974	8.747	6.079	5.483
HCM Lane V/C Ratio	0.111	1.052	0.578	0.452	0.197	0.358	0.098	2.383
HCM Control Delay	14.2	44.6	20.2	20.8	17.2	17.8	12	675.9
HCM Lane LOS	B	E	C	C	C	C	B	F
HCM 95th-tile Q	0.3	7.1	2.2	1.5	0.5	1.1	0.3	88.6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	141	416	142	308	872	91	214	479	192	66	557	298
v/c Ratio	0.62	0.77	0.26	1.29	0.84	0.16	0.90	0.64	0.26	0.58	0.43	0.42
Control Delay	65.7	48.2	7.1	203.6	46.8	2.2	91.7	34.8	5.2	73.7	29.4	10.9
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	65.7	48.2	7.1	203.6	46.8	2.2	91.7	34.8	5.2	73.7	29.4	10.9
Queue Length 50th (ft)	54	282	4	~156	321	0	85	309	4	50	168	47
Queue Length 95th (ft)	81	359	40	#241	388	12	#147	406	46	#104	221	122
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	238	581	576	238	1105	587	238	744	742	123	1289	707
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.72	0.25	1.29	0.79	0.16	0.90	0.64	0.26	0.54	0.43	0.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	345	118	271	767	80	184	412	165	63	529	283
Future Volume (veh/h)	117	345	118	271	767	80	184	412	165	63	529	283
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	141	416	142	308	872	91	214	479	192	66	557	298
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.86	0.86	0.86	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	521	441	242	1055	470	242	745	631	85	1305	582
Arrive On Green	0.06	0.28	0.28	0.07	0.30	0.30	0.07	0.40	0.40	0.05	0.37	0.37
Sat Flow, veh/h	3456	1870	1582	3456	3554	1585	3456	1870	1585	1781	3554	1585
Grp Volume(v), veh/h	141	416	142	308	872	91	214	479	192	66	557	298
Grp Sat Flow(s),veh/h/ln	1728	1870	1582	1728	1777	1585	1728	1870	1585	1781	1777	1585
Q Serve(g_s), s	4.6	23.6	8.1	8.0	26.2	3.9	7.0	23.7	9.5	4.2	13.5	12.5
Cycle Q Clear(g_c), s	4.6	23.6	8.1	8.0	26.2	3.9	7.0	23.7	9.5	4.2	13.5	12.5
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	198	521	441	242	1055	470	242	745	631	85	1305	582
V/C Ratio(X)	0.71	0.80	0.32	1.27	0.83	0.19	0.89	0.64	0.30	0.78	0.43	0.51
Avail Cap(c_a), veh/h	242	589	498	242	1118	499	242	745	631	125	1305	582
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	53.0	38.3	32.7	53.2	37.5	19.0	52.7	27.8	23.6	53.9	27.2	15.7
Incr Delay (d2), s/veh	5.1	11.0	1.6	151.7	6.9	0.8	29.1	4.2	1.2	9.3	1.0	3.2
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	2.1	12.0	3.2	8.5	11.9	1.9	3.9	10.9	3.6	2.0	5.6	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.1	49.2	34.3	204.8	44.4	19.8	81.8	32.1	24.8	63.1	28.2	18.9
LnGrp LOS	E	D	C	F	D	B	F	C	C	E	C	B
Approach Vol, veh/h		699			1271			885			921	
Approach Delay, s/veh		48.0			81.5			42.5			27.7	
Approach LOS		D			F			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.7	48.0	12.4	39.2	11.1	51.6	13.9	37.8
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	* 5.9
Max Green Setting (Gmax), s	8.0	42.0	8.0	36.0	8.0	38.0	8.0	* 36
Max Q Clear Time (g_c+I1), s	9.0	15.5	6.6	28.2	6.2	25.7	10.0	25.6
Green Ext Time (p_c), s	0.0	9.3	0.0	5.8	0.0	4.9	0.0	4.5

Intersection Summary	
HCM 6th Ctrl Delay	53.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	45	153	106	497	53	533	94	268	868
v/c Ratio	0.26	0.28	0.60	0.81	0.30	1.07	0.19	1.46	1.39
Control Delay	43.7	21.0	55.3	32.4	44.5	93.2	3.7	268.0	212.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.7	21.0	55.3	32.4	44.5	93.2	3.7	268.0	212.6
Queue Length 50th (ft)	24	56	59	213	29	~364	0	~220	~766
Queue Length 95th (ft)	52	84	82	185	62	#530	14	#370	#1005
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	183	823	183	800	183	500	507	183	624
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.19	0.58	0.62	0.29	1.07	0.19	1.46	1.39

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	94	24	67	128	185	43	432	76	225	582	147
Future Volume (veh/h)	35	94	24	67	128	185	43	432	76	225	582	147
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	45	122	31	106	203	294	53	533	94	268	693	175
Peak Hour Factor	0.77	0.77	0.77	0.63	0.63	0.63	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	107	470	120	149	240	348	117	465	392	171	402	101
Arrive On Green	0.06	0.33	0.33	0.08	0.35	0.35	0.07	0.25	0.25	0.10	0.28	0.28
Sat Flow, veh/h	1767	1428	363	1767	681	986	1767	1856	1566	1767	1428	361
Grp Volume(v), veh/h	45	0	153	106	0	497	53	533	94	268	0	868
Grp Sat Flow(s),veh/h/ln	1767	0	1790	1767	0	1666	1767	1856	1566	1767	0	1789
Q Serve(g_s), s	2.2	0.0	5.5	5.1	0.0	24.2	2.5	22.0	4.2	8.5	0.0	24.7
Cycle Q Clear(g_c), s	2.2	0.0	5.5	5.1	0.0	24.2	2.5	22.0	4.2	8.5	0.0	24.7
Prop In Lane	1.00		0.20	1.00		0.59	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	107	0	590	149	0	588	117	465	392	171	0	503
V/C Ratio(X)	0.42	0.00	0.26	0.71	0.00	0.84	0.45	1.15	0.24	1.57	0.00	1.73
Avail Cap(c_a), veh/h	171	0	754	171	0	702	171	465	392	171	0	503
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.8	0.0	21.6	39.2	0.0	26.2	39.5	32.9	26.3	39.7	0.0	31.6
Incr Delay (d2), s/veh	1.0	0.0	0.6	8.5	0.0	11.0	1.0	88.7	1.4	281.6	0.0	334.9
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(50%),veh/ln	0.9	0.0	2.2	2.5	0.0	10.6	1.1	20.6	1.6	16.9	0.0	56.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.7	0.0	22.2	47.6	0.0	37.2	40.5	121.6	27.7	321.3	0.0	366.4
LnGrp LOS	D	A	C	D	A	D	D	F	C	F	A	F
Approach Vol, veh/h		198			603			680			1136	
Approach Delay, s/veh		26.4			39.0			102.3			355.8	
Approach LOS		C			D			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.8	31.4	9.3	37.3	12.5	28.7	11.4	35.2
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0
Max Q Clear Time (g_c+I1), s	4.5	26.7	4.2	26.2	10.5	24.0	7.1	7.5
Green Ext Time (p_c), s	0.0	0.0	0.0	4.3	0.0	0.0	0.0	1.7

Intersection Summary	
HCM 6th Ctrl Delay	192.0
HCM 6th LOS	F

Intersection	
Int Delay, s/veh	7.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	51	88	435	125	66	632
Future Vol, veh/h	51	88	435	125	66	632
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	76	76	93	93	82	82
Heavy Vehicles, %	6	6	6	6	6	6
Mvmt Flow	67	116	468	134	80	771

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1466	535	0	0	602	0
Stage 1	535	-	-	-	-	-
Stage 2	931	-	-	-	-	-
Critical Hdwy	6.46	6.26	-	-	4.16	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	-	-	2.254	-
Pot Cap-1 Maneuver	138	538	-	-	956	-
Stage 1	579	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	118	538	-	-	956	-
Mov Cap-2 Maneuver	118	-	-	-	-	-
Stage 1	579	-	-	-	-	-
Stage 2	322	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	60.4	0	0.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	233	956	-
HCM Lane V/C Ratio	-	-	0.785	0.084	-
HCM Control Delay (s)	-	-	60.4	9.1	0
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	5.7	0.3	-

Intersection	
Intersection Delay, s/veh	157.4
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	98	17	145	193	28	13	432	44	9	540	137
Future Vol, veh/h	98	98	17	145	193	28	13	432	44	9	540	137
Peak Hour Factor	0.75	0.75	0.75	0.87	0.87	0.87	0.95	0.95	0.95	0.94	0.94	0.94
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	131	131	23	167	222	32	14	455	46	10	574	146
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	45	99.9	182.8	216.4
HCM LOS	E	F	F	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	3%	46%	40%	2%	0%
Vol Thru, %	88%	46%	53%	98%	0%
Vol Right, %	9%	8%	8%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	489	213	366	549	137
LT Vol	13	98	145	9	0
Through Vol	432	98	193	540	0
RT Vol	44	17	28	0	137
Lane Flow Rate	515	284	421	584	146
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.298	0.766	1.059	1.502	0.346
Departure Headway (Hd)	10.277	11.842	10.765	10.226	9.483
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	360	310	341	362	382
Service Time	8.277	9.842	8.765	7.926	7.183
HCM Lane V/C Ratio	1.431	0.916	1.235	1.613	0.382
HCM Control Delay	182.8	45	99.9	266.1	17.1
HCM Lane LOS	F	E	F	F	C
HCM 95th-tile Q	21.1	5.9	12.8	28.9	1.5

Intersection	
Intersection Delay, s/veh	120.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	73	60	41	99	111	51	29	345	29	31	596	54
Future Vol, veh/h	73	60	41	99	111	51	29	345	29	31	596	54
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.91	0.91	0.91	0.95	0.95	0.95
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	94	77	53	111	125	57	32	379	32	33	627	57
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	18.6	22.5	51.5	235.1
HCM LOS	C	C	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	7%	55%	0%	47%	0%	5%
Vol Thru, %	86%	45%	0%	53%	0%	88%
Vol Right, %	7%	0%	100%	0%	100%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	403	133	41	210	51	681
LT Vol	29	73	0	99	0	31
Through Vol	345	60	0	111	0	596
RT Vol	29	0	41	0	51	54
Lane Flow Rate	443	171	53	236	57	717
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.904	0.428	0.118	0.572	0.124	1.452
Departure Headway (Hd)	8.264	10.162	9.134	9.797	8.812	7.29
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	443	356	395	370	409	502
Service Time	6.264	7.862	6.834	7.497	6.512	5.352
HCM Lane V/C Ratio	1	0.48	0.134	0.638	0.139	1.428
HCM Control Delay	51.5	20.3	13.1	24.8	12.8	235.1
HCM Lane LOS	F	C	B	C	B	F
HCM 95th-tile Q	9.8	2.1	0.4	3.4	0.4	35.2

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	0	1	22	0	6	0	353	4	5	860	0
Future Vol, veh/h	0	0	1	22	0	6	0	353	4	5	860	0
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	25	25	25	79	79	79	90	90	90	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	4	28	0	8	0	392	4	6	966	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1376	1374	966	1374	1372	394	966	0	0	396	0	0
Stage 1	978	978	-	394	394	-	-	-	-	-	-	-
Stage 2	398	396	-	980	978	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	122	145	307	122	145	653	709	-	-	1157	-	-
Stage 1	300	327	-	629	603	-	-	-	-	-	-	-
Stage 2	626	602	-	299	327	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	120	143	307	119	143	653	709	-	-	1157	-	-
Mov Cap-2 Maneuver	120	143	-	119	143	-	-	-	-	-	-	-
Stage 1	300	323	-	629	603	-	-	-	-	-	-	-
Stage 2	619	602	-	292	323	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.9	38	0	0
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	709	-	-	307	144	1157	-	-
HCM Lane V/C Ratio	-	-	-	0.013	0.246	0.005	-	-
HCM Control Delay (s)	0	-	-	16.9	38	8.1	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.9	0	-	-

Intersection	
Int Delay, s/veh	106.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	137	349	24	53	488	45	10	52	57	30	110	384
Future Vol, veh/h	137	349	24	53	488	45	10	52	57	30	110	384
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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	86	86	86	82	82	82	64	64	63	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	159	406	28	65	595	55	16	81	90	32	117	409

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	650	0	0	434	0	0	1754	1518	420	1577	1505	623
Stage 1	-	-	-	-	-	-	738	738	-	753	753	-
Stage 2	-	-	-	-	-	-	1016	780	-	824	752	-
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	936	-	-	1126	-	-	67	119	633	89	121	486
Stage 1	-	-	-	-	-	-	410	424	-	402	417	-
Stage 2	-	-	-	-	-	-	287	406	-	367	418	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	936	-	-	1126	-	-	-	90	633	~ 14	~ 91	486
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	90	-	~ 14	~ 91	-
Stage 1	-	-	-	-	-	-	340	352	-	334	379	-
Stage 2	-	-	-	-	-	-	29	369	-	201	347	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.6	0.8		$ 389.2
HCM LOS			-	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	936	-	-	1126	-	-	42	486
HCM Lane V/C Ratio	-	0.17	-	-	0.057	-	-	3.546	0.841
HCM Control Delay (s)	-	9.6	-	-	8.4	0	-	$ 1345.5	40.5
HCM Lane LOS	-	A	-	-	A	A	-	F	E
HCM 95th %tile Q(veh)	-	0.6	-	-	0.2	-	-	16.7	8.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	158.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	251	180	12	2	243	15	25	221	2	20	263	309
Future Vol, veh/h	251	180	12	2	243	15	25	221	2	20	263	309
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.79	0.79	0.79	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	276	198	13	2	261	16	32	280	3	24	313	368
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	119.8	35.8	41.8	286.1
HCM LOS	F	E	E	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	57%	1%	3%
Vol Thru, %	89%	41%	93%	44%
Vol Right, %	1%	3%	6%	52%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	248	443	260	592
LT Vol	25	251	2	20
Through Vol	221	180	243	263
RT Vol	2	12	15	309
Lane Flow Rate	314	487	280	705
Geometry Grp	1	1	1	1
Degree of Util (X)	0.769	1.133	0.696	1.562
Departure Headway (Hd)	10.718	9.864	11.038	8.491
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	339	370	330	437
Service Time	8.718	7.864	9.038	6.491
HCM Lane V/C Ratio	0.926	1.316	0.848	1.613
HCM Control Delay	41.8	119.8	35.8	286.1
HCM Lane LOS	E	F	E	F
HCM 95th-tile Q	6.1	15.9	4.9	36.6

Intersection	
Intersection Delay, s/veh	114.6
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	50	84	25	102	218	47	18	153	22	47	443	70
Future Vol, veh/h	50	84	25	102	218	47	18	153	22	47	443	70
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.73	0.73	0.73	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	60	101	30	136	291	63	25	210	30	56	527	83
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	20.5	74.2	24.6	206.9
HCM LOS	C	F	C	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	31%	28%	8%
Vol Thru, %	79%	53%	59%	79%
Vol Right, %	11%	16%	13%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	193	159	367	560
LT Vol	18	50	102	47
Through Vol	153	84	218	443
RT Vol	22	25	47	70
Lane Flow Rate	264	192	489	667
Geometry Grp	1	1	1	1
Degree of Util (X)	0.596	0.452	1.006	1.383
Departure Headway (Hd)	9.061	9.712	8.346	7.469
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	402	374	440	487
Service Time	7.061	7.712	6.346	5.554
HCM Lane V/C Ratio	0.657	0.513	1.111	1.37
HCM Control Delay	24.6	20.5	74.2	206.9
HCM Lane LOS	C	C	F	F
HCM 95th-tile Q	3.7	2.3	12.9	30.8

Intersection	
Intersection Delay, s/veh	42
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	46	116	7	100	255	26	68	155	114	27	240	392
Future Vol, veh/h	46	116	7	100	255	26	68	155	114	27	240	392
Peak Hour Factor	0.90	0.90	0.90	0.80	0.80	0.80	0.69	0.69	0.69	0.83	0.83	0.83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	51	129	8	125	319	33	99	225	165	33	289	472
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	17	36.7	31.2	57.8
HCM LOS	C	E	D	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	30%	0%	100%	0%	100%	0%	10%	0%
Vol Thru, %	70%	0%	0%	94%	0%	91%	90%	0%
Vol Right, %	0%	100%	0%	6%	0%	9%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	223	114	46	123	100	281	267	392
LT Vol	68	0	46	0	100	0	27	0
Through Vol	155	0	0	116	0	255	240	0
RT Vol	0	114	0	7	0	26	0	392
Lane Flow Rate	323	165	51	137	125	351	322	472
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.8	0.368	0.142	0.361	0.319	0.842	0.763	1.018
Departure Headway (Hd)	8.914	8.028	10.305	9.739	9.419	8.832	8.541	7.763
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	404	446	350	372	384	414	428	472
Service Time	6.7	5.813	8.005	7.439	7.119	6.532	6.209	5.431
HCM Lane V/C Ratio	0.8	0.37	0.146	0.368	0.326	0.848	0.752	1
HCM Control Delay	39.3	15.5	14.7	17.8	16.5	43.9	33.8	74.1
HCM Lane LOS	E	C	B	C	C	E	D	F
HCM 95th-tile Q	7	1.7	0.5	1.6	1.3	8	6.4	13.9

Intersection	
Intersection Delay, s/veh	53.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	24	33	9	7	46	36	643	32	60	456	56
Future Vol, veh/h	40	24	33	9	7	46	36	643	32	60	456	56
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	48	29	40	10	8	50	38	670	33	65	496	61
Number of Lanes	0	1	0	1	1	0	1	2	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	2	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	3	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	2	2	1
HCM Control Delay	15.2	12.8	31.2	91.6
HCM LOS	C	B	D	F

Lane	NBLn1	NBLn2	NBLn3	EBLn1	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	100%	0%	0%	41%	100%	0%	100%	0%
Vol Thru, %	0%	100%	87%	25%	0%	13%	0%	89%
Vol Right, %	0%	0%	13%	34%	0%	87%	0%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	36	429	246	97	9	53	60	512
LT Vol	36	0	0	40	9	0	60	0
Through Vol	0	429	214	24	0	7	0	456
RT Vol	0	0	32	33	0	46	0	56
Lane Flow Rate	38	447	257	117	10	58	65	557
Geometry Grp	8	8	8	8	8	8	8	8
Degree of Util (X)	0.078	0.867	0.492	0.28	0.026	0.133	0.141	1.114
Departure Headway (Hd)	7.801	7.291	7.198	9.005	9.884	8.737	7.789	7.203
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	462	500	503	402	364	413	463	506
Service Time	5.501	4.991	4.898	6.705	7.584	6.437	5.489	4.903
HCM Lane V/C Ratio	0.082	0.894	0.511	0.291	0.027	0.14	0.14	1.101
HCM Control Delay	11.2	41.2	16.7	15.2	12.8	12.8	11.8	100.9
HCM Lane LOS	B	E	C	C	B	B	B	F
HCM 95th-tile Q	0.3	9.2	2.7	1.1	0.1	0.5	0.5	18.4

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	211	688	133	167	380	67	162	514	220	106	360	101
v/c Ratio	0.35	1.14	0.22	0.88	0.53	0.15	0.85	0.78	0.34	1.08	0.30	0.16
Control Delay	43.6	116.2	4.3	91.3	40.2	0.7	87.0	41.2	11.1	163.6	26.8	2.2
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	43.6	116.2	4.3	91.3	40.2	0.7	87.0	41.2	11.1	163.6	26.8	2.2
Queue Length 50th (ft)	64	~557	0	60	127	0	58	315	37	~82	95	0
Queue Length 95th (ft)	#144	#687	26	#118	141	0	#118	449	96	#189	130	14
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	606	604	613	190	1147	613	190	656	648	98	1213	627
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	1.14	0.22	0.88	0.33	0.11	0.85	0.78	0.34	1.08	0.30	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	571	110	147	334	59	151	478	205	93	317	89
Future Volume (veh/h)	175	571	110	147	334	59	151	478	205	93	317	89
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	211	688	133	167	380	67	162	514	220	106	360	101
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	717	607	514	192	613	273	192	659	558	99	1219	542
Arrive On Green	0.21	0.32	0.32	0.06	0.17	0.17	0.06	0.35	0.35	0.06	0.34	0.34
Sat Flow, veh/h	3456	1870	1585	3456	3554	1585	3456	1870	1585	1781	3554	1581
Grp Volume(v), veh/h	211	688	133	167	380	67	162	514	220	106	360	101
Grp Sat Flow(s),veh/h/ln	1728	1870	1585	1728	1777	1585	1728	1870	1585	1781	1777	1581
Q Serve(g_s), s	5.6	35.0	5.0	5.2	10.7	3.2	5.0	26.5	8.4	6.0	8.0	2.5
Cycle Q Clear(g_c), s	5.6	35.0	5.0	5.2	10.7	3.2	5.0	26.5	8.4	6.0	8.0	2.5
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	717	607	514	192	613	273	192	659	558	99	1219	542
V/C Ratio(X)	0.29	1.13	0.26	0.87	0.62	0.25	0.84	0.78	0.39	1.07	0.30	0.19
Avail Cap(c_a), veh/h	717	607	514	192	1153	514	192	659	558	99	1219	542
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	36.1	36.4	15.2	50.6	41.4	25.3	50.5	31.2	14.5	50.9	25.9	6.6
Incr Delay (d2), s/veh	0.1	79.4	1.0	30.9	3.9	1.8	26.1	8.9	2.1	110.6	0.6	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	2.3	28.3	2.5	3.0	4.8	1.6	2.8	12.9	4.2	5.6	3.3	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.2	115.8	16.3	81.5	45.3	27.1	76.6	40.1	16.6	161.6	26.5	7.4
LnGrp LOS	D	F	B	F	D	C	E	D	B	F	C	A
Approach Vol, veh/h		1032			614			896			567	
Approach Delay, s/veh		86.7			53.1			41.0			48.4	
Approach LOS		F			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	43.0	28.3	23.9	11.7	44.0	11.9	40.3
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	5.7	6.0	5.9	5.3
Max Green Setting (Gmax), s	6.0	37.0	6.0	35.0	6.0	37.0	6.0	35.0
Max Q Clear Time (g_c+I1), s	7.0	10.0	7.6	12.7	8.0	28.5	7.2	37.0
Green Ext Time (p_c), s	0.0	4.9	0.0	5.9	0.0	4.1	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	59.9
HCM 6th LOS	E

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	121	86	28	80	45	718	52	65	566
v/c Ratio	0.51	0.17	0.13	0.22	0.21	1.02	0.08	0.31	0.81
Control Delay	42.5	13.4	35.4	11.2	35.9	67.6	0.2	37.4	36.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.5	13.4	35.4	11.2	35.9	67.6	0.2	37.4	36.6
Queue Length 50th (ft)	49	13	11	8	17	~374	0	26	227
Queue Length 95th (ft)	#169	48	38	29	61	#875	0	81	#670
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	235	973	224	939	224	707	679	224	698
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.09	0.13	0.09	0.20	1.02	0.08	0.29	0.81

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	41	38	22	16	46	41	661	48	60	465	61
Future Volume (veh/h)	111	41	38	22	16	46	41	661	48	60	465	61
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	121	45	41	28	21	59	45	718	52	65	500	66
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.92	0.92	0.92	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	198	166	152	88	53	149	123	651	552	153	591	78
Arrive On Green	0.11	0.18	0.18	0.05	0.12	0.12	0.07	0.35	0.35	0.09	0.36	0.36
Sat Flow, veh/h	1781	901	821	1781	433	1218	1781	1870	1585	1781	1618	214
Grp Volume(v), veh/h	121	0	86	28	0	80	45	718	52	65	0	566
Grp Sat Flow(s),veh/h/ln	1781	0	1723	1781	0	1651	1781	1870	1585	1781	0	1832
Q Serve(g_s), s	4.1	0.0	2.7	1.0	0.0	2.8	1.5	22.0	1.4	2.2	0.0	18.0
Cycle Q Clear(g_c), s	4.1	0.0	2.7	1.0	0.0	2.8	1.5	22.0	1.4	2.2	0.0	18.0
Prop In Lane	1.00		0.48	1.00		0.74	1.00		1.00	1.00		0.12
Lane Grp Cap(c), veh/h	198	0	318	88	0	202	123	651	552	153	0	669
V/C Ratio(X)	0.61	0.00	0.27	0.32	0.00	0.40	0.37	1.10	0.09	0.42	0.00	0.85
Avail Cap(c_a), veh/h	239	0	1008	239	0	966	239	651	552	239	0	669
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.8	0.0	22.1	29.0	0.0	25.6	28.1	20.6	13.9	27.4	0.0	18.4
Incr Delay (d2), s/veh	1.3	0.0	1.2	0.8	0.0	3.4	0.7	67.0	0.3	0.7	0.0	12.6
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	1.6	0.0	1.1	0.4	0.0	1.2	0.6	20.0	0.5	0.9	0.0	8.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.0	0.0	23.4	29.8	0.0	29.0	28.8	87.6	14.2	28.1	0.0	31.0
LnGrp LOS	C	A	C	C	A	C	C	F	B	C	A	C
Approach Vol, veh/h		207			108			815			631	
Approach Delay, s/veh		26.1			29.2			79.6			30.7	
Approach LOS		C			C			E			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	29.8	11.0	14.0	9.4	28.7	7.1	18.0
Change Period (Y+Rc), s	4.0	6.7	4.0	6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.5	22.0	8.5	37.0	8.5	22.0	8.5	37.0
Max Q Clear Time (g_c+I1), s	3.5	20.0	6.1	4.8	4.2	24.0	3.0	4.7
Green Ext Time (p_c), s	0.0	1.2	0.0	0.9	0.0	0.0	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	52.7
HCM 6th LOS	D

Intersection						
Int Delay, s/veh	3.6					

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	43	710	71	65	452
Future Vol, veh/h	48	43	710	71	65	452
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	89	89	91	91	93	93
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	48	780	78	70	486

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1445	819	0	0	858	0
Stage 1	819	-	-	-	-	-
Stage 2	626	-	-	-	-	-
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	145	375	-	-	783	-
Stage 1	433	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	127	375	-	-	783	-
Mov Cap-2 Maneuver	127	-	-	-	-	-
Stage 1	433	-	-	-	-	-
Stage 2	468	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	46.2	0	1.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	185	783	-
HCM Lane V/C Ratio	-	-	0.553	0.089	-
HCM Control Delay (s)	-	-	46.2	10	0
HCM Lane LOS	-	-	E	B	A
HCM 95th %tile Q(veh)	-	-	2.9	0.3	-

Intersection	
Intersection Delay, s/veh	126.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	126	98	13	55	57	10	8	654	67	28	392	79
Future Vol, veh/h	126	98	13	55	57	10	8	654	67	28	392	79
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.93	0.93	0.93	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	133	103	14	60	63	11	9	703	72	30	417	84
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	1	1
HCM Control Delay	21.3	16.5	237.6	39.7
HCM LOS	C	C	F	E

Lane	NBLn1	EBLn1	WBLn1	SBLn1	SBLn2
Vol Left, %	1%	53%	45%	7%	0%
Vol Thru, %	90%	41%	47%	93%	0%
Vol Right, %	9%	5%	8%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	729	237	122	420	79
LT Vol	8	126	55	28	0
Through Vol	654	98	57	392	0
RT Vol	67	13	10	0	79
Lane Flow Rate	784	249	134	447	84
Geometry Grp	5	2	2	7	7
Degree of Util (X)	1.463	0.536	0.307	0.877	0.148
Departure Headway (Hd)	6.721	8.694	9.376	7.854	7.096
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	549	417	386	465	508
Service Time	4.748	6.694	7.376	5.554	4.796
HCM Lane V/C Ratio	1.428	0.597	0.347	0.961	0.165
HCM Control Delay	237.6	21.3	16.5	45.1	11
HCM Lane LOS	F	C	C	E	B
HCM 95th-tile Q	38.5	3.1	1.3	9.2	0.5

Intersection	
Intersection Delay, s/veh	128.5
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	83	125	35	44	78	41	6	590	46	54	381	38
Future Vol, veh/h	83	125	35	44	78	41	6	590	46	54	381	38
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.86	0.86	0.86	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	89	134	38	48	85	45	7	686	53	61	428	43
Number of Lanes	0	1	1	0	1	1	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	2	2
HCM Control Delay	21.3	16.4	228.4	78.4
HCM LOS	C	C	F	F

Lane	NBLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	1%	40%	0%	36%	0%	11%
Vol Thru, %	92%	60%	0%	64%	0%	81%
Vol Right, %	7%	0%	100%	0%	100%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	642	208	35	122	41	473
LT Vol	6	83	0	44	0	54
Through Vol	590	125	0	78	0	381
RT Vol	46	0	35	0	41	38
Lane Flow Rate	747	224	38	133	45	531
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	1.438	0.532	0.08	0.328	0.099	1.032
Departure Headway (Hd)	7.138	9.64	8.694	10.079	9.15	7.76
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	515	376	415	359	394	473
Service Time	5.138	7.34	6.394	7.779	6.85	5.76
HCM Lane V/C Ratio	1.45	0.596	0.092	0.37	0.114	1.123
HCM Control Delay	228.4	22.8	12.1	17.6	12.9	78.4
HCM Lane LOS	F	C	B	C	B	F
HCM 95th-tile Q	35.3	3	0.3	1.4	0.3	14.4

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	2	0	0	22	0	11	1	676	35	2	472	0
Future Vol, veh/h	2	0	0	22	0	11	1	676	35	2	472	0
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	25	25	25	72	72	72	93	93	93	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	0	31	0	15	1	727	38	2	543	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1303	1314	543	1295	1295	746	543	0	0	765	0	0
Stage 1	547	547	-	748	748	-	-	-	-	-	-	-
Stage 2	756	767	-	547	547	-	-	-	-	-	-	-
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	138	158	540	139	162	413	1026	-	-	848	-	-
Stage 1	521	517	-	404	420	-	-	-	-	-	-	-
Stage 2	400	411	-	521	517	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	132	157	540	138	161	413	1026	-	-	848	-	-
Mov Cap-2 Maneuver	132	157	-	138	161	-	-	-	-	-	-	-
Stage 1	520	515	-	403	419	-	-	-	-	-	-	-
Stage 2	384	410	-	519	515	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	34	32.3	0	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1026	-	-	132	177	848	-	-
HCM Lane V/C Ratio	0.001	-	-	0.061	0.259	0.003	-	-
HCM Control Delay (s)	8.5	0	-	34	32.3	9.3	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1	0	-	-

Intersection	
Int Delay, s/veh	9.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	210	389	5	14	254	22	7	44	24	13	26	157
Future Vol, veh/h	210	389	5	14	254	22	7	44	24	13	26	157
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	246	-	-	-	-	-	-	-	-	-	-	273
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	96	96	96	78	78	78	81	81	81
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	241	447	6	15	265	23	9	56	31	16	32	194

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	288	0	0	453	0	0	1352	1250	450	1283	1242	277
Stage 1	-	-	-	-	-	-	932	932	-	307	307	-
Stage 2	-	-	-	-	-	-	420	318	-	976	935	-
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	1274	-	-	1108	-	-	127	173	609	142	175	762
Stage 1	-	-	-	-	-	-	320	345	-	703	661	-
Stage 2	-	-	-	-	-	-	611	654	-	302	344	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1274	-	-	1108	-	-	66	138	609	79	140	762
Mov Cap-2 Maneuver	-	-	-	-	-	-	66	138	-	79	140	-
Stage 1	-	-	-	-	-	-	260	280	-	570	650	-
Stage 2	-	-	-	-	-	-	426	644	-	186	279	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3	0.4	55.3	21
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	162	1274	-	-	1108	-	-	111	762
HCM Lane V/C Ratio	0.594	0.189	-	-	0.013	-	-	0.434	0.254
HCM Control Delay (s)	55.3	8.5	-	-	8.3	0	-	60.2	11.3
HCM Lane LOS	F	A	-	-	A	A	-	F	B
HCM 95th %tile Q(veh)	3.2	0.7	-	-	0	-	-	1.9	1

Intersection	
Intersection Delay, s/veh	23
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	206	213	13	2	139	18	24	205	2	10	122	119
Future Vol, veh/h	206	213	13	2	139	18	24	205	2	10	122	119
Peak Hour Factor	0.90	0.90	0.90	0.77	0.77	0.77	0.90	0.90	0.90	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	229	237	14	3	181	23	27	228	2	11	133	129
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	34.1	14.2	16.5	16.1
HCM LOS	D	B	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	10%	48%	1%	4%
Vol Thru, %	89%	49%	87%	49%
Vol Right, %	1%	3%	11%	47%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	231	432	159	251
LT Vol	24	206	2	10
Through Vol	205	213	139	122
RT Vol	2	13	18	119
Lane Flow Rate	257	480	206	273
Geometry Grp	1	1	1	1
Degree of Util (X)	0.491	0.839	0.39	0.498
Departure Headway (Hd)	6.883	6.295	6.799	6.571
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	521	571	524	546
Service Time	4.972	4.368	4.895	4.66
HCM Lane V/C Ratio	0.493	0.841	0.393	0.5
HCM Control Delay	16.5	34.1	14.2	16.1
HCM Lane LOS	C	D	B	C
HCM 95th-tile Q	2.7	8.8	1.8	2.8

Intersection	
Intersection Delay, s/veh	17.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	91	168	20	29	69	16	11	307	44	23	142	30
Future Vol, veh/h	91	168	20	29	69	16	11	307	44	23	142	30
Peak Hour Factor	0.78	0.78	0.78	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	117	215	26	45	106	25	12	337	48	25	154	33
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	19.3	13	20.8	13.6
HCM LOS	C	B	C	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	3%	33%	25%	12%
Vol Thru, %	85%	60%	61%	73%
Vol Right, %	12%	7%	14%	15%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	362	279	114	195
LT Vol	11	91	29	23
Through Vol	307	168	69	142
RT Vol	44	20	16	30
Lane Flow Rate	398	358	175	212
Geometry Grp	1	1	1	1
Degree of Util (X)	0.673	0.625	0.326	0.382
Departure Headway (Hd)	6.089	6.293	6.685	6.494
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	593	572	535	551
Service Time	4.141	4.35	4.753	4.559
HCM Lane V/C Ratio	0.671	0.626	0.327	0.385
HCM Control Delay	20.8	19.3	13	13.6
HCM Lane LOS	C	C	B	B
HCM 95th-tile Q	5.1	4.3	1.4	1.8

Intersection	
Intersection Delay, s/veh	16.6
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	158	159	7	18	133	6	6	301	72	12	103	103
Future Vol, veh/h	158	159	7	18	133	6	6	301	72	12	103	103
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.81	0.81	0.81	0.94	0.94	0.94
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	166	167	7	21	156	7	7	372	89	13	110	110
Number of Lanes	1	1	0	1	1	0	0	1	1	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	2	2
HCM Control Delay	14	13.6	22	11.7
HCM LOS	B	B	C	B

Lane	NBLn1	NBLn2	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2
Vol Left, %	2%	0%	100%	0%	100%	0%	10%	0%
Vol Thru, %	98%	0%	0%	96%	0%	96%	90%	0%
Vol Right, %	0%	100%	0%	4%	0%	4%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	307	72	158	166	18	139	115	103
LT Vol	6	0	158	0	18	0	12	0
Through Vol	301	0	0	159	0	133	103	0
RT Vol	0	72	0	7	0	6	0	103
Lane Flow Rate	379	89	166	175	21	164	122	110
Geometry Grp	7	7	7	7	7	7	7	7
Degree of Util (X)	0.714	0.15	0.353	0.345	0.047	0.337	0.248	0.198
Departure Headway (Hd)	6.785	6.062	7.64	7.099	7.97	7.425	7.29	6.519
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	534	592	471	507	449	484	493	550
Service Time	4.522	3.798	5.382	4.841	5.716	5.172	5.036	4.264
HCM Lane V/C Ratio	0.71	0.15	0.352	0.345	0.047	0.339	0.247	0.2
HCM Control Delay	24.8	9.9	14.5	13.6	11.1	13.9	12.4	10.9
HCM Lane LOS	C	A	B	B	B	B	B	B
HCM 95th-tile Q	5.7	0.5	1.6	1.5	0.1	1.5	1	0.7

APPENDIX K

EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT CONDITIONS

SIGNAL WARRANT ANALYSIS

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 50 mph

MINOR STREET: DAKOTA Critical Approach Speed 40 mph

Critical speed of major street traffic > 40 mph ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. ☐

☐ URBAN (U)

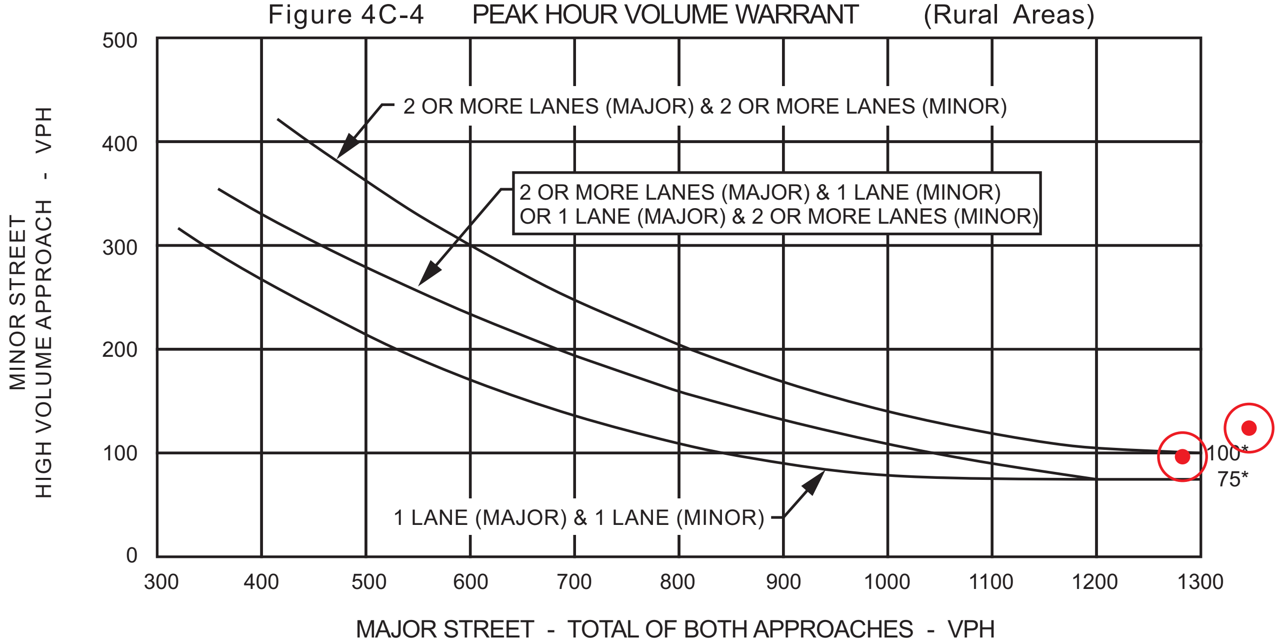
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	1547	1283			
Highest Approaches - Minor Street	✓		124	97			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: MCKINLEY Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

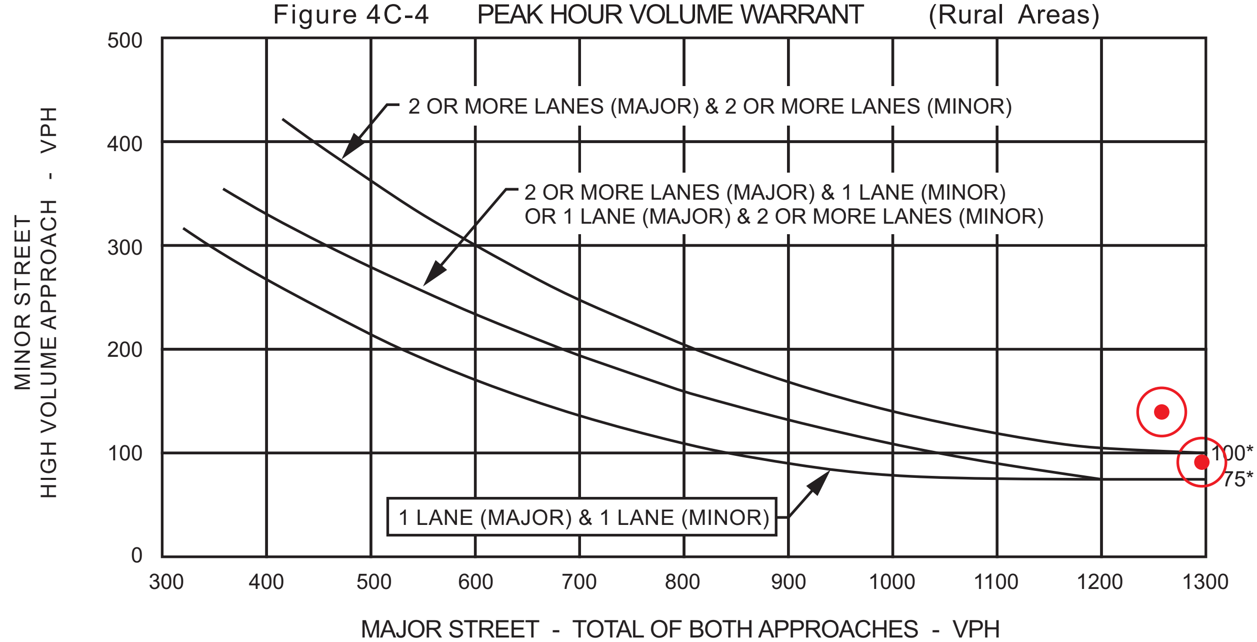
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1258	1298			
Highest Approaches - Minor Street	✓		139	91			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

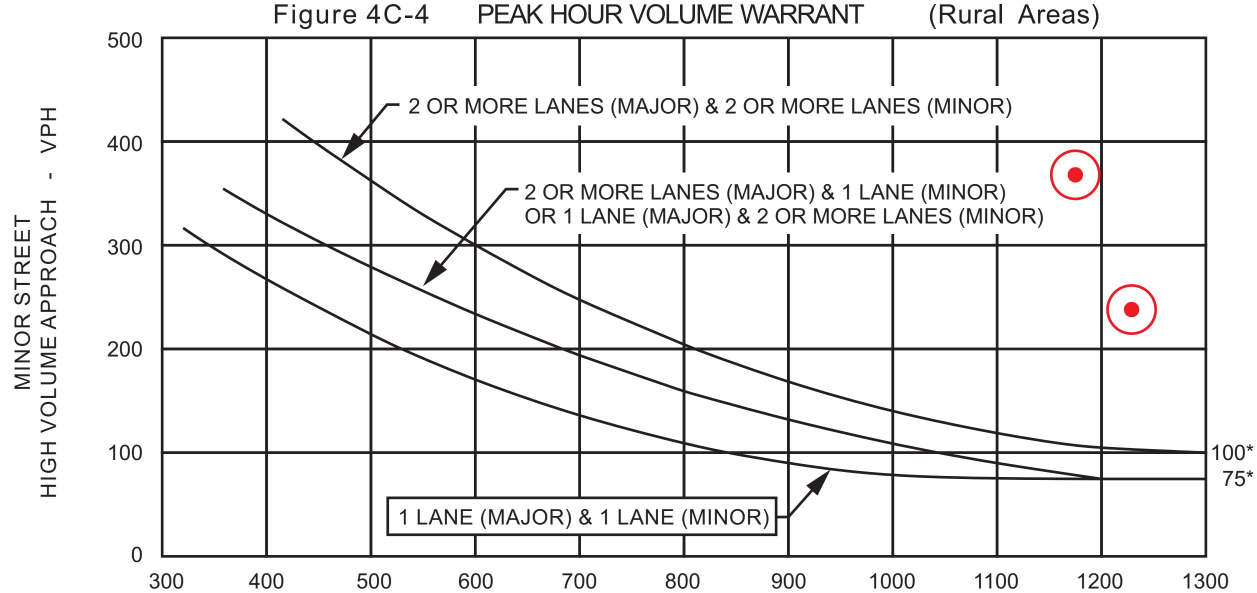
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1175	1228			
Highest Approaches - Minor Street	✓		366	237			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK ________ DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: BELMONT Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)
In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

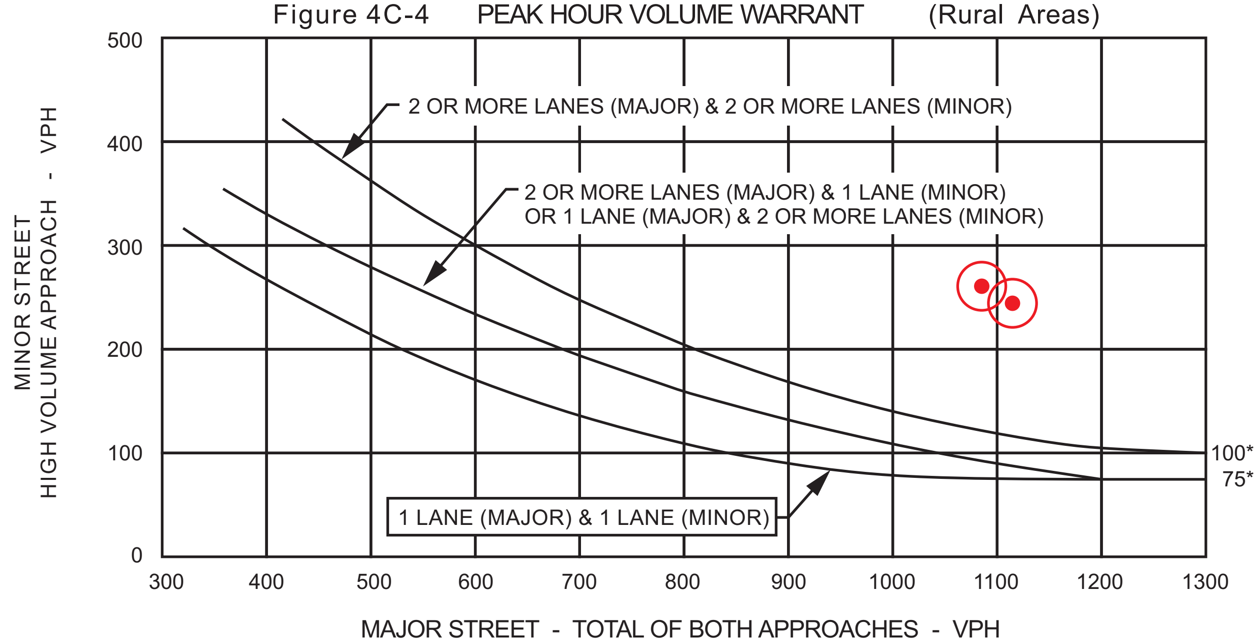
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1084	1115			
Highest Approaches - Minor Street	✓		261	243			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: TEMPERANCE Critical Approach Speed 45 mph

MINOR STREET: TULARE Critical Approach Speed 50 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

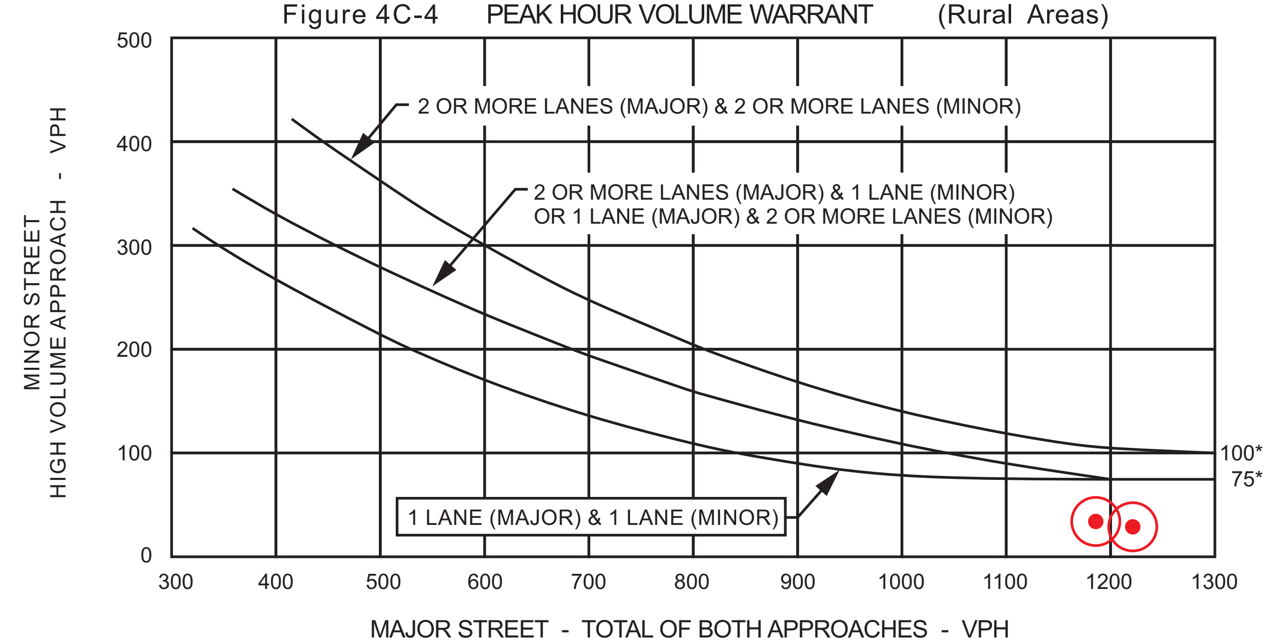
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES [ ] NO [X]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		1221	1186			
Highest Approaches - Minor Street	✓		28	33			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: SHIELDS Critical Approach Speed 45 mph

MINOR STREET: LOCAN Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- ☒ or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- ☐

☐ URBAN (U)

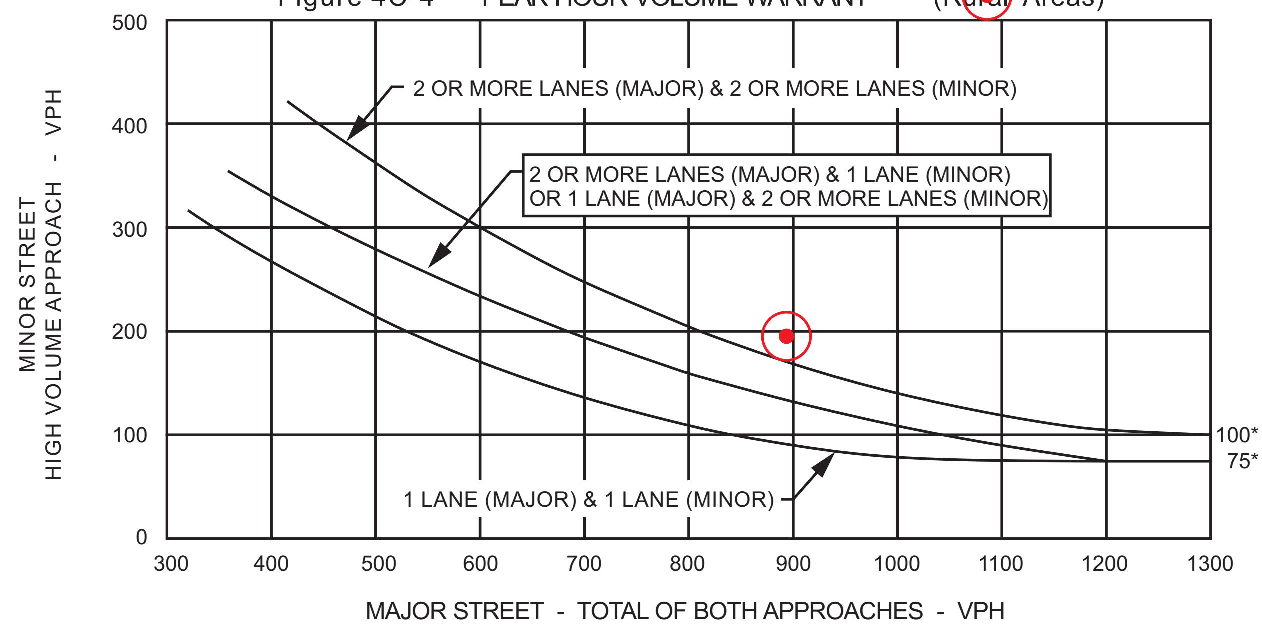
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	1096	894			
Highest Approaches - Minor Street	✓		524	196			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: DEWOLF/SHIELDS Critical Approach Speed 45 mph

MINOR STREET: SHIELDS/DEWOLF Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- ☒ or ☐ RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- ☐ URBAN (U)

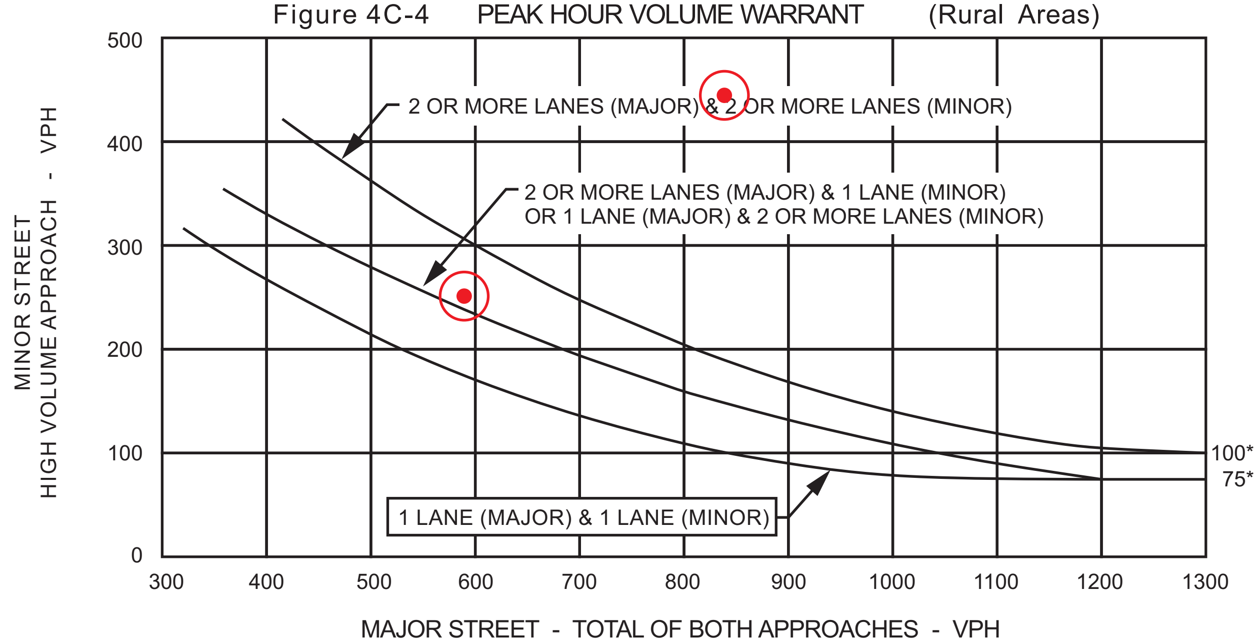
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES ☒ NO ☐

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		840	591			
Highest Approaches - Minor Street	✓		443	251			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: CLINTON Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

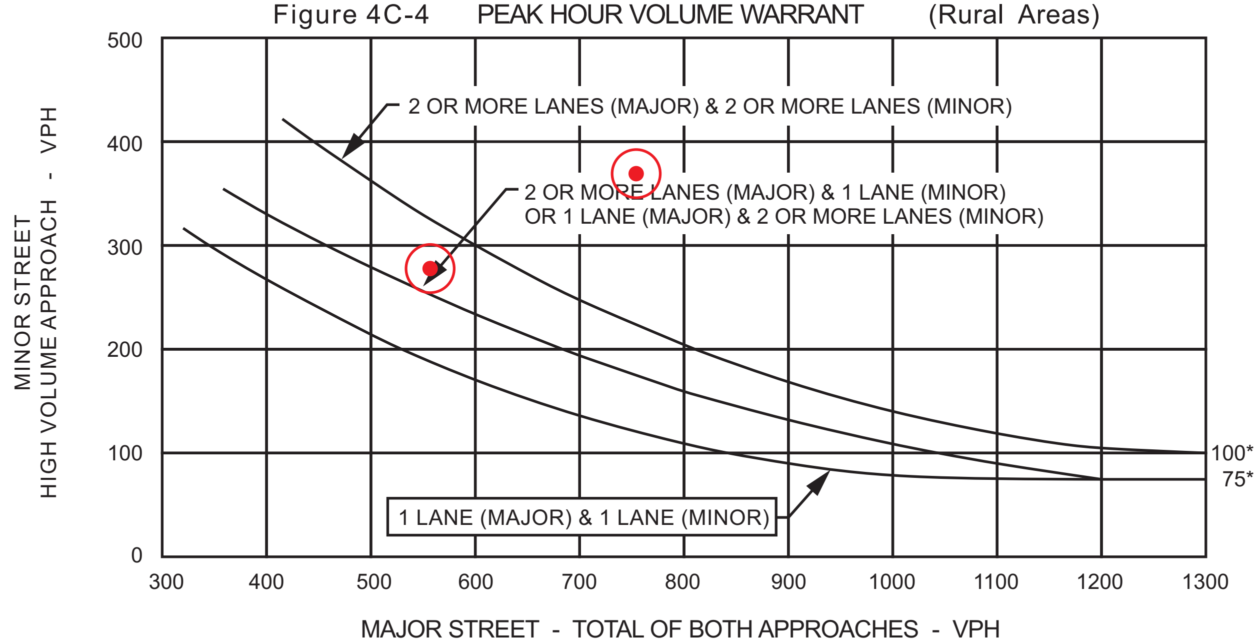
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street	✓		753	557			
Highest Approaches - Minor Street	✓		367	279			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

TRAFFIC SIGNAL WARRANTS

CALC R.D. DATE 02/11/19 CHK R.D. DATE 02/15/19

MAJOR STREET: ARMSTRONG Critical Approach Speed 45 mph

MINOR STREET: OLIVE Critical Approach Speed 45 mph

Critical speed of major street traffic > 40 mph ---------------- [X] or RURAL (R)

In built up area of isolated community of < 10,000 pop. --------- [ ]

[ ] URBAN (U)

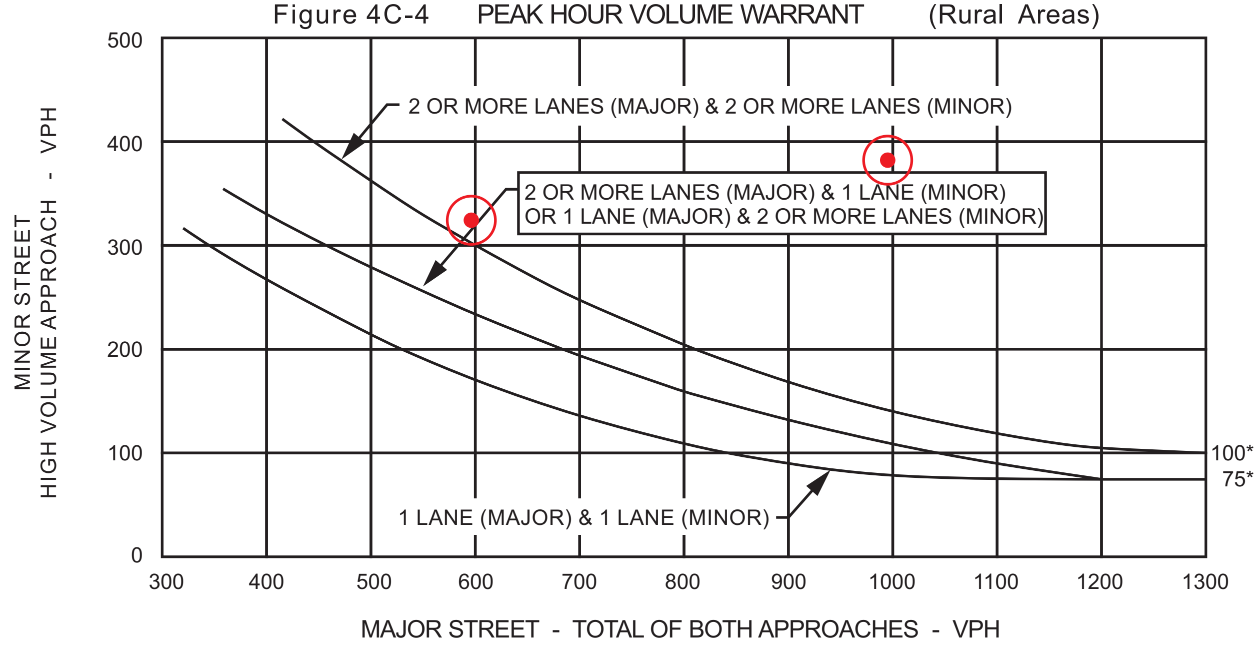
CONDITION: EXISTING (2018) + APPROVED/PENDING/PROPOSED PROJECTS + PROJECT

WARRANT 3 - Peak Hour Volume SATISFIED* YES [X] NO [ ]

Approach Lanes	One	2 or more	AM PEAK	PM PEAK			
Both Approaches - Major Street		✓	996	597			
Highest Approaches - Minor Street	✓		381	324			

* Refer to Fig. 4C-3 (URBAN AREAS) or Fig. 4C-4 (RURAL AREAS) to determine if this warrant is satisfied.

Figure 4C-4 PEAK HOUR VOLUME WARRANT (Rural Areas)



* NOTE: 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

The satisfaction of a warant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown.

APPENDIX L

MITIGATED EXISTING (2018) PLUS APPROVED/PENDING/PROPOSED PROJECTS PLUS PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	85	52	58	116	38	579	18	42	1014	132
v/c Ratio	0.55	0.17	0.45	0.39	0.38	0.33	0.02	0.18	0.50	0.14
Control Delay	69.3	16.9	68.3	12.7	57.3	22.4	0.1	49.0	21.6	2.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.3	16.9	68.3	12.7	57.3	22.4	0.1	49.0	21.6	2.4
Queue Length 50th (ft)	70	10	48	6	26	147	0	32	230	0
Queue Length 95th (ft)	110	34	72	27	m51	325	m0	55	361	12
Internal Link Dist (ft)		165		163		2549			254	
Turn Bay Length (ft)	200		200		250		250	255		250
Base Capacity (vph)	183	463	143	457	100	1921	913	234	2037	957
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.11	0.41	0.25	0.38	0.30	0.02	0.18	0.50	0.14

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	10	33	41	6	77	36	556	17	33	801	104
Future Volume (veh/h)	70	10	33	41	6	77	36	556	17	33	801	104
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		0.94	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	85	12	40	58	8	108	38	579	18	42	1014	132
Peak Hour Factor	0.82	0.82	0.82	0.71	0.71	0.71	0.96	0.96	0.96	0.79	0.79	0.79
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	50	168	83	12	166	63	727	323	783	2174	969
Arrive On Green	0.06	0.13	0.13	0.05	0.12	0.12	0.01	0.07	0.07	0.44	0.61	0.61
Sat Flow, veh/h	1781	378	1259	1781	105	1412	1781	3554	1581	1781	3554	1584
Grp Volume(v), veh/h	85	0	52	58	0	116	38	579	18	42	1014	132
Grp Sat Flow(s),veh/h/ln	1781	0	1637	1781	0	1516	1781	1777	1581	1781	1777	1584
Q Serve(g_s), s	6.1	0.0	3.7	4.2	0.0	9.5	2.8	20.9	1.2	1.8	20.2	2.8
Cycle Q Clear(g_c), s	6.1	0.0	3.7	4.2	0.0	9.5	2.8	20.9	1.2	1.8	20.2	2.8
Prop In Lane	1.00		0.77	1.00		0.93	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	107	0	218	83	0	178	63	727	323	783	2174	969
V/C Ratio(X)	0.79	0.00	0.24	0.70	0.00	0.65	0.60	0.80	0.06	0.05	0.47	0.14
Avail Cap(c_a), veh/h	177	0	436	136	0	369	85	1498	667	783	2174	969
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	0.81	0.81	0.81	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.3	0.0	50.5	61.1	0.0	54.8	63.3	57.9	33.8	20.9	13.7	4.1
Incr Delay (d2), s/veh	12.4	0.0	0.6	10.2	0.0	4.0	7.1	7.3	0.3	0.0	0.7	0.3
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(50%),veh/ln	3.1	0.0	1.5	2.1	0.0	3.8	1.4	10.7	0.6	0.7	7.5	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.7	0.0	51.0	71.2	0.0	58.8	70.5	65.2	34.1	20.9	14.4	4.3
LnGrp LOS	E	A	D	E	A	E	E	E	C	C	B	A
Approach Vol, veh/h		137			174			635			1188	
Approach Delay, s/veh		64.5			63.0			64.6			13.5	
Approach LOS		E			E			E			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	63.4	32.8	11.2	22.7	10.4	85.7	13.2	20.6
Change Period (Y+Rc), s	6.2	* 6.2	5.1	5.4	5.8	6.2	5.4	* 5.4
Max Green Setting (Gmax), s	8.2	* 55	9.9	34.6	6.2	56.8	12.9	* 32
Max Q Clear Time (g_c+I1), s	3.8	22.9	6.2	5.7	4.8	22.2	8.1	11.5
Green Ext Time (p_c), s	0.0	3.7	0.0	0.2	0.0	8.1	0.1	0.6

Intersection Summary	
HCM 6th Ctrl Delay	36.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	141	416	142	308	872	91	214	479	192	66	557	298
v/c Ratio	0.62	0.46	0.26	0.79	0.82	0.15	0.74	0.61	0.25	0.62	0.42	0.41
Control Delay	71.5	42.4	1.9	68.8	36.4	1.1	50.5	35.4	7.6	65.6	20.9	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	71.5	42.4	1.9	68.8	36.4	1.1	50.5	35.4	7.6	65.6	20.9	10.4
Queue Length 50th (ft)	60	156	0	98	387	8	79	429	34	56	200	131
Queue Length 95th (ft)	88	183	0	184	257	m0	m104	m494	m54	#110	59	11
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	237		138	235		113	241		100	229		228
Base Capacity (vph)	240	980	577	425	1170	633	305	784	754	113	1339	721
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.42	0.25	0.72	0.75	0.14	0.70	0.61	0.25	0.58	0.42	0.41

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	345	118	271	767	80	184	412	165	63	529	283
Future Volume (veh/h)	117	345	118	271	767	80	184	412	165	63	529	283
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	141	416	142	308	872	91	214	479	192	66	557	298
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.86	0.86	0.86	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	192	869	387	356	1037	463	267	686	582	205	1446	645
Arrive On Green	0.06	0.24	0.24	0.21	0.58	0.58	0.03	0.12	0.12	0.04	0.13	0.13
Sat Flow, veh/h	3456	3554	1582	3456	3554	1585	3456	1870	1585	1781	3554	1585
Grp Volume(v), veh/h	141	416	142	308	872	91	214	479	192	66	557	298
Grp Sat Flow(s),veh/h/ln	1728	1777	1582	1728	1777	1585	1728	1870	1585	1781	1777	1585
Q Serve(g_s), s	5.2	13.0	9.7	11.2	26.1	2.5	8.0	32.0	10.2	4.7	18.6	22.6
Cycle Q Clear(g_c), s	5.2	13.0	9.7	11.2	26.1	2.5	8.0	32.0	10.2	4.7	18.6	22.6
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	192	869	387	356	1037	463	267	686	582	205	1446	645
V/C Ratio(X)	0.73	0.48	0.37	0.87	0.84	0.20	0.80	0.70	0.33	0.32	0.39	0.46
Avail Cap(c_a), veh/h	242	984	438	428	1175	524	300	686	582	205	1446	645
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.71	0.71	0.71	0.55	0.55	0.55	0.86	0.86	0.86
Uniform Delay (d), s/veh	60.5	42.0	40.8	50.8	24.6	10.2	62.3	50.2	21.1	57.6	41.4	43.1
Incr Delay (d2), s/veh	5.8	1.6	2.2	9.7	5.5	0.6	6.5	3.3	0.8	0.3	0.7	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(50%),veh/ln	2.4	5.8	3.9	4.7	7.6	1.3	3.8	16.6	4.2	2.1	9.0	9.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.2	43.6	43.0	60.5	30.1	10.7	68.9	53.5	22.0	57.9	42.1	45.2
LnGrp LOS	E	D	D	E	C	B	E	D	C	E	D	D
Approach Vol, veh/h		699			1271			885			921	
Approach Delay, s/veh		48.0			36.1			50.4			44.2	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.8	58.9	12.1	43.2	20.9	53.7	18.3	37.1
Change Period (Y+Rc), s	5.7	6.0	4.9	5.3	6.0	* 6	4.9	5.3
Max Green Setting (Gmax), s	11.3	44.7	9.1	43.0	8.3	* 48	16.1	36.0
Max Q Clear Time (g_c+I1), s	10.0	24.6	7.2	28.1	6.7	34.0	13.2	15.0
Green Ext Time (p_c), s	0.1	8.1	0.0	9.9	0.0	5.3	0.2	7.0

Intersection Summary	
HCM 6th Ctrl Delay	43.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	45	153	106	497	53	533	94	268	868
v/c Ratio	0.42	0.31	0.97	0.96	0.50	0.80	0.15	0.96	1.01
Control Delay	71.2	36.1	138.4	71.1	79.3	42.9	3.9	88.7	54.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.2	36.1	138.4	71.1	79.3	42.9	3.9	88.7	54.1
Queue Length 50th (ft)	37	93	91	373	46	436	6	239	~840
Queue Length 95th (ft)	67	127	#121	304	m73	421	18	#363	#951
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	107	530	109	522	107	665	636	283	857
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.29	0.97	0.95	0.50	0.80	0.15	0.95	1.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	94	24	67	128	185	43	432	76	225	582	147
Future Volume (veh/h)	35	94	24	67	128	185	43	432	76	225	582	147
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	45	122	31	106	203	294	53	533	94	268	693	175
Peak Hour Factor	0.77	0.77	0.77	0.63	0.63	0.63	0.81	0.81	0.81	0.84	0.84	0.84
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	87	400	102	109	199	288	130	628	531	307	626	158
Arrive On Green	0.05	0.28	0.28	0.06	0.29	0.29	0.15	0.68	0.68	0.17	0.44	0.44
Sat Flow, veh/h	1767	1428	363	1767	680	984	1767	1856	1568	1767	1429	361
Grp Volume(v), veh/h	45	0	153	106	0	497	53	533	94	268	0	868
Grp Sat Flow(s),veh/h/ln	1767	0	1790	1767	0	1664	1767	1856	1568	1767	0	1790
Q Serve(g_s), s	3.2	0.0	8.7	7.8	0.0	38.0	3.5	28.4	2.3	19.2	0.0	57.0
Cycle Q Clear(g_c), s	3.2	0.0	8.7	7.8	0.0	38.0	3.5	28.4	2.3	19.2	0.0	57.0
Prop In Lane	1.00		0.20	1.00		0.59	1.00		1.00	1.00		0.20
Lane Grp Cap(c), veh/h	87	0	502	109	0	486	130	628	531	307	0	785
V/C Ratio(X)	0.52	0.00	0.31	0.97	0.00	1.02	0.41	0.85	0.18	0.87	0.00	1.11
Avail Cap(c_a), veh/h	109	0	523	109	0	486	130	628	531	307	0	785
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	0.96	0.00	0.96	1.00	0.00	1.00	0.72	0.72	0.72	0.85	0.00	0.85
Uniform Delay (d), s/veh	60.3	0.0	36.8	60.9	0.0	46.0	52.9	18.5	9.1	52.3	0.0	36.5
Incr Delay (d2), s/veh	1.7	0.0	0.9	77.7	0.0	46.4	0.5	10.1	0.5	19.6	0.0	63.2
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	1.5	0.0	3.9	5.8	0.0	21.5	1.5	7.9	1.0	10.0	0.0	37.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.9	0.0	37.7	138.6	0.0	92.4	53.4	28.6	9.6	71.9	0.0	99.7
LnGrp LOS	E	A	D	F	A	F	D	C	A	E	A	F
Approach Vol, veh/h		198			603			680			1136	
Approach Delay, s/veh		43.2			100.5			27.9			93.1	
Approach LOS		D			F			C			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.6	62.7	10.4	43.3	26.6	49.7	12.0	41.7
Change Period (Y+Rc), s	4.0	5.7	4.0	5.3	4.0	5.7	4.0	5.3
Max Green Setting (Gmax), s	8.0	57.0	8.0	38.0	21.0	44.0	8.0	38.0
Max Q Clear Time (g_c+I1), s	5.5	59.0	5.2	40.0	21.2	30.4	9.8	10.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	6.2	0.0	1.7

Intersection Summary		
HCM 6th Ctrl Delay		74.1
HCM 6th LOS		E

Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	183	602	80	771
v/c Ratio	0.59	0.65	0.39	0.62
Control Delay	20.2	15.9	26.0	5.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.2	15.9	26.0	5.3
Queue Length 50th (ft)	26	168	30	189
Queue Length 95th (ft)	59	281	m37	m132
Internal Link Dist (ft)	239	2603		2573
Turn Bay Length (ft)			250	
Base Capacity (vph)	323	931	206	1236
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.65	0.39	0.62

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	51	88	435	125	66	632
Future Volume (veh/h)	51	88	435	125	66	632
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1811	1811	1811	1811
Adj Flow Rate, veh/h	67	116	468	134	80	771
Peak Hour Factor	0.76	0.76	0.93	0.93	0.82	0.82
Percent Heavy Veh, %	0	0	6	6	6	6
Cap, veh/h	80	139	527	151	354	1239
Arrive On Green	0.14	0.14	0.39	0.39	0.41	1.00
Sat Flow, veh/h	583	1009	1354	388	1725	1811
Grp Volume(v), veh/h	184	0	0	602	80	771
Grp Sat Flow(s),veh/h/ln	1600	0	0	1741	1725	1811
Q Serve(g_s), s	7.3	0.0	0.0	21.0	2.0	0.0
Cycle Q Clear(g_c), s	7.3	0.0	0.0	21.0	2.0	0.0
Prop In Lane	0.36	0.63		0.22	1.00	
Lane Grp Cap(c), veh/h	220	0	0	678	354	1239
V/C Ratio(X)	0.84	0.00	0.00	0.89	0.23	0.62
Avail Cap(c_a), veh/h	227	0	0	836	354	1239
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	0.00	0.63	0.09	0.09
Uniform Delay (d), s/veh	27.3	0.0	0.0	18.5	15.8	0.0
Incr Delay (d2), s/veh	22.4	0.0	0.0	10.9	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.0	0.0	8.9	0.7	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	49.8	0.0	0.0	29.4	15.8	0.2
LnGrp LOS	D	A	A	C	B	A
Approach Vol, veh/h	184		602			851
Approach Delay, s/veh	49.8		29.4			1.7
Approach LOS	D		C			A

Timer - Assigned Phs	1	2	6	8
Phs Duration (G+Y+Rc), s	19.1	31.1	50.3	14.7
Change Period (Y+Rc), s	5.8	* 5.8	5.8	5.8
Max Green Setting (Gmax), s	7.6	* 31	44.2	9.2
Max Q Clear Time (g_c+I1), s	4.0	23.0	2.0	9.3
Green Ext Time (p_c), s	0.0	2.3	5.9	0.0

Intersection Summary	
HCM 6th Ctrl Delay	17.3
HCM 6th LOS	B

Notes
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	131	154	167	254	14	501	10	574	146
v/c Ratio	0.77	0.38	0.98	0.63	0.08	0.70	0.06	0.79	0.20
Control Delay	62.9	23.7	99.9	30.4	34.2	26.6	34.1	31.0	3.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.9	23.7	99.9	30.4	34.2	26.6	34.1	31.0	3.8
Queue Length 50th (ft)	50	48	66	87	5	149	4	183	0
Queue Length 95th (ft)	#149	89	#237	174	27	#473	22	#565	34
Internal Link Dist (ft)		2568		478		2539		2603	
Turn Bay Length (ft)	200		200		250		250		250
Base Capacity (vph)	171	756	171	757	171	717	171	723	715
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.20	0.98	0.34	0.08	0.70	0.06	0.79	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	98	98	17	145	193	28	13	432	44	9	540	137
Future Volume (veh/h)	98	98	17	145	193	28	13	432	44	9	540	137
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	131	131	23	167	222	32	14	455	46	10	574	146
Peak Hour Factor	0.75	0.75	0.75	0.87	0.87	0.87	0.95	0.95	0.95	0.94	0.94	0.94
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	165	272	48	167	283	41	39	636	64	29	701	594
Arrive On Green	0.09	0.18	0.18	0.10	0.18	0.18	0.02	0.39	0.39	0.02	0.38	0.38
Sat Flow, veh/h	1753	1525	268	1753	1573	227	1753	1645	166	1753	1841	1560
Grp Volume(v), veh/h	131	0	154	167	0	254	14	0	501	10	574	146
Grp Sat Flow(s),veh/h/ln	1753	0	1793	1753	0	1800	1753	0	1811	1753	1841	1560
Q Serve(g_s), s	5.1	0.0	5.4	6.6	0.0	9.3	0.5	0.0	16.3	0.4	19.5	4.4
Cycle Q Clear(g_c), s	5.1	0.0	5.4	6.6	0.0	9.3	0.5	0.0	16.3	0.4	19.5	4.4
Prop In Lane	1.00		0.15	1.00		0.13	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	165	0	320	167	0	324	39	0	700	29	701	594
V/C Ratio(X)	0.80	0.00	0.48	1.00	0.00	0.78	0.35	0.00	0.72	0.34	0.82	0.25
Avail Cap(c_a), veh/h	167	0	724	167	0	727	167	0	700	167	701	594
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	0.0	25.6	31.4	0.0	27.1	33.4	0.0	18.0	33.7	19.3	14.7
Incr Delay (d2), s/veh	22.7	0.0	1.1	69.9	0.0	4.2	5.3	0.0	6.2	6.8	10.3	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	3.0	0.0	2.2	5.8	0.0	4.0	0.3	0.0	6.9	0.2	9.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	53.5	0.0	26.7	101.3	0.0	31.3	38.7	0.0	24.2	40.5	29.7	15.7
LnGrp LOS	D	A	C	F	A	C	D	A	C	D	C	B
Approach Vol, veh/h		285			421			515			730	
Approach Delay, s/veh		39.0			59.1			24.6			27.0	
Approach LOS		D			E			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.6	32.6	12.0	18.2	7.0	32.2	11.9	18.3
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	6.6	26.4	6.6	28.0	6.6	26.4	6.6	28.0
Max Q Clear Time (g_c+I1), s	2.4	18.3	8.6	7.4	2.5	21.5	7.1	11.3
Green Ext Time (p_c), s	0.0	1.8	0.0	0.7	0.0	1.7	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	35.1
HCM 6th LOS	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	94	77	53	111	125	57	32	411	33	684
v/c Ratio	0.57	0.24	0.13	0.63	0.40	0.14	0.19	0.48	0.20	0.80
Control Delay	49.7	27.7	0.7	52.8	30.3	0.7	37.2	19.4	37.3	30.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	27.7	0.7	52.8	30.3	0.7	37.2	19.4	37.3	30.2
Queue Length 50th (ft)	35	26	0	42	44	0	12	102	12	211
Queue Length 95th (ft)	#105	58	0	#159	99	0	46	304	47	#676
Internal Link Dist (ft)		507			663			2371		2539
Turn Bay Length (ft)	250		250	250		250	250		250	
Base Capacity (vph)	166	662	669	176	662	669	166	858	166	855
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.12	0.08	0.63	0.19	0.09	0.19	0.48	0.20	0.80

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	60	41	99	111	51	29	345	29	31	596	54
Future Volume (veh/h)	73	60	41	99	111	51	29	345	29	31	596	54
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	94	77	53	111	125	57	32	379	32	33	627	57
Peak Hour Factor	0.78	0.78	0.78	0.89	0.89	0.89	0.91	0.91	0.91	0.95	0.95	0.95
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	145	225	190	154	233	198	78	688	58	80	683	62
Arrive On Green	0.08	0.12	0.12	0.09	0.13	0.13	0.04	0.41	0.41	0.05	0.41	0.41
Sat Flow, veh/h	1767	1856	1572	1767	1856	1572	1767	1687	142	1767	1672	152
Grp Volume(v), veh/h	94	77	53	111	125	57	32	0	411	33	0	684
Grp Sat Flow(s),veh/h/ln	1767	1856	1572	1767	1856	1572	1767	0	1830	1767	0	1824
Q Serve(g_s), s	3.4	2.5	2.0	4.0	4.2	2.2	1.2	0.0	11.3	1.2	0.0	23.4
Cycle Q Clear(g_c), s	3.4	2.5	2.0	4.0	4.2	2.2	1.2	0.0	11.3	1.2	0.0	23.4
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.08	1.00		0.08
Lane Grp Cap(c), veh/h	145	225	190	154	233	198	78	0	746	80	0	745
V/C Ratio(X)	0.65	0.34	0.28	0.72	0.54	0.29	0.41	0.00	0.55	0.41	0.00	0.92
Avail Cap(c_a), veh/h	177	702	595	177	702	595	177	0	814	177	0	812
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	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	29.4	26.6	26.4	29.4	27.1	26.2	30.7	0.0	14.9	30.7	0.0	18.5
Incr Delay (d2), s/veh	5.9	0.9	0.8	11.7	1.9	0.8	3.4	0.0	0.7	3.3	0.0	14.5
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(50%),veh/ln	1.6	1.1	0.7	2.1	1.8	0.8	0.5	0.0	4.0	0.5	0.0	11.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.3	27.5	27.2	41.1	29.0	27.0	34.1	0.0	15.6	34.0	0.0	33.0
LnGrp LOS	D	C	C	D	C	C	C	A	B	C	A	C
Approach Vol, veh/h		224			293			443			717	
Approach Delay, s/veh		30.7			33.2			16.9			33.1	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	32.7	11.1	13.8	8.3	32.8	10.8	14.1
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	6.6	29.4	6.6	25.0	6.6	29.4	6.6	25.0
Max Q Clear Time (g_c+I1), s	3.2	13.3	6.0	4.5	3.2	25.4	5.4	6.2
Green Ext Time (p_c), s	0.0	2.0	0.0	0.4	0.0	1.6	0.0	0.7

Intersection Summary		
HCM 6th Ctrl Delay		28.5
HCM 6th LOS		C

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	0	1	22	0	6	0	353	4	5	860	0
Future Vol, veh/h	0	0	1	22	0	6	0	353	4	5	860	0
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	25	25	25	79	79	79	90	90	90	89	89	89
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	0	0	4	28	0	8	0	392	4	6	966	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1376	1374	966	1374	1372	394	966	0	0	396	0	0
Stage 1	978	978	-	394	394	-	-	-	-	-	-	-
Stage 2	398	396	-	980	978	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.53	6.23	7.13	6.53	6.23	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.027	3.327	3.527	4.027	3.327	2.227	-	-	2.227	-	-
Pot Cap-1 Maneuver	122	145	307	122	145	653	709	-	-	1157	-	-
Stage 1	300	327	-	629	603	-	-	-	-	-	-	-
Stage 2	626	602	-	299	327	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	120	143	307	119	143	653	709	-	-	1157	-	-
Mov Cap-2 Maneuver	120	143	-	119	143	-	-	-	-	-	-	-
Stage 1	300	323	-	629	603	-	-	-	-	-	-	-
Stage 2	619	602	-	292	323	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.9	38	0	0
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	709	-	-	307	144	1157	-	-
HCM Lane V/C Ratio	-	-	-	0.013	0.246	0.005	-	-
HCM Control Delay (s)	0	-	-	16.9	38	8.1	0	-
HCM Lane LOS	A	-	-	C	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.9	0	-	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	159	434	65	650	16	171	32	117	409
v/c Ratio	0.69	0.61	0.21	0.80	0.17	0.22	0.29	0.14	0.43
Control Delay	48.9	31.5	30.9	36.8	62.2	21.5	64.6	25.2	4.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.9	31.5	30.9	36.8	62.2	21.5	64.6	25.2	4.5
Queue Length 50th (ft)	118	186	30	171	13	68	26	51	0
Queue Length 95th (ft)	192	215	m51	217	27	91	60	125	78
Internal Link Dist (ft)		2528		2598		168		294	
Turn Bay Length (ft)	250		250		200		273		273
Base Capacity (vph)	308	1302	324	993	96	789	109	872	958
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.33	0.20	0.65	0.17	0.22	0.29	0.13	0.43

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	349	24	53	488	45	10	52	57	30	110	384
Future Volume (veh/h)	137	349	24	53	488	45	10	52	57	30	110	384
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	159	406	28	65	595	55	16	81	90	32	117	409
Peak Hour Factor	0.86	0.86	0.86	0.82	0.82	0.82	0.64	0.64	0.63	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	188	516	35	275	674	62	40	97	108	696	920	779
Arrive On Green	0.03	0.05	0.05	0.31	0.41	0.41	0.02	0.12	0.12	0.39	0.49	0.49
Sat Flow, veh/h	1781	3374	232	1781	3289	304	1781	809	899	1781	1870	1585
Grp Volume(v), veh/h	159	213	221	65	321	329	16	0	171	32	117	409
Grp Sat Flow(s),veh/h/ln	1781	1777	1829	1781	1777	1816	1781	0	1709	1781	1870	1585
Q Serve(g_s), s	11.5	15.4	15.5	3.5	21.7	21.8	1.2	0.0	12.7	1.4	4.4	23.0
Cycle Q Clear(g_c), s	11.5	15.4	15.5	3.5	21.7	21.8	1.2	0.0	12.7	1.4	4.4	23.0
Prop In Lane	1.00		0.13	1.00		0.17	1.00		0.53	1.00		1.00
Lane Grp Cap(c), veh/h	188	272	280	275	364	372	40	0	205	696	920	779
V/C Ratio(X)	0.84	0.78	0.79	0.24	0.88	0.88	0.40	0.00	0.83	0.05	0.13	0.52
Avail Cap(c_a), veh/h	310	659	678	275	503	514	90	0	541	696	920	779
HCM Platoon Ratio	0.33	0.33	0.33	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.91	0.91	0.91	0.80	0.80	0.80	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.7	59.6	59.6	39.2	36.9	36.9	62.7	0.0	55.9	24.6	17.9	22.6
Incr Delay (d2), s/veh	9.8	4.5	4.5	0.3	10.6	10.7	6.5	0.0	31.1	0.0	0.3	2.5
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(50%),veh/ln	6.0	7.7	8.0	1.5	8.0	8.2	0.6	0.0	7.1	0.6	1.9	8.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.5	64.1	64.2	39.5	47.5	47.6	69.2	0.0	87.1	24.6	18.2	25.2
LnGrp LOS	E	E	E	D	D	D	E	A	F	C	B	C
Approach Vol, veh/h		593			715			187			558	
Approach Delay, s/veh		66.1			46.8			85.5			23.7	
Approach LOS		E			D			F			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	56.6	21.4	26.3	25.7	8.3	69.7	19.1	32.8				
Change Period (Y+Rc), s	5.8	* 5.8	6.2	* 5.8	5.4	5.8	5.4	6.2				
Max Green Setting (Gmax), s	6.6	* 41	11.2	* 48	6.6	41.2	22.6	36.8				
Max Q Clear Time (g_c+I1), s	3.4	14.7	5.5	17.5	3.2	25.0	13.5	23.8				
Green Ext Time (p_c), s	0.0	0.9	0.0	2.4	0.0	1.8	0.2	2.8				
Intersection Summary												
HCM 6th Ctrl Delay			49.6									
HCM 6th LOS			D									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	276	211	2	277	32	283	24	313	368
v/c Ratio	0.80	0.28	0.02	0.80	0.33	0.36	0.25	0.40	0.42
Control Delay	45.9	17.3	60.0	67.2	68.0	31.5	65.7	32.4	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.9	17.3	60.0	67.2	68.0	31.5	65.7	32.4	5.0
Queue Length 50th (ft)	62	28	2	223	26	173	20	196	0
Queue Length 95th (ft)	79	40	11	307	54	250	46	298	52
Internal Link Dist (ft)		2598		234		299		264	
Turn Bay Length (ft)	250		250		200		200		200
Base Capacity (vph)	438	823	84	438	98	787	95	786	880
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.63	0.26	0.02	0.63	0.33	0.36	0.25	0.40	0.42

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	251	180	12	2	243	15	25	221	2	20	263	309
Future Volume (veh/h)	251	180	12	2	243	15	25	221	2	20	263	309
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	276	198	13	2	261	16	32	280	3	24	313	368
Peak Hour Factor	0.91	0.91	0.91	0.93	0.93	0.93	0.79	0.79	0.79	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	306	590	39	6	294	18	395	829	9	52	474	402
Arrive On Green	0.17	0.34	0.34	0.00	0.17	0.17	0.22	0.45	0.45	0.03	0.25	0.25
Sat Flow, veh/h	1781	1736	114	1781	1744	107	1781	1847	20	1781	1870	1585
Grp Volume(v), veh/h	276	0	211	2	0	277	32	0	283	24	313	368
Grp Sat Flow(s),veh/h/ln	1781	0	1850	1781	0	1851	1781	0	1867	1781	1870	1585
Q Serve(g_s), s	19.7	0.0	11.0	0.1	0.0	19.0	1.9	0.0	12.8	1.7	19.5	29.3
Cycle Q Clear(g_c), s	19.7	0.0	11.0	0.1	0.0	19.0	1.9	0.0	12.8	1.7	19.5	29.3
Prop In Lane	1.00		0.06	1.00		0.06	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	306	0	629	6	0	312	395	0	838	52	474	402
V/C Ratio(X)	0.90	0.00	0.34	0.34	0.00	0.89	0.08	0.00	0.34	0.46	0.66	0.92
Avail Cap(c_a), veh/h	441	0	808	85	0	439	395	0	838	90	535	454
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)	0.78	0.00	0.78	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.8	0.0	32.0	64.6	0.0	52.8	40.1	0.0	23.3	62.1	43.5	47.2
Incr Delay (d2), s/veh	13.5	0.0	0.2	30.4	0.0	14.8	0.1	0.0	1.1	6.1	7.1	28.1
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(50%),veh/ln	9.7	0.0	4.8	0.1	0.0	9.8	0.8	0.0	5.7	0.9	9.7	14.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.3	0.0	32.2	95.1	0.0	67.6	40.2	0.0	24.4	68.2	50.6	75.3
LnGrp LOS	E	A	C	F	A	E	D	A	C	E	D	E
Approach Vol, veh/h		487			279			315			705	
Approach Delay, s/veh		51.5			67.8			26.0			64.1	
Approach LOS		D			E			C			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.2	64.1	6.2	50.4	34.6	38.7	28.5	28.1
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.8	* 5.8	6.2	* 6.2
Max Green Setting (Gmax), s	6.6	37.2	6.2	56.8	6.6	* 37	32.2	* 31
Max Q Clear Time (g_c+I1), s	3.7	14.8	2.1	13.0	3.9	31.3	21.7	21.0
Green Ext Time (p_c), s	0.0	1.4	0.0	1.1	0.0	1.6	0.6	0.9

Intersection Summary	
HCM 6th Ctrl Delay	54.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	60	131	136	354	25	240	56	610
v/c Ratio	0.36	0.32	0.69	0.71	0.15	0.34	0.33	0.79
Control Delay	43.1	23.7	58.7	33.6	39.3	21.5	42.5	32.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	23.7	58.7	33.6	39.3	21.5	42.5	32.5
Queue Length 50th (ft)	25	40	60	138	10	89	24	225
Queue Length 95th (ft)	67	87	#153	211	31	129	65	#512
Internal Link Dist (ft)		176		2597		70		117
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	168	665	198	667	168	775	168	775
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.20	0.69	0.53	0.15	0.31	0.33	0.79

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	84	25	102	218	47	18	153	22	47	443	70
Future Volume (veh/h)	50	84	25	102	218	47	18	153	22	47	443	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	60	101	30	136	291	63	25	210	30	56	527	83
Peak Hour Factor	0.83	0.83	0.83	0.75	0.75	0.75	0.73	0.73	0.73	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	113	284	84	160	345	75	64	542	77	109	574	90
Arrive On Green	0.06	0.21	0.21	0.09	0.23	0.23	0.04	0.34	0.34	0.06	0.36	0.36
Sat Flow, veh/h	1781	1385	411	1781	1490	323	1781	1601	229	1781	1577	248
Grp Volume(v), veh/h	60	0	131	136	0	354	25	0	240	56	0	610
Grp Sat Flow(s),veh/h/ln	1781	0	1796	1781	0	1812	1781	0	1829	1781	0	1826
Q Serve(g_s), s	2.4	0.0	4.6	5.5	0.0	13.7	1.0	0.0	7.3	2.2	0.0	23.4
Cycle Q Clear(g_c), s	2.4	0.0	4.6	5.5	0.0	13.7	1.0	0.0	7.3	2.2	0.0	23.4
Prop In Lane	1.00		0.23	1.00		0.18	1.00		0.13	1.00		0.14
Lane Grp Cap(c), veh/h	113	0	368	160	0	420	64	0	620	109	0	665
V/C Ratio(X)	0.53	0.00	0.36	0.85	0.00	0.84	0.39	0.00	0.39	0.51	0.00	0.92
Avail Cap(c_a), veh/h	160	0	616	160	0	622	160	0	727	160	0	726
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.3	0.0	25.0	32.9	0.0	27.0	34.6	0.0	18.5	33.4	0.0	22.3
Incr Delay (d2), s/veh	3.8	0.0	0.6	32.7	0.0	6.9	3.8	0.0	0.4	3.7	0.0	15.8
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	1.1	0.0	1.8	3.7	0.0	6.1	0.5	0.0	2.8	1.0	0.0	11.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.2	0.0	25.6	65.6	0.0	33.8	38.5	0.0	18.9	37.1	0.0	38.1
LnGrp LOS	D	A	C	E	A	C	D	A	B	D	A	D
Approach Vol, veh/h		191			490			265			666	
Approach Delay, s/veh		29.2			42.6			20.7			38.0	
Approach LOS		C			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.9	30.7	12.0	20.9	8.0	32.5	10.1	22.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	6.6	29.2	6.6	25.2	6.6	29.2	6.6	25.2
Max Q Clear Time (g_c+I1), s	4.2	9.3	7.5	6.6	3.0	25.4	4.4	15.7
Green Ext Time (p_c), s	0.0	1.1	0.0	0.5	0.0	1.3	0.0	1.3

Intersection Summary		
HCM 6th Ctrl Delay		35.6
HCM 6th LOS		D

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	51	137	125	352	99	225	165	33	289	472
v/c Ratio	0.27	0.31	0.54	0.65	0.55	0.32	0.23	0.18	0.62	0.67
Control Delay	39.0	24.4	46.1	29.3	49.1	21.7	5.4	38.1	31.0	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.0	24.4	46.1	29.3	49.1	21.7	5.4	38.1	31.0	10.0
Queue Length 50th (ft)	22	48	55	142	44	65	0	14	115	21
Queue Length 95th (ft)	65	102	#141	218	#90	124	17	43	197	80
Internal Link Dist (ft)		2563		2568		323			652	
Turn Bay Length (ft)	200		200		200		200	200		424
Base Capacity (vph)	189	806	231	821	181	770	751	181	748	881
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.17	0.54	0.43	0.55	0.29	0.22	0.18	0.39	0.54

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	46	116	7	100	255	26	68	155	114	27	240	392
Future Volume (veh/h)	46	116	7	100	255	26	68	155	114	27	240	392
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	51	129	8	125	319	32	99	225	165	33	289	472
Peak Hour Factor	0.90	0.90	0.90	0.80	0.80	0.80	0.69	0.69	0.69	0.83	0.83	0.83
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	109	345	21	158	385	39	140	676	573	79	612	519
Arrive On Green	0.06	0.20	0.20	0.09	0.23	0.23	0.08	0.36	0.36	0.04	0.33	0.33
Sat Flow, veh/h	1781	1743	108	1781	1672	168	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	51	0	137	125	0	351	99	225	165	33	289	472
Grp Sat Flow(s),veh/h/ln	1781	0	1851	1781	0	1840	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	2.0	0.0	4.7	5.0	0.0	13.2	4.0	6.4	5.4	1.3	9.0	20.8
Cycle Q Clear(g_c), s	2.0	0.0	4.7	5.0	0.0	13.2	4.0	6.4	5.4	1.3	9.0	20.8
Prop In Lane	1.00		0.06	1.00		0.09	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	109	0	367	158	0	423	140	676	573	79	612	519
V/C Ratio(X)	0.47	0.00	0.37	0.79	0.00	0.83	0.71	0.33	0.29	0.42	0.47	0.91
Avail Cap(c_a), veh/h	169	0	711	186	0	722	161	676	573	161	662	561
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.1	0.0	25.3	32.5	0.0	26.7	32.8	16.9	16.6	33.9	19.5	23.5
Incr Delay (d2), s/veh	3.1	0.0	0.6	17.6	0.0	4.2	11.4	0.3	0.3	3.5	0.6	18.1
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(50%),veh/ln	0.9	0.0	2.0	2.8	0.0	5.7	2.0	2.4	1.8	0.6	3.5	9.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.2	0.0	25.9	50.2	0.0	30.9	44.1	17.2	16.8	37.4	20.1	41.6
LnGrp LOS	D	A	C	D	A	C	D	B	B	D	C	D
Approach Vol, veh/h		188			476			489			794	
Approach Delay, s/veh		28.7			36.0			22.5			33.6	
Approach LOS		C			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.6	32.1	11.9	20.2	11.1	29.6	9.5	22.6
Change Period (Y+Rc), s	5.4	5.8	5.4	* 5.8	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	6.6	25.8	7.6	* 28	6.6	25.8	6.9	28.6
Max Q Clear Time (g_c+I1), s	3.3	8.4	7.0	6.7	6.0	22.8	4.0	15.2
Green Ext Time (p_c), s	0.0	1.5	0.0	0.6	0.0	1.1	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	30.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	48	69	10	58	38	670	33	65	496	61
v/c Ratio	0.15	0.12	0.03	0.14	0.11	0.33	0.03	0.20	0.23	0.06
Control Delay	33.2	11.3	33.8	10.3	31.9	18.9	0.1	33.1	17.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.2	11.3	33.8	10.3	31.9	18.9	0.1	33.1	17.0	0.1
Queue Length 50th (ft)	17	8	4	3	14	122	0	24	56	0
Queue Length 95th (ft)	58	37	22	30	53	256	0	80	186	0
Internal Link Dist (ft)		165		163		2549			254	
Turn Bay Length (ft)	200		200		250		250	255		250
Base Capacity (vph)	321	1125	321	1077	345	2036	982	330	2120	1036
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.15	0.06	0.03	0.05	0.11	0.33	0.03	0.20	0.23	0.06

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	24	33	9	7	46	36	643	32	60	456	56
Future Volume (veh/h)	40	24	33	9	7	46	36	643	32	60	456	56
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		0.98	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	48	29	40	10	8	50	38	670	33	65	496	61
Peak Hour Factor	0.83	0.83	0.83	0.92	0.92	0.92	0.96	0.96	0.96	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	136	136	188	37	29	182	251	970	423	165	771	344
Arrive On Green	0.08	0.19	0.19	0.02	0.13	0.13	0.14	0.27	0.27	0.09	0.22	0.22
Sat Flow, veh/h	1781	712	982	1781	223	1396	1781	3554	1551	1781	3554	1585
Grp Volume(v), veh/h	48	0	69	10	0	58	38	670	33	65	496	61
Grp Sat Flow(s),veh/h/ln	1781	0	1694	1781	0	1619	1781	1777	1551	1781	1777	1585
Q Serve(g_s), s	1.4	0.0	1.8	0.3	0.0	1.7	1.0	9.0	0.8	1.8	6.8	1.7
Cycle Q Clear(g_c), s	1.4	0.0	1.8	0.3	0.0	1.7	1.0	9.0	0.8	1.8	6.8	1.7
Prop In Lane	1.00		0.58	1.00		0.86	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	136	0	325	37	0	211	251	970	423	165	771	344
V/C Ratio(X)	0.35	0.00	0.21	0.27	0.00	0.27	0.15	0.69	0.08	0.39	0.64	0.18
Avail Cap(c_a), veh/h	267	0	985	267	0	942	267	1687	736	274	1700	758
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.4	0.0	18.2	25.7	0.0	20.9	20.1	17.4	14.4	22.8	19.0	17.0
Incr Delay (d2), s/veh	1.6	0.0	0.3	3.9	0.0	0.7	0.3	0.9	0.1	1.5	0.9	0.2
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	0.6	0.0	0.6	0.2	0.0	0.6	0.4	3.0	0.3	0.7	2.3	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.9	0.0	18.5	29.6	0.0	21.6	20.4	18.3	14.5	24.3	19.9	17.2
LnGrp LOS	C	A	B	C	A	C	C	B	B	C	B	B
Approach Vol, veh/h		117			68			741			622	
Approach Delay, s/veh		21.1			22.8			18.2			20.1	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	20.7	6.2	15.6	13.7	17.8	9.5	12.3
Change Period (Y+Rc), s	5.8	6.2	5.1	5.4	6.2	* 6.2	5.4	* 5.4
Max Green Setting (Gmax), s	8.2	25.3	8.0	31.0	8.0	* 26	8.0	* 31
Max Q Clear Time (g_c+I1), s	3.8	11.0	2.3	3.8	3.0	8.8	3.4	3.7
Green Ext Time (p_c), s	0.0	3.5	0.0	0.3	0.0	2.8	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	19.4
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	211	688	133	167	380	67	162	514	220	106	360	101
v/c Ratio	0.43	0.72	0.25	0.65	0.54	0.15	0.63	0.79	0.32	0.65	0.28	0.15
Control Delay	46.6	40.1	4.9	62.2	40.9	0.7	61.2	42.8	5.1	67.1	26.2	0.4
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	46.6	40.1	4.9	62.2	40.9	0.7	61.2	42.8	5.1	67.1	26.2	0.4
Queue Length 50th (ft)	67	225	0	58	127	0	56	315	1	71	92	0
Queue Length 95th (ft)	110	260	26	#105	154	0	#104	#537	55	#154	140	0
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	494	1211	639	256	1155	616	256	649	694	164	1267	685
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.57	0.21	0.65	0.33	0.11	0.63	0.79	0.32	0.65	0.28	0.15

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	571	110	147	334	59	151	478	205	93	317	89
Future Volume (veh/h)	175	571	110	147	334	59	151	478	205	93	317	89
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	211	688	133	167	380	67	162	514	220	106	360	101
Peak Hour Factor	0.83	0.83	0.83	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	625	974	435	253	611	273	253	644	546	147	1257	559
Arrive On Green	0.18	0.27	0.27	0.07	0.17	0.17	0.07	0.34	0.34	0.08	0.35	0.35
Sat Flow, veh/h	3456	3554	1585	3456	3554	1585	3456	1870	1585	1781	3554	1581
Grp Volume(v), veh/h	211	688	133	167	380	67	162	514	220	106	360	101
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1585	1728	1870	1585	1781	1777	1581
Q Serve(g_s), s	5.8	18.9	5.3	5.1	10.8	4.0	4.9	27.0	8.3	6.3	7.9	4.8
Cycle Q Clear(g_c), s	5.8	18.9	5.3	5.1	10.8	4.0	4.9	27.0	8.3	6.3	7.9	4.8
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	625	974	435	253	611	273	253	644	546	147	1257	559
V/C Ratio(X)	0.34	0.71	0.31	0.66	0.62	0.25	0.64	0.80	0.40	0.72	0.29	0.18
Avail Cap(c_a), veh/h	625	1201	536	255	1146	511	255	644	546	164	1257	559
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	38.8	35.5	17.1	49.0	41.7	38.8	48.9	32.2	14.1	48.6	25.2	24.2
Incr Delay (d2), s/veh	0.1	3.7	1.5	4.9	3.9	1.8	4.1	9.9	2.2	10.3	0.6	0.7
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(50%),veh/ln	2.4	8.3	2.8	2.3	4.9	1.6	2.2	13.3	4.3	3.1	3.2	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.9	39.2	18.6	53.9	45.6	40.6	53.0	42.1	16.3	58.9	25.8	24.9
LnGrp LOS	D	D	B	D	D	D	D	D	B	E	C	C
Approach Vol, veh/h		1032			614			896			567	
Approach Delay, s/veh		36.5			47.3			37.7			31.8	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.6	44.4	25.5	24.0	15.6	43.4	13.8	35.7
Change Period (Y+Rc), s	6.7	6.0	5.9	5.3	6.7	* 6	5.9	* 5.9
Max Green Setting (Gmax), s	8.0	38.4	9.7	35.0	10.0	* 37	8.0	* 37
Max Q Clear Time (g_c+I1), s	6.9	9.9	7.8	12.8	8.3	29.0	7.1	20.9
Green Ext Time (p_c), s	0.0	4.9	0.1	5.9	0.0	4.1	0.0	8.8

Intersection Summary	
HCM 6th Ctrl Delay	38.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	121	86	28	80	45	718	52	65	566
v/c Ratio	0.73	0.23	0.19	0.28	0.30	0.74	0.06	0.43	0.56
Control Delay	71.4	20.8	48.9	16.2	51.3	28.0	0.1	55.5	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	71.4	20.8	48.9	16.2	51.3	28.0	0.1	55.5	21.7
Queue Length 50th (ft)	71	21	15	11	25	325	0	37	226
Queue Length 95th (ft)	#224	65	45	37	74	#816	0	#105	533
Internal Link Dist (ft)		2597		155		2573			2580
Turn Bay Length (ft)	51		200		251		151	151	
Base Capacity (vph)	165	704	150	687	150	973	903	150	1007
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.73	0.12	0.19	0.12	0.30	0.74	0.06	0.43	0.56

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	41	38	22	16	46	41	661	48	60	465	61
Future Volume (veh/h)	111	41	38	22	16	46	41	661	48	60	465	61
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	121	45	41	28	21	59	45	718	52	65	500	66
Peak Hour Factor	0.92	0.92	0.92	0.78	0.78	0.78	0.92	0.92	0.92	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	150	135	123	79	37	104	105	956	810	124	798	105
Arrive On Green	0.08	0.15	0.15	0.04	0.09	0.09	0.06	0.51	0.51	0.07	0.49	0.49
Sat Flow, veh/h	1781	901	821	1781	433	1218	1781	1870	1585	1781	1618	214
Grp Volume(v), veh/h	121	0	86	28	0	80	45	718	52	65	0	566
Grp Sat Flow(s),veh/h/ln	1781	0	1723	1781	0	1651	1781	1870	1585	1781	0	1832
Q Serve(g_s), s	6.2	0.0	4.2	1.4	0.0	4.3	2.3	28.4	1.5	3.3	0.0	21.2
Cycle Q Clear(g_c), s	6.2	0.0	4.2	1.4	0.0	4.3	2.3	28.4	1.5	3.3	0.0	21.2
Prop In Lane	1.00		0.48	1.00		0.74	1.00		1.00	1.00		0.12
Lane Grp Cap(c), veh/h	150	0	258	79	0	141	105	956	810	124	0	903
V/C Ratio(X)	0.81	0.00	0.33	0.36	0.00	0.57	0.43	0.75	0.06	0.52	0.00	0.63
Avail Cap(c_a), veh/h	153	0	683	153	0	655	153	956	810	153	0	903
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.0	0.0	35.5	43.3	0.0	41.0	42.4	18.1	11.5	41.9	0.0	17.4
Incr Delay (d2), s/veh	24.1	0.0	2.1	1.0	0.0	9.6	1.0	5.4	0.2	1.3	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(50%),veh/ln	3.6	0.0	1.8	0.6	0.0	2.1	1.0	12.1	0.5	1.4	0.0	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.0	0.0	37.6	44.3	0.0	50.6	43.4	23.5	11.7	43.2	0.0	20.6
LnGrp LOS	E	A	D	D	A	D	D	C	B	D	A	C
Approach Vol, veh/h		207			108			815			631	
Approach Delay, s/veh		54.2			49.0			23.9			23.0	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.2	52.7	14.2	14.2	10.5	54.4	8.1	20.3
Change Period (Y+Rc), s	6.7	* 6.7	6.3	* 6.3	4.0	6.7	4.0	6.3
Max Green Setting (Gmax), s	8.0	* 46	8.0	* 37	8.0	46.0	8.0	37.0
Max Q Clear Time (g_c+I1), s	4.3	23.2	8.2	6.3	5.3	30.4	3.4	6.2
Green Ext Time (p_c), s	0.0	8.2	0.0	0.8	0.0	8.7	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	28.7
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	WBL	NBT	SBL	SBT
Lane Group Flow (vph)	102	858	70	486
v/c Ratio	0.34	0.76	0.36	0.35
Control Delay	20.1	22.3	39.4	6.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.1	22.3	39.4	6.2
Queue Length 50th (ft)	23	301	30	62
Queue Length 95th (ft)	61	#767	81	210
Internal Link Dist (ft)	239	2603		2573
Turn Bay Length (ft)			250	
Base Capacity (vph)	612	1133	198	1406
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.17	0.76	0.35	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	48	43	710	71	65	452
Future Volume (veh/h)	48	43	710	71	65	452
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1870	1870	1870	1870
Adj Flow Rate, veh/h	54	48	780	78	70	486
Peak Hour Factor	0.89	0.89	0.91	0.91	0.93	0.93
Percent Heavy Veh, %	0	0	2	2	2	2
Cap, veh/h	95	85	877	88	162	1315
Arrive On Green	0.11	0.11	0.52	0.52	0.09	0.70
Sat Flow, veh/h	883	785	1673	167	1781	1870
Grp Volume(v), veh/h	103	0	0	858	70	486
Grp Sat Flow(s),veh/h/ln	1685	0	0	1840	1781	1870
Q Serve(g_s), s	3.6	0.0	0.0	25.5	2.3	6.4
Cycle Q Clear(g_c), s	3.6	0.0	0.0	25.5	2.3	6.4
Prop In Lane	0.52	0.47		0.09	1.00	
Lane Grp Cap(c), veh/h	182	0	0	964	162	1315
V/C Ratio(X)	0.57	0.00	0.00	0.89	0.43	0.37
Avail Cap(c_a), veh/h	687	0	0	1194	238	1629
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.0	0.0	0.0	13.0	26.4	3.7
Incr Delay (d2), s/veh	2.8	0.0	0.0	7.3	1.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	9.3	0.9	1.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.8	0.0	0.0	20.3	28.2	3.8
LnGrp LOS	C	A	A	C	C	A
Approach Vol, veh/h	103		858			556
Approach Delay, s/veh	28.8		20.3			6.9
Approach LOS	C		C			A

Timer - Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	11.0	37.9				48.9		12.4
Change Period (Y+Rc), s	5.4	5.8				5.8		5.8
Max Green Setting (Gmax), s	8.2	39.8				53.4		25.0
Max Q Clear Time (g_c+I1), s	4.3	27.5				8.4		5.6
Green Ext Time (p_c), s	0.0	4.6				3.0		0.2

Intersection Summary	
HCM 6th Ctrl Delay	16.0
HCM 6th LOS	B

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	133	117	60	74	9	775	30	417	84
v/c Ratio	0.71	0.42	0.38	0.30	0.06	0.79	0.19	0.38	0.09
Control Delay	65.6	39.8	52.8	37.8	47.1	29.4	48.5	15.0	1.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.6	39.8	52.8	37.8	47.1	29.4	48.5	15.0	1.2
Queue Length 50th (ft)	81	65	36	39	5	404	18	113	0
Queue Length 95th (ft)	#218	117	89	79	24	#853	53	332	10
Internal Link Dist (ft)		2568		478		2539		2603	
Turn Bay Length (ft)	200		200		250		250		250
Base Capacity (vph)	187	599	158	567	156	983	156	1097	985
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.20	0.38	0.13	0.06	0.79	0.19	0.38	0.09

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	126	98	13	55	57	10	8	654	67	28	392	79
Future Volume (veh/h)	126	98	13	55	57	10	8	654	67	28	392	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	133	103	14	60	63	11	9	703	72	30	417	84
Peak Hour Factor	0.95	0.95	0.95	0.91	0.91	0.91	0.93	0.93	0.93	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	171	199	27	132	157	27	32	782	80	87	934	792
Arrive On Green	0.10	0.12	0.12	0.07	0.10	0.10	0.02	0.47	0.47	0.05	0.50	0.50
Sat Flow, veh/h	1781	1612	219	1781	1551	271	1781	1669	171	1781	1870	1585
Grp Volume(v), veh/h	133	0	117	60	0	74	9	0	775	30	417	84
Grp Sat Flow(s),veh/h/ln	1781	0	1831	1781	0	1822	1781	0	1840	1781	1870	1585
Q Serve(g_s), s	5.7	0.0	4.7	2.5	0.0	3.0	0.4	0.0	30.4	1.3	11.3	2.2
Cycle Q Clear(g_c), s	5.7	0.0	4.7	2.5	0.0	3.0	0.4	0.0	30.4	1.3	11.3	2.2
Prop In Lane	1.00		0.12	1.00		0.15	1.00		0.09	1.00		1.00
Lane Grp Cap(c), veh/h	171	0	226	132	0	185	32	0	862	87	934	792
V/C Ratio(X)	0.78	0.00	0.52	0.45	0.00	0.40	0.28	0.00	0.90	0.34	0.45	0.11
Avail Cap(c_a), veh/h	218	0	687	184	0	649	181	0	1100	181	1118	948
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.7	0.0	32.3	34.9	0.0	33.1	38.1	0.0	19.2	36.2	12.7	10.4
Incr Delay (d2), s/veh	12.6	0.0	1.8	2.4	0.0	1.4	4.6	0.0	8.4	2.3	0.3	0.1
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(50%),veh/ln	2.9	0.0	2.1	1.1	0.0	1.3	0.2	0.0	12.8	0.6	4.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.3	0.0	34.1	37.3	0.0	34.5	42.7	0.0	27.6	38.5	13.0	10.5
LnGrp LOS	D	A	C	D	A	C	D	A	C	D	B	B
Approach Vol, veh/h		250			134			784			531	
Approach Delay, s/veh		41.2			35.7			27.8			14.0	
Approach LOS		D			D			C			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.2	42.6	11.2	15.5	6.8	45.1	13.0	13.8				
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8				
Max Green Setting (Gmax), s	8.0	47.0	8.1	29.5	8.0	47.0	9.6	28.0				
Max Q Clear Time (g_c+I1), s	3.3	32.4	4.5	6.7	2.4	13.3	7.7	5.0				
Green Ext Time (p_c), s	0.0	4.4	0.0	0.5	0.0	2.7	0.1	0.3				
Intersection Summary												
HCM 6th Ctrl Delay			26.1									
HCM 6th LOS			C									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	89	134	38	48	85	45	7	739	61	471
v/c Ratio	0.54	0.41	0.10	0.30	0.32	0.13	0.04	0.81	0.38	0.44
Control Delay	55.6	38.0	0.5	47.4	38.5	0.8	43.0	32.3	49.5	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.6	38.0	0.5	47.4	38.5	0.8	43.0	32.3	49.5	15.6
Queue Length 50th (ft)	50	74	0	27	46	0	4	378	34	134
Queue Length 95th (ft)	#129	128	0	70	88	0	18	#701	82	358
Internal Link Dist (ft)		507			663			2371		2539
Turn Bay Length (ft)	250		250	250		250	250		250	
Base Capacity (vph)	167	539	548	161	532	553	161	909	163	1071
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.25	0.07	0.30	0.16	0.08	0.04	0.81	0.37	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	83	125	35	44	78	41	6	590	46	54	381	38
Future Volume (veh/h)	83	125	35	44	78	41	6	590	46	54	381	38
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		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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	89	134	38	48	85	45	7	686	53	61	428	43
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.86	0.86	0.86	0.89	0.89	0.89
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	234	194	119	194	164	26	759	59	135	842	85
Arrive On Green	0.09	0.13	0.13	0.07	0.10	0.10	0.01	0.44	0.44	0.08	0.50	0.50
Sat Flow, veh/h	1781	1870	1549	1781	1870	1585	1781	1714	132	1781	1672	168
Grp Volume(v), veh/h	89	134	38	48	85	45	7	0	739	61	0	471
Grp Sat Flow(s),veh/h/ln	1781	1870	1549	1781	1870	1585	1781	0	1847	1781	0	1840
Q Serve(g_s), s	3.7	5.2	1.7	2.0	3.3	2.0	0.3	0.0	28.7	2.5	0.0	13.2
Cycle Q Clear(g_c), s	3.7	5.2	1.7	2.0	3.3	2.0	0.3	0.0	28.7	2.5	0.0	13.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.07	1.00		0.09
Lane Grp Cap(c), veh/h	157	234	194	119	194	164	26	0	817	135	0	927
V/C Ratio(X)	0.57	0.57	0.20	0.40	0.44	0.27	0.27	0.00	0.90	0.45	0.00	0.51
Avail Cap(c_a), veh/h	191	613	507	185	605	513	185	0	985	187	0	984
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	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.8	31.8	30.3	34.6	32.5	31.9	37.7	0.0	20.0	34.2	0.0	12.8
Incr Delay (d2), s/veh	3.2	2.2	0.5	2.2	1.6	0.9	5.6	0.0	10.2	2.4	0.0	0.4
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	1.6	2.3	0.6	0.9	1.5	0.8	0.2	0.0	12.7	1.1	0.0	4.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	34.0	30.8	36.8	34.1	32.8	43.2	0.0	30.2	36.5	0.0	13.2
LnGrp LOS	D	C	C	D	C	C	D	A	C	D	A	B
Approach Vol, veh/h		261			178			746			532	
Approach Delay, s/veh		34.6			34.5			30.4			15.9	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	40.0	10.5	15.5	6.5	44.7	12.2	13.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.1	41.2	8.0	25.3	8.0	41.3	8.3	25.0
Max Q Clear Time (g_c+I1), s	4.5	30.7	4.0	7.2	2.3	15.2	5.7	5.3
Green Ext Time (p_c), s	0.0	3.5	0.0	0.6	0.0	2.8	0.0	0.4

Intersection Summary		
HCM 6th Ctrl Delay		26.9
HCM 6th LOS		C

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	2	0	0	22	0	11	1	676	35	2	472	0
Future Vol, veh/h	2	0	0	22	0	11	1	676	35	2	472	0
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	25	25	25	72	72	72	93	93	93	87	87	87
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	8	0	0	31	0	15	1	727	38	2	543	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1303	1314	543	1295	1295	746	543	0	0	765	0	0
Stage 1	547	547	-	748	748	-	-	-	-	-	-	-
Stage 2	756	767	-	547	547	-	-	-	-	-	-	-
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	138	158	540	139	162	413	1026	-	-	848	-	-
Stage 1	521	517	-	404	420	-	-	-	-	-	-	-
Stage 2	400	411	-	521	517	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	132	157	540	138	161	413	1026	-	-	848	-	-
Mov Cap-2 Maneuver	132	157	-	138	161	-	-	-	-	-	-	-
Stage 1	520	515	-	403	419	-	-	-	-	-	-	-
Stage 2	384	410	-	519	515	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	34	32.3	0	0
HCM LOS	D	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1026	-	-	132	177	848	-	-
HCM Lane V/C Ratio	0.001	-	-	0.061	0.259	0.003	-	-
HCM Control Delay (s)	8.5	0	-	34	32.3	9.3	0	-
HCM Lane LOS	A	A	-	D	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	1	0	-	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	241	453	15	288	9	87	16	32	194
v/c Ratio	0.65	0.25	0.05	0.37	0.03	0.24	0.06	0.09	0.42
Control Delay	35.0	11.9	27.4	19.6	28.7	16.9	28.6	21.2	7.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	11.9	27.4	19.6	28.7	16.9	28.6	21.2	7.2
Queue Length 50th (ft)	55	25	3	33	2	13	3	7	0
Queue Length 95th (ft)	#311	153	27	101	17	53	26	33	36
Internal Link Dist (ft)		2528		2598		168		294	
Turn Bay Length (ft)	250		250		200		273		273
Base Capacity (vph)	372	2147	291	1949	281	911	281	947	900
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.21	0.05	0.15	0.03	0.10	0.06	0.03	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	389	5	14	254	22	7	44	24	13	26	157
Future Volume (veh/h)	210	389	5	14	254	22	7	44	24	13	26	157
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	241	447	6	15	265	23	9	56	31	16	32	194
Peak Hour Factor	0.87	0.87	0.87	0.96	0.96	0.96	0.78	0.78	0.78	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	298	725	10	243	539	46	34	187	103	57	318	270
Arrive On Green	0.17	0.20	0.20	0.14	0.16	0.16	0.02	0.17	0.17	0.03	0.17	0.17
Sat Flow, veh/h	1781	3590	48	1781	3311	285	1781	1131	626	1781	1870	1585
Grp Volume(v), veh/h	241	221	232	15	141	147	9	0	87	16	32	194
Grp Sat Flow(s),veh/h/ln	1781	1777	1862	1781	1777	1819	1781	0	1758	1781	1870	1585
Q Serve(g_s), s	6.4	5.6	5.6	0.4	3.6	3.6	0.2	0.0	2.1	0.4	0.7	5.7
Cycle Q Clear(g_c), s	6.4	5.6	5.6	0.4	3.6	3.6	0.2	0.0	2.1	0.4	0.7	5.7
Prop In Lane	1.00		0.03	1.00		0.16	1.00		0.36	1.00		1.00
Lane Grp Cap(c), veh/h	298	359	376	243	289	296	34	0	290	57	318	270
V/C Ratio(X)	0.81	0.62	0.62	0.06	0.49	0.49	0.27	0.00	0.30	0.28	0.10	0.72
Avail Cap(c_a), veh/h	385	1107	1160	290	1013	1037	290	0	916	290	975	826
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	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	19.7	17.9	17.9	18.5	18.7	18.7	23.8	0.0	18.0	23.2	17.2	19.3
Incr Delay (d2), s/veh	9.5	1.7	1.6	0.1	1.3	1.3	4.2	0.0	0.6	2.7	0.1	3.6
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	3.0	2.0	2.1	0.1	1.3	1.3	0.1	0.0	0.8	0.2	0.3	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.1	19.6	19.5	18.6	20.0	20.0	28.0	0.0	18.6	25.9	17.3	22.9
LnGrp LOS	C	B	B	B	B	B	C	A	B	C	B	C
Approach Vol, veh/h		694			303			96			242	
Approach Delay, s/veh		22.9			19.9			19.5			22.3	
Approach LOS		C			B			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.0	13.9	12.5	15.7	6.7	14.2	14.0	14.2
Change Period (Y+Rc), s	5.4	5.8	5.8	5.8	5.8	* 5.8	5.8	* 6.2
Max Green Setting (Gmax), s	8.0	25.6	8.0	30.6	8.0	* 26	10.6	* 28
Max Q Clear Time (g_c+I1), s	2.4	4.1	2.4	7.6	2.2	7.7	8.4	5.6
Green Ext Time (p_c), s	0.0	0.3	0.0	2.3	0.0	0.7	0.1	1.3

Intersection Summary	
HCM 6th Ctrl Delay	21.9
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	229	251	3	204	27	230	11	133	129
v/c Ratio	0.71	0.28	0.01	0.50	0.11	0.49	0.04	0.34	0.28
Control Delay	44.0	15.0	33.0	26.1	32.5	24.7	32.6	25.7	4.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	15.0	33.0	26.1	32.5	24.7	32.6	25.7	4.2
Queue Length 50th (ft)	63	35	1	52	7	60	3	33	0
Queue Length 95th (ft)	#313	186	9	129	42	187	24	113	25
Internal Link Dist (ft)		2598		234		299		264	
Turn Bay Length (ft)	250		250		200		200		200
Base Capacity (vph)	321	995	252	916	252	848	252	849	811
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.25	0.01	0.22	0.11	0.27	0.04	0.16	0.16

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	213	13	2	139	18	24	205	2	10	122	119
Future Volume (veh/h)	206	213	13	2	139	18	24	205	2	10	122	119
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	229	237	14	3	181	23	27	228	2	11	133	129
Peak Hour Factor	0.90	0.90	0.90	0.77	0.77	0.77	0.90	0.90	0.90	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	284	553	33	12	265	34	89	348	3	40	301	255
Arrive On Green	0.16	0.32	0.32	0.01	0.16	0.16	0.05	0.19	0.19	0.02	0.16	0.16
Sat Flow, veh/h	1781	1748	103	1781	1626	207	1781	1851	16	1781	1870	1585
Grp Volume(v), veh/h	229	0	251	3	0	204	27	0	230	11	133	129
Grp Sat Flow(s),veh/h/ln	1781	0	1852	1781	0	1833	1781	0	1867	1781	1870	1585
Q Serve(g_s), s	6.2	0.0	5.3	0.1	0.0	5.2	0.7	0.0	5.7	0.3	3.2	3.7
Cycle Q Clear(g_c), s	6.2	0.0	5.3	0.1	0.0	5.2	0.7	0.0	5.7	0.3	3.2	3.7
Prop In Lane	1.00		0.06	1.00		0.11	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	284	0	585	12	0	299	89	0	352	40	301	255
V/C Ratio(X)	0.81	0.00	0.43	0.26	0.00	0.68	0.30	0.00	0.65	0.27	0.44	0.51
Avail Cap(c_a), veh/h	365	0	1124	286	0	1032	286	0	961	286	963	816
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.2	0.0	13.5	24.6	0.0	19.6	22.8	0.0	18.7	23.9	18.9	19.1
Incr Delay (d2), s/veh	9.8	0.0	0.5	11.2	0.0	2.7	1.9	0.0	2.1	3.6	1.0	1.6
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	2.8	0.0	1.7	0.1	0.0	2.0	0.3	0.0	2.2	0.1	1.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.9	0.0	14.0	35.8	0.0	22.4	24.7	0.0	20.8	27.5	19.9	20.6
LnGrp LOS	C	A	B	D	A	C	C	A	C	C	B	C
Approach Vol, veh/h		480			207			257			273	
Approach Delay, s/veh		21.6			22.5			21.2			20.5	
Approach LOS		C			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.5	15.2	6.1	21.9	7.9	13.8	13.7	14.3				
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.4	5.8	5.8	6.2				
Max Green Setting (Gmax), s	8.0	25.6	8.0	30.2	8.0	25.6	10.2	28.0				
Max Q Clear Time (g_c+I1), s	2.3	7.7	2.1	7.3	2.7	5.7	8.2	7.2				
Green Ext Time (p_c), s	0.0	1.0	0.0	1.2	0.0	1.0	0.1	0.9				
Intersection Summary												
HCM 6th Ctrl Delay			21.4									
HCM 6th LOS			C									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	117	241	45	131	12	385	25	187
v/c Ratio	0.41	0.44	0.17	0.31	0.04	0.68	0.09	0.30
Control Delay	36.9	24.4	34.0	23.7	34.1	28.7	34.0	18.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.9	24.4	34.0	23.7	34.1	28.7	34.0	18.2
Queue Length 50th (ft)	35	67	13	32	3	106	7	43
Queue Length 95th (ft)	#105	149	41	67	23	#302	38	137
Internal Link Dist (ft)		176		2597		70		117
Turn Bay Length (ft)	200		200		200		200	
Base Capacity (vph)	307	921	272	878	272	905	272	952
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.26	0.17	0.15	0.04	0.43	0.09	0.20

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	168	20	29	69	16	11	307	44	23	142	30
Future Volume (veh/h)	91	168	20	29	69	16	11	307	44	23	142	30
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		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	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	117	215	26	45	106	25	12	337	48	25	154	33
Peak Hour Factor	0.78	0.78	0.78	0.65	0.65	0.65	0.91	0.91	0.91	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	325	39	130	217	51	43	424	60	83	427	91
Arrive On Green	0.12	0.20	0.20	0.07	0.15	0.15	0.02	0.26	0.26	0.05	0.29	0.29
Sat Flow, veh/h	1781	1637	198	1781	1463	345	1781	1601	228	1781	1486	319
Grp Volume(v), veh/h	117	0	241	45	0	131	12	0	385	25	0	187
Grp Sat Flow(s),veh/h/ln	1781	0	1835	1781	0	1808	1781	0	1829	1781	0	1805
Q Serve(g_s), s	3.3	0.0	6.5	1.3	0.0	3.6	0.4	0.0	10.5	0.7	0.0	4.4
Cycle Q Clear(g_c), s	3.3	0.0	6.5	1.3	0.0	3.6	0.4	0.0	10.5	0.7	0.0	4.4
Prop In Lane	1.00		0.11	1.00		0.19	1.00		0.12	1.00		0.18
Lane Grp Cap(c), veh/h	219	0	365	130	0	269	43	0	485	83	0	518
V/C Ratio(X)	0.53	0.00	0.66	0.35	0.00	0.49	0.28	0.00	0.79	0.30	0.00	0.36
Avail Cap(c_a), veh/h	298	0	888	265	0	842	265	0	872	265	0	860
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	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.1	0.0	19.8	23.7	0.0	21.0	25.7	0.0	18.4	24.8	0.0	15.2
Incr Delay (d2), s/veh	2.0	0.0	2.1	1.6	0.0	1.4	3.4	0.0	3.0	2.0	0.0	0.4
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	1.3	0.0	2.5	0.5	0.0	1.4	0.2	0.0	4.0	0.3	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.1	0.0	21.9	25.3	0.0	22.4	29.1	0.0	21.4	26.8	0.0	15.7
LnGrp LOS	C	A	C	C	A	C	C	A	C	C	A	B
Approach Vol, veh/h		358			176			397			212	
Approach Delay, s/veh		22.6			23.1			21.6			17.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	7.9	20.0	9.3	16.5	6.7	21.2	12.0	13.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	25.6	8.0	26.0	8.0	25.6	9.0	25.0
Max Q Clear Time (g_c+I1), s	2.7	12.5	3.3	8.5	2.4	6.4	5.3	5.6
Green Ext Time (p_c), s	0.0	1.7	0.0	1.1	0.0	0.8	0.1	0.5

Intersection Summary		
HCM 6th Ctrl Delay		21.3
HCM 6th LOS		C

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	166	174	21	163	7	372	89	13	110	110
v/c Ratio	0.51	0.20	0.08	0.42	0.03	0.70	0.16	0.05	0.21	0.20
Control Delay	34.4	14.2	32.3	25.8	32.3	29.8	1.0	32.2	20.6	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.4	14.2	32.3	25.8	32.3	29.8	1.0	32.2	20.6	2.7
Queue Length 50th (ft)	49	29	6	48	2	108	0	4	27	0
Queue Length 95th (ft)	#196	128	33	120	16	271	0	26	96	17
Internal Link Dist (ft)		2562		2568		323			652	
Turn Bay Length (ft)	200		200		200		200	200		424
Base Capacity (vph)	369	1039	248	910	248	816	781	248	816	781
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.17	0.08	0.18	0.03	0.46	0.11	0.05	0.13	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	158	159	7	18	133	6	6	301	72	12	103	103
Future Volume (veh/h)	158	159	7	18	133	6	6	301	72	12	103	103
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	166	167	7	21	156	7	7	372	89	13	110	110
Peak Hour Factor	0.95	0.95	0.95	0.85	0.85	0.85	0.81	0.81	0.81	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	248	438	18	72	271	12	26	484	410	47	506	428
Arrive On Green	0.14	0.25	0.25	0.04	0.15	0.15	0.01	0.26	0.26	0.03	0.27	0.27
Sat Flow, veh/h	1781	1782	75	1781	1776	80	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	166	0	174	21	0	163	7	372	89	13	110	110
Grp Sat Flow(s),veh/h/ln	1781	0	1857	1781	0	1856	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	4.6	0.0	4.1	0.6	0.0	4.3	0.2	9.6	2.3	0.4	2.4	2.8
Cycle Q Clear(g_c), s	4.6	0.0	4.1	0.6	0.0	4.3	0.2	9.6	2.3	0.4	2.4	2.8
Prop In Lane	1.00		0.04	1.00		0.04	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	248	0	456	72	0	283	26	484	410	47	506	428
V/C Ratio(X)	0.67	0.00	0.38	0.29	0.00	0.58	0.27	0.77	0.22	0.28	0.22	0.26
Avail Cap(c_a), veh/h	406	0	1138	273	0	995	273	895	759	273	895	759
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.3	0.0	16.4	24.3	0.0	20.6	25.4	17.9	15.2	24.9	14.8	14.9
Incr Delay (d2), s/veh	3.1	0.0	0.5	2.2	0.0	1.9	5.3	2.6	0.3	3.1	0.2	0.3
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(50%),veh/ln	1.9	0.0	1.5	0.3	0.0	1.7	0.1	3.7	0.7	0.2	0.8	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	24.4	0.0	16.9	26.6	0.0	22.4	30.7	20.5	15.5	28.1	15.0	15.3
LnGrp LOS	C	A	B	C	A	C	C	C	B	C	B	B
Approach Vol, veh/h		340			184			468			233	
Approach Delay, s/veh		20.6			22.9			19.7			15.8	
Approach LOS		C			C			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	6.8	19.3	7.5	18.6	6.2	19.9	12.4	13.8
Change Period (Y+Rc), s	5.4	5.8	5.4	* 5.8	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	8.0	25.0	8.0	* 32	8.0	25.0	11.9	28.0
Max Q Clear Time (g_c+I1), s	2.4	11.6	2.6	6.1	2.2	4.8	6.6	6.3
Green Ext Time (p_c), s	0.0	1.9	0.0	0.9	0.0	0.8	0.2	0.7

Intersection Summary	
HCM 6th Ctrl Delay	19.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

APPENDIX M

2035 PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	146	35	293	142	14	84	126	812	37	40	1168	113
v/c Ratio	0.75	0.12	0.59	0.73	0.05	0.21	0.68	0.31	0.04	0.37	0.51	0.14
Control Delay	79.0	40.3	8.6	76.9	37.2	1.2	38.5	5.9	0.1	68.5	30.8	1.9
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	79.0	40.3	8.6	76.9	37.2	1.2	38.5	5.9	0.1	68.5	30.8	1.9
Queue Length 50th (ft)	119	29	0	116	11	0	82	25	0	33	213	0
Queue Length 95th (ft)	#206	46	64	#197	24	0	#133	46	0	73	396	16
Internal Link Dist (ft)		165			163			2549			254	
Turn Bay Length (ft)	200		200	200		200	250		250	255		250
Base Capacity (vph)	217	587	692	217	587	598	202	2606	869	109	2307	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.06	0.42	0.65	0.02	0.14	0.62	0.31	0.04	0.37	0.51	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	32	270	131	13	77	116	747	34	37	1075	104
Future Volume (veh/h)	134	32	270	131	13	77	116	747	34	37	1075	104
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		0.96	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	35	293	142	14	84	126	812	37	40	1168	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	172	411	348	168	412	335	438	2367	734	84	1337	414
Arrive On Green	0.10	0.22	0.22	0.09	0.22	0.22	0.49	0.93	0.93	0.05	0.26	0.26
Sat Flow, veh/h	1781	1870	1581	1781	1870	1522	1781	5106	1583	1781	5106	1582
Grp Volume(v), veh/h	146	35	293	142	14	84	126	812	37	40	1168	113
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1522	1781	1702	1583	1781	1702	1582
Q Serve(g_s), s	10.5	1.9	23.1	10.2	0.8	5.9	5.4	2.2	0.2	2.8	28.5	5.5
Cycle Q Clear(g_c), s	10.5	1.9	23.1	10.2	0.8	5.9	5.4	2.2	0.2	2.8	28.5	5.5
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	172	411	348	168	412	335	438	2367	734	84	1337	414
V/C Ratio(X)	0.85	0.09	0.84	0.85	0.03	0.25	0.29	0.34	0.05	0.48	0.87	0.27
Avail Cap(c_a), veh/h	218	590	499	218	590	480	438	2367	734	110	1430	443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.8	40.3	48.5	58.0	39.8	41.9	26.3	2.6	1.1	60.4	45.9	21.6
Incr Delay (d2), s/veh	21.8	0.1	8.7	20.7	0.0	0.4	0.3	0.4	0.1	4.2	8.2	1.6
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	5.7	0.9	9.8	5.5	0.4	2.2	2.1	0.7	0.1	1.4	12.5	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.6	40.4	57.3	78.7	39.9	42.2	26.7	3.0	1.2	64.6	54.1	23.2
LnGrp LOS	E	D	E	E	D	D	C	A	A	E	D	C
Approach Vol, veh/h		474			240			975			1321	
Approach Delay, s/veh		62.9			63.7			6.0			51.8	
Approach LOS		E			E			A			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	66.5	17.6	34.0	38.1	40.2	17.6	34.0
Change Period (Y+Rc), s	5.8	6.2	5.4	* 5.4	6.2	* 6.2	5.1	5.4
Max Green Setting (Gmax), s	8.0	42.6	15.9	* 41	14.2	* 36	15.9	41.0
Max Q Clear Time (g_c+I1), s	4.8	4.2	12.2	25.1	7.4	30.5	12.5	7.9
Green Ext Time (p_c), s	0.0	5.8	0.1	1.0	0.1	3.6	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	39.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	375	238	882	834	87	390	761	582	68	1220	308
v/c Ratio	0.46	0.76	0.43	2.15	0.77	0.14	0.77	0.37	0.64	0.63	0.82	0.51
Control Delay	62.3	53.7	11.6	543.1	29.1	0.1	37.4	19.0	16.1	77.7	42.1	17.9
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	62.3	53.7	11.6	543.1	29.1	0.1	37.4	19.0	16.1	77.7	42.1	17.9
Queue Length 50th (ft)	53	293	35	~610	295	0	151	201	363	57	357	118
Queue Length 95th (ft)	85	369	97	m#531	m243	m0	m#310	279	m426	m#114	296	134
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	280	630	650	411	1363	714	505	2030	913	108	1486	603
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.60	0.37	2.15	0.61	0.12	0.77	0.37	0.64	0.63	0.82	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	345	219	811	767	80	359	700	535	63	1122	283
Future Volume (veh/h)	117	345	219	811	767	80	359	700	535	63	1122	283
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	127	375	238	882	834	87	390	761	582	68	1220	308
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	231	479	405	415	1088	485	255	1555	483	251	1914	594
Arrive On Green	0.07	0.26	0.26	0.20	0.51	0.51	0.05	0.20	0.20	0.09	0.25	0.25
Sat Flow, veh/h	3456	1870	1583	3456	3554	1585	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	127	375	238	882	834	87	390	761	582	68	1220	308
Grp Sat Flow(s),veh/h/ln	1728	1870	1583	1728	1777	1585	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	4.6	24.3	17.1	15.6	24.5	3.8	9.6	17.1	27.9	4.6	27.7	16.2
Cycle Q Clear(g_c), s	4.6	24.3	17.1	15.6	24.5	3.8	9.6	17.1	27.9	4.6	27.7	16.2
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	231	479	405	415	1088	485	255	1555	483	251	1914	594
V/C Ratio(X)	0.55	0.78	0.59	2.13	0.77	0.18	1.53	0.49	1.21	0.27	0.64	0.52
Avail Cap(c_a), veh/h	253	633	536	415	1370	611	255	1555	483	251	1914	594
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	0.67	0.67	0.67	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	0.09	0.09	0.09	0.59	0.59	0.59	0.82	0.82	0.82
Uniform Delay (d), s/veh	58.8	45.0	42.4	52.0	28.1	23.0	61.8	42.8	25.6	52.6	40.8	21.4
Incr Delay (d2), s/veh	0.8	10.6	5.1	507.8	0.4	0.1	249.2	0.7	103.9	0.2	1.3	2.6
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	2.0	12.3	7.1	35.2	8.1	1.4	13.1	7.5	24.8	2.0	12.1	6.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.6	55.6	47.5	559.8	28.5	23.1	311.0	43.4	129.5	52.8	42.1	24.1
LnGrp LOS	E	E	D	F	C	C	F	D	F	D	D	C
Approach Vol, veh/h		740			1803			1733			1596	
Approach Delay, s/veh		53.7			288.1			132.6			39.1	
Approach LOS		D			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	54.9	14.5	45.6	24.5	45.4	21.0	39.1
Change Period (Y+Rc), s	5.4	6.2	5.8	* 5.8	6.2	* 5.8	5.4	5.8
Max Green Setting (Gmax), s	9.6	38.0	9.5	* 50	8.0	* 40	15.6	44.0
Max Q Clear Time (g_c+I1), s	11.6	29.7	6.6	26.5	6.6	29.9	17.6	26.3
Green Ext Time (p_c), s	0.0	6.9	0.0	13.2	0.0	7.2	0.0	6.8

Intersection Summary	
HCM 6th Ctrl Delay	145.0
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	38	155	66	402	198	277	130	1249	264	245	2054	160
v/c Ratio	0.36	0.24	0.16	0.87	0.14	0.35	1.13	0.84	0.42	1.57	1.28	0.27
Control Delay	68.2	43.5	0.8	66.0	25.6	4.3	180.0	20.8	3.4	285.8	146.2	1.9
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	68.2	43.5	0.8	66.0	25.6	4.3	180.0	20.8	3.4	285.8	146.2	1.9
Queue Length 50th (ft)	31	65	0	288	56	0	~129	239	53	~284	~769	19
Queue Length 95th (ft)	69	77	0	#708	84	56	#251	83	0	m#274	m#582	m13
Internal Link Dist (ft)		2597			155			2573			2580	
Turn Bay Length (ft)	200		200	200		200	251		250	250		250
Base Capacity (vph)	107	1105	606	461	1420	788	115	1487	631	156	1603	600
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.14	0.11	0.87	0.14	0.35	1.13	0.84	0.42	1.57	1.28	0.27

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	143	61	370	182	255	120	1149	243	225	1890	147
Future Volume (veh/h)	35	143	61	370	182	255	120	1149	243	225	1890	147
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	38	155	66	402	198	277	130	1249	264	245	2054	160
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	81	373	166	230	680	300	117	1496	464	519	2664	826
Arrive On Green	0.05	0.11	0.11	0.13	0.19	0.19	0.07	0.30	0.30	0.10	0.17	0.17
Sat Flow, veh/h	1767	3526	1572	1767	3526	1555	1767	5066	1569	1767	5066	1571
Grp Volume(v), veh/h	38	155	66	402	198	277	130	1249	264	245	2054	160
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1555	1767	1689	1569	1767	1689	1571
Q Serve(g_s), s	2.7	5.3	4.2	16.9	6.2	12.0	8.6	30.0	18.5	17.1	50.3	11.3
Cycle Q Clear(g_c), s	2.7	5.3	4.2	16.9	6.2	12.0	8.6	30.0	18.5	17.1	50.3	11.3
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	81	373	166	230	680	300	117	1496	464	519	2664	826
V/C Ratio(X)	0.47	0.42	0.40	1.75	0.29	0.92	1.11	0.83	0.57	0.47	0.77	0.19
Avail Cap(c_a), veh/h	109	1112	496	230	1356	598	117	1496	464	519	2664	826
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	0.96	0.96	0.96	1.00	1.00	1.00	0.77	0.77	0.77	0.09	0.09	0.09
Uniform Delay (d), s/veh	60.5	54.4	37.4	56.6	44.9	14.5	60.7	42.8	38.8	49.2	46.3	30.2
Incr Delay (d2), s/veh	1.5	2.0	4.0	354.8	0.6	25.0	106.2	4.4	3.9	0.0	0.2	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	1.2	2.4	2.2	30.1	2.8	6.2	7.2	12.7	7.5	8.1	22.7	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	62.0	56.3	41.4	411.4	45.5	39.5	166.9	47.2	42.7	49.2	46.5	30.2
LnGrp LOS	E	E	D	F	D	D	F	D	D	D	D	C
Approach Vol, veh/h		259			877			1643			2459	
Approach Delay, s/veh		53.3			211.3			56.0			45.7	
Approach LOS		D			F			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	74.2	11.4	30.5	44.0	44.2	22.3	19.5
Change Period (Y+Rc), s	5.4	5.8	5.4	5.4	5.8	* 5.8	5.4	* 5.8
Max Green Setting (Gmax), s	8.6	41.4	8.0	50.0	11.6	* 38	16.9	* 41
Max Q Clear Time (g_c+I1), s	10.6	52.3	4.7	14.0	19.1	32.0	18.9	7.3
Green Ext Time (p_c), s	0.0	0.0	0.0	5.8	0.0	5.8	0.0	2.6

Intersection Summary	
HCM 6th Ctrl Delay	77.0
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	48	2	68	460	55	262	434	1279	190	176	1879	413
v/c Ratio	0.25	0.01	0.17	2.17	0.17	0.54	2.05	0.63	0.26	0.76	0.88	0.50
Control Delay	55.1	33.5	0.9	568.7	42.0	8.1	511.3	43.6	23.6	60.0	20.5	6.9
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	55.1	33.5	0.9	568.7	42.0	8.1	511.3	43.6	23.6	60.0	20.5	6.9
Queue Length 50th (ft)	37	2	0	~620	45	0	~562	174	2	137	107	7
Queue Length 95th (ft)	77	8	0	#831	65	62	m#723	m431	m138	m109	m#615	m109
Internal Link Dist (ft)		242			239			2603			2573	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	197	587	612	212	689	728	212	2046	738	233	2131	829
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.00	0.11	2.17	0.08	0.36	2.05	0.63	0.26	0.76	0.88	0.50

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	2	63	423	51	241	399	1177	175	162	1729	380
Future Volume (veh/h)	44	2	63	423	51	241	399	1177	175	162	1729	380
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	1811	1870	1811	1870	1811	1811	1811	1811	1870
Adj Flow Rate, veh/h	48	2	68	460	55	262	434	1279	190	176	1879	413
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	6	2	6	2	6	6	6	6	2
Cap, veh/h	125	115	98	215	211	173	660	2639	819	175	1293	415
Arrive On Green	0.07	0.06	0.06	0.12	0.11	0.11	0.37	0.53	0.53	0.03	0.09	0.09
Sat Flow, veh/h	1781	1870	1585	1725	1870	1535	1781	4944	1535	1725	4944	1585
Grp Volume(v), veh/h	48	2	68	460	55	262	434	1279	190	176	1879	413
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1725	1870	1535	1781	1648	1535	1725	1648	1585
Q Serve(g_s), s	3.3	0.1	2.8	16.2	3.5	11.5	26.3	21.1	8.6	13.2	34.0	33.9
Cycle Q Clear(g_c), s	3.3	0.1	2.8	16.2	3.5	11.5	26.3	21.1	8.6	13.2	34.0	33.9
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	125	115	98	215	211	173	660	2639	819	175	1293	415
V/C Ratio(X)	0.38	0.02	0.70	2.14	0.26	1.51	0.66	0.48	0.23	1.00	1.45	1.00
Avail Cap(c_a), veh/h	125	590	500	215	692	568	660	2639	819	175	1293	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.62	0.62	0.62	0.09	0.09	0.09
Uniform Delay (d), s/veh	57.7	57.3	15.3	56.9	52.7	35.5	34.0	19.1	16.1	62.8	59.4	59.3
Incr Delay (d2), s/veh	1.9	0.1	8.6	528.3	0.6	237.1	1.5	0.4	0.4	21.6	204.3	12.4
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	1.6	0.1	2.3	38.4	1.6	15.6	11.3	7.7	2.9	7.2	39.5	15.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.7	57.4	24.0	585.2	53.4	272.6	35.5	19.5	16.5	84.4	263.7	71.7
LnGrp LOS	E	E	C	F	D	F	D	B	B	F	F	E
Approach Vol, veh/h		118			777			1903			2468	
Approach Delay, s/veh		39.1			442.2			22.8			218.8	
Approach LOS		D			F			C			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	75.2	22.0	14.2	54.0	39.8	15.3	20.9
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.8	* 5.8	6.2	* 6.2
Max Green Setting (Gmax), s	13.2	36.4	16.2	41.0	15.6	* 34	9.1	* 48
Max Q Clear Time (g_c+I1), s	15.2	23.1	18.2	4.8	28.3	36.0	5.3	13.5
Green Ext Time (p_c), s	0.0	7.3	0.0	0.2	0.0	0.0	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	176.9
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	291	107	72	224	215	30	64	1636	99	12	1979	471
v/c Ratio	1.32	0.32	0.17	1.05	0.34	0.07	0.56	0.63	0.11	0.11	0.84	0.53
Control Delay	214.4	44.8	0.9	128.6	45.6	0.4	68.7	15.6	2.0	41.0	18.6	7.9
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	214.4	44.8	0.9	128.6	45.6	0.4	68.7	15.6	2.0	41.0	18.6	7.9
Queue Length 50th (ft)	~315	87	0	~204	92	0	41	266	0	9	140	43
Queue Length 95th (ft)	#498	112	0	#370	102	0	m68	m#611	m25	m8	m#667	m53
Internal Link Dist (ft)		2568			478			2539			2603	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	221	583	606	214	1094	601	114	2595	863	106	2365	889
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	0.18	0.12	1.05	0.20	0.05	0.56	0.63	0.11	0.11	0.84	0.53

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	268	98	66	206	198	28	59	1505	91	11	1821	433
Future Volume (veh/h)	268	98	66	206	198	28	59	1505	91	11	1821	433
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	291	107	72	224	215	30	64	1636	99	12	1979	471
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	224	165	140	217	299	134	97	1624	504	505	2809	872
Arrive On Green	0.13	0.09	0.09	0.12	0.09	0.09	0.02	0.11	0.11	0.58	1.00	1.00
Sat Flow, veh/h	1753	1841	1560	1753	3497	1560	1753	5025	1560	1753	5025	1560
Grp Volume(v), veh/h	291	107	72	224	215	30	64	1636	99	12	1979	471
Grp Sat Flow(s),veh/h/ln	1753	1841	1560	1753	1749	1560	1753	1675	1560	1753	1675	1560
Q Serve(g_s), s	16.6	7.3	5.7	16.1	7.8	1.4	4.7	42.0	5.2	0.4	0.0	0.0
Cycle Q Clear(g_c), s	16.6	7.3	5.7	16.1	7.8	1.4	4.7	42.0	5.2	0.4	0.0	0.0
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	224	165	140	217	299	134	97	1624	504	505	2809	872
V/C Ratio(X)	1.30	0.65	0.52	1.03	0.72	0.22	0.66	1.01	0.20	0.02	0.70	0.54
Avail Cap(c_a), veh/h	224	588	498	217	1103	492	108	1624	504	505	2809	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	2.00	2.00	2.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	1.00	0.63	0.63	0.63	0.09	0.09	0.09
Uniform Delay (d), s/veh	56.7	57.2	56.5	57.0	57.9	19.1	62.6	58.1	20.3	19.7	0.0	0.0
Incr Delay (d2), s/veh	162.2	4.0	2.8	69.6	3.2	0.8	7.8	19.6	0.5	0.0	0.1	0.2
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	17.3	3.5	2.3	11.2	3.5	0.9	2.3	21.8	3.0	0.2	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	218.9	61.2	59.3	126.5	61.1	19.9	70.3	77.7	20.9	19.7	0.1	0.2
LnGrp LOS	F	E	E	F	E	B	E	F	C	B	A	A
Approach Vol, veh/h		470			469			1799			2462	
Approach Delay, s/veh		158.6			89.7			74.3			0.2	
Approach LOS		F			F			E			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	43.3	47.8	21.5	17.4	12.6	78.5	22.0	16.9
Change Period (Y+Rc), s	5.8	* 5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	* 42	16.1	41.5	8.0	42.0	16.6	41.0
Max Q Clear Time (g_c+I1), s	2.4	44.0	18.1	9.3	6.7	2.0	18.6	9.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.7	0.0	24.5	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	48.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	232	113	48	130	363	192	101	1350	65	155	1771	345
v/c Ratio	1.05	0.26	0.10	0.76	0.51	0.41	0.94	0.70	0.10	0.78	0.81	0.43
Control Delay	126.9	39.5	0.4	84.9	46.8	7.0	133.3	38.2	0.8	80.6	16.3	1.5
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	126.9	39.5	0.4	84.9	46.8	7.0	133.3	38.2	0.8	80.6	16.3	1.5
Queue Length 50th (ft)	~212	85	0	108	154	0	86	335	0	113	248	4
Queue Length 95th (ft)	#380	114	0	#203	166	54	#202	#495	5	m#165	m#686	m7
Internal Link Dist (ft)		507			663			2371			2539	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	222	625	639	180	1105	625	107	1922	669	200	2190	808
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.05	0.18	0.08	0.72	0.33	0.31	0.94	0.70	0.10	0.78	0.81	0.43

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	213	104	44	120	334	177	93	1242	60	143	1629	317
Future Volume (veh/h)	213	104	44	120	334	177	93	1242	60	143	1629	317
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	232	113	48	130	363	192	101	1350	65	155	1771	345
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	224	359	305	155	544	243	388	2281	708	170	1640	503
Arrive On Green	0.13	0.19	0.19	0.09	0.15	0.15	0.22	0.45	0.45	0.19	0.65	0.65
Sat Flow, veh/h	1767	1856	1572	1767	3526	1572	1767	5066	1572	1767	5066	1553
Grp Volume(v), veh/h	232	113	48	130	363	192	101	1350	65	155	1771	345
Grp Sat Flow(s),veh/h/ln	1767	1856	1572	1767	1763	1572	1767	1689	1572	1767	1689	1553
Q Serve(g_s), s	16.5	6.8	2.0	9.4	12.6	15.3	6.1	26.0	3.1	11.2	42.1	12.5
Cycle Q Clear(g_c), s	16.5	6.8	2.0	9.4	12.6	15.3	6.1	26.0	3.1	11.2	42.1	12.5
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	224	359	305	155	544	243	388	2281	708	170	1640	503
V/C Ratio(X)	1.03	0.31	0.16	0.84	0.67	0.79	0.26	0.59	0.09	0.91	1.08	0.69
Avail Cap(c_a), veh/h	224	629	533	182	1112	496	388	2281	708	170	1640	503
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.44	0.44	0.44
Uniform Delay (d), s/veh	56.8	45.0	16.6	58.4	51.8	53.0	42.0	26.8	20.5	52.0	22.9	8.8
Incr Delay (d2), s/veh	69.3	0.5	0.2	25.2	1.4	5.7	0.4	1.1	0.3	25.4	41.5	3.4
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	11.5	3.1	1.3	5.2	5.6	6.3	2.7	10.2	1.2	5.6	15.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	126.1	45.5	16.8	83.6	53.3	58.7	42.3	27.9	20.7	77.4	64.4	12.1
LnGrp LOS	F	D	B	F	D	E	D	C	C	E	F	B
Approach Vol, veh/h		393			685			1516			2271	
Approach Delay, s/veh		89.6			60.5			28.6			57.3	
Approach LOS		F			E			C			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.9	64.3	16.8	31.0	34.3	47.9	21.9	25.9
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.8	* 5.8	5.4	5.8
Max Green Setting (Gmax), s	12.5	37.6	13.4	44.1	8.0	* 42	16.5	41.0
Max Q Clear Time (g_c+I1), s	13.2	28.0	11.4	8.8	8.1	44.1	18.5	17.3
Green Ext Time (p_c), s	0.0	5.8	0.1	0.7	0.0	0.0	0.0	2.8

Intersection Summary	
HCM 6th Ctrl Delay	51.4
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	8	16	145	5	116	1	1364	20	49	1940	2
v/c Ratio	0.04	0.06	0.62	0.01	0.25	0.01	0.52	0.02	0.27	0.64	0.00
Control Delay	44.6	24.3	51.1	27.0	2.6	48.0	18.7	0.1	45.6	17.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.6	24.3	51.1	27.0	2.6	48.0	18.7	0.1	45.6	17.0	0.0
Queue Length 50th (ft)	3	3	54	2	0	0	141	0	18	131	0
Queue Length 95th (ft)	23	23	#266	13	13	7	421	0	84	#734	0
Internal Link Dist (ft)		265		263			337			2371	
Turn Bay Length (ft)	50		200		200	250		250	250		250
Base Capacity (vph)	182	888	234	1003	928	175	3103	1007	201	3170	1028
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.02	0.62	0.00	0.13	0.01	0.44	0.02	0.24	0.61	0.00

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	8	6	133	5	107	1	1255	18	45	1785	2
Future Volume (veh/h)	7	8	6	133	5	107	1	1255	18	45	1785	2
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	8	9	7	145	5	116	1	1364	20	49	1940	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	137	95	74	181	189	161	4	2312	718	118	2615	812
Arrive On Green	0.08	0.10	0.10	0.10	0.10	0.10	0.00	0.46	0.46	0.07	0.52	0.52
Sat Flow, veh/h	1767	968	753	1767	1856	1572	1767	5066	1572	1767	5066	1572
Grp Volume(v), veh/h	8	0	16	145	5	116	1	1364	20	49	1940	2
Grp Sat Flow(s),veh/h/ln	1767	0	1720	1767	1856	1572	1767	1689	1572	1767	1689	1572
Q Serve(g_s), s	0.3	0.0	0.7	6.3	0.2	4.2	0.0	15.7	0.3	2.1	23.5	0.0
Cycle Q Clear(g_c), s	0.3	0.0	0.7	6.3	0.2	4.2	0.0	15.7	0.3	2.1	23.5	0.0
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	137	0	168	181	189	161	4	2312	718	118	2615	812
V/C Ratio(X)	0.06	0.00	0.09	0.80	0.03	0.72	0.26	0.59	0.03	0.41	0.74	0.00
Avail Cap(c_a), veh/h	181	0	902	242	1030	873	181	3078	956	208	3156	980
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	0.00	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	33.4	0.0	32.1	34.3	31.6	19.7	38.9	15.8	3.4	35.0	14.8	9.2
Incr Delay (d2), s/veh	0.2	0.0	0.2	13.1	0.1	6.0	31.7	0.2	0.0	2.3	0.8	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	0.0	0.3	3.1	0.1	2.2	0.1	5.2	0.2	0.9	7.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.6	0.0	32.3	47.5	31.7	25.7	70.6	16.0	3.4	37.3	15.6	9.2
LnGrp LOS	C	A	C	D	C	C	E	B	A	D	B	A
Approach Vol, veh/h		24			266			1385			1991	
Approach Delay, s/veh		32.8			37.7			15.9			16.1	
Approach LOS		C			D			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.6	41.5	13.8	12.3	6.0	46.2	11.9	14.2
Change Period (Y+Rc), s	5.4	5.8	5.8	4.6	5.8	* 5.8	5.8	* 6.2
Max Green Setting (Gmax), s	9.2	47.5	10.7	41.0	8.0	* 49	8.0	* 43
Max Q Clear Time (g_c+I1), s	4.1	17.7	8.3	2.7	2.0	25.5	2.3	6.2
Green Ext Time (p_c), s	0.0	11.0	0.1	0.1	0.0	14.9	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	17.7
HCM 6th LOS	B

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	210	621	139	117	813	49	120	182	228	41	318	685
v/c Ratio	1.14	0.91	0.20	0.63	1.19	0.07	1.03	0.31	0.35	0.38	0.60	1.13
Control Delay	148.6	41.9	2.8	48.8	111.0	0.1	148.9	37.2	5.9	69.2	45.5	106.8
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	148.6	41.9	2.8	48.8	111.0	0.1	148.9	37.2	5.9	69.2	45.5	106.8
Queue Length 50th (ft)	~212	383	13	100	~807	0	~108	121	0	34	231	~531
Queue Length 95th (ft)	#370	#672	20	m113	m#775	m0	#237	188	61	73	332	#773
Internal Link Dist (ft)		2528			2598			168			294	
Turn Bay Length (ft)	250		250	250		250	200		200	273		273
Base Capacity (vph)	185	738	727	187	685	687	117	579	649	108	533	607
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.14	0.84	0.19	0.63	1.19	0.07	1.03	0.31	0.35	0.38	0.60	1.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	193	571	128	108	748	45	110	167	210	38	293	630
Future Volume (veh/h)	193	571	128	108	748	45	110	167	210	38	293	630
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	210	621	139	117	813	49	120	182	228	41	318	685
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	186	677	574	202	688	583	118	544	461	285	725	615
Arrive On Green	0.03	0.12	0.12	0.15	0.49	0.49	0.07	0.29	0.29	0.16	0.39	0.39
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	210	621	139	117	813	49	120	182	228	41	318	685
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	13.6	42.7	9.6	7.9	47.8	2.1	8.6	9.9	15.5	2.6	16.3	43.1
Cycle Q Clear(g_c), s	13.6	42.7	9.6	7.9	47.8	2.1	8.6	9.9	15.5	2.6	16.3	43.1
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	186	677	574	202	688	583	118	544	461	285	725	615
V/C Ratio(X)	1.13	0.92	0.24	0.58	1.18	0.08	1.02	0.33	0.49	0.14	0.44	1.11
Avail Cap(c_a), veh/h	186	741	628	202	688	583	118	544	461	285	725	615
HCM Platoon Ratio	0.33	0.33	0.33	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.67	0.67	0.67	0.23	0.23	0.23	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.8	55.3	35.2	52.3	33.2	21.5	60.7	36.2	38.2	46.9	29.4	29.0
Incr Delay (d2), s/veh	92.6	11.3	0.1	1.0	85.7	0.0	87.9	1.7	3.8	0.2	1.9	72.0
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	11.3	23.5	3.8	3.4	34.4	0.8	6.7	4.7	6.3	1.1	7.5	27.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	155.3	66.6	35.3	53.3	118.9	21.6	148.6	37.9	42.0	47.2	31.3	101.1
LnGrp LOS	F	E	D	D	F	C	F	D	D	D	C	F
Approach Vol, veh/h		970			979			530			1044	
Approach Delay, s/veh		81.3			106.2			64.7			77.7	
Approach LOS		F			F			E			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.0	43.6	20.5	52.9	14.0	56.6	19.4	54.0
Change Period (Y+Rc), s	5.8	* 5.8	5.8	5.8	5.4	5.8	5.8	* 6.2
Max Green Setting (Gmax), s	8.0	* 38	9.9	51.5	8.6	37.2	13.6	* 48
Max Q Clear Time (g_c+I1), s	4.6	17.5	9.9	44.7	10.6	45.1	15.6	49.8
Green Ext Time (p_c), s	0.0	1.6	0.0	2.4	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	84.7
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	273	453	43	11	778	70	47	328	12	50	489	336
v/c Ratio	1.11	0.47	0.05	0.08	1.14	0.10	0.44	0.65	0.02	0.46	0.96	0.56
Control Delay	112.4	27.3	0.1	55.2	116.4	0.3	71.8	49.7	0.1	73.3	78.9	17.4
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	112.4	27.3	0.1	55.2	116.4	0.3	71.8	49.7	0.1	73.3	78.9	17.4
Queue Length 50th (ft)	~262	370	0	9	~762	0	39	252	0	41	~445	74
Queue Length 95th (ft)	m#371	m451	m0	27	#1006	0	81	362	0	85	#660	178
Internal Link Dist (ft)		2598			234			299			264	
Turn Bay Length (ft)	250		250	250		250	200		200	200		200
Base Capacity (vph)	247	989	920	132	685	687	108	508	557	108	508	598
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.11	0.46	0.05	0.08	1.14	0.10	0.44	0.65	0.02	0.46	0.96	0.56

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	251	417	40	10	716	64	43	302	11	46	450	309
Future Volume (veh/h)	251	417	40	10	716	64	43	302	11	46	450	309
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	273	453	43	11	778	70	47	328	12	50	489	336
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	249	514	436	409	688	583	104	491	416	92	472	400
Arrive On Green	0.05	0.09	0.09	0.23	0.37	0.37	0.06	0.26	0.26	0.05	0.25	0.25
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	273	453	43	11	778	70	47	328	12	50	489	336
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	18.2	31.1	3.2	0.6	47.8	3.8	3.3	20.4	0.4	3.6	32.8	18.1
Cycle Q Clear(g_c), s	18.2	31.1	3.2	0.6	47.8	3.8	3.3	20.4	0.4	3.6	32.8	18.1
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	249	514	436	409	688	583	104	491	416	92	472	400
V/C Ratio(X)	1.09	0.88	0.10	0.03	1.13	0.12	0.45	0.67	0.03	0.55	1.04	0.84
Avail Cap(c_a), veh/h	249	834	707	409	688	583	110	491	416	110	472	400
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.59	0.59	0.59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.0	57.0	44.3	38.8	41.1	27.2	59.2	42.9	11.3	60.2	48.6	22.2
Incr Delay (d2), s/veh	71.8	4.0	0.1	0.0	76.5	0.1	3.0	7.1	0.1	5.0	51.1	18.8
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	13.6	16.1	1.3	0.3	35.3	1.4	1.6	10.1	0.3	1.7	21.5	8.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	133.8	61.0	44.4	38.8	117.6	27.3	62.2	49.9	11.4	65.2	99.7	40.9
LnGrp LOS	F	E	D	D	F	C	E	D	B	E	F	D
Approach Vol, veh/h		769			859			387			875	
Approach Delay, s/veh		86.0			109.2			50.2			75.2	
Approach LOS		F			F			D			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.1	39.9	36.1	41.9	13.4	38.6	24.0	54.0
Change Period (Y+Rc), s	5.4	5.8	6.2	* 6.2	5.8	* 5.8	5.8	6.2
Max Green Setting (Gmax), s	8.0	32.8	8.0	* 58	8.0	* 33	18.2	47.8
Max Q Clear Time (g_c+I1), s	5.6	22.4	2.6	33.1	5.3	34.8	20.2	49.8
Green Ext Time (p_c), s	0.0	1.3	0.0	2.6	0.0	0.0	0.0	0.0

Intersection Summary		
HCM 6th Ctrl Delay		84.8
HCM 6th LOS		F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	55	122	49	162	280	54	61	513	42	74	967	83
v/c Ratio	0.41	0.30	0.17	0.90	0.48	0.15	0.50	0.52	0.05	0.48	0.95	0.09
Control Delay	63.5	49.1	1.4	99.0	48.4	0.9	69.6	22.4	0.1	63.6	45.6	1.5
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	63.5	49.1	1.4	99.0	48.4	0.9	69.6	22.4	0.1	63.6	45.6	1.5
Queue Length 50th (ft)	40	45	0	123	106	0	45	246	0	54	669	0
Queue Length 95th (ft)	91	75	0	#290	152	0	#108	438	0	112	#1158	14
Internal Link Dist (ft)		176			2597			70			117	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	147	769	433	180	833	459	123	986	891	183	1018	917
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.16	0.11	0.90	0.34	0.12	0.50	0.52	0.05	0.40	0.95	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	112	45	149	258	50	56	472	39	68	890	76
Future Volume (veh/h)	51	112	45	149	258	50	56	472	39	68	890	76
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	55	122	49	162	280	54	61	513	42	74	967	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	254	113	186	418	186	108	1046	886	115	1052	892
Arrive On Green	0.06	0.07	0.07	0.10	0.12	0.12	0.06	0.56	0.56	0.06	0.56	0.56
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	55	122	49	162	280	54	61	513	42	74	967	83
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	3.4	3.7	3.3	10.0	8.4	3.5	3.7	18.6	1.3	4.5	52.3	2.7
Cycle Q Clear(g_c), s	3.4	3.7	3.3	10.0	8.4	3.5	3.7	18.6	1.3	4.5	52.3	2.7
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	104	254	113	186	418	186	108	1046	886	115	1052	892
V/C Ratio(X)	0.53	0.48	0.43	0.87	0.67	0.29	0.56	0.49	0.05	0.65	0.92	0.09
Avail Cap(c_a), veh/h	153	795	354	186	861	384	127	1046	886	190	1052	892
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	51.1	49.9	49.7	49.3	47.2	45.1	51.1	15.0	11.2	51.1	22.1	11.3
Incr Delay (d2), s/veh	4.1	1.4	2.6	32.7	1.9	0.8	4.5	1.6	0.1	6.0	14.0	0.2
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	1.6	1.6	1.4	6.0	3.7	1.4	1.8	7.6	0.5	2.2	24.2	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.2	51.3	52.3	82.0	49.1	45.9	55.6	16.6	11.3	57.0	36.1	11.5
LnGrp LOS	E	D	D	F	D	D	E	B	B	E	D	B
Approach Vol, veh/h		226			496			616			1124	
Approach Delay, s/veh		52.5			59.5			20.1			35.7	
Approach LOS		D			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.6	68.3	17.1	13.8	12.2	68.7	12.0	18.9
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	11.9	59.0	11.7	25.0	8.0	62.9	9.6	27.1
Max Q Clear Time (g_c+I1), s	6.5	20.6	12.0	5.7	5.7	54.3	5.4	10.4
Green Ext Time (p_c), s	0.1	3.3	0.0	0.7	0.0	4.4	0.0	1.6

Intersection Summary	
HCM 6th Ctrl Delay	38.1
HCM 6th LOS	D

2035 Project AM
11: Armstrong Avenue & Olive Avenue 06/27/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	154	195	17	286	404	98	104	522	214	50	632	634
v/c Ratio	0.58	0.43	0.05	0.83	0.66	0.25	0.73	0.70	0.29	0.35	0.91	0.72
Control Delay	50.1	42.5	0.3	60.5	43.9	4.1	75.4	33.3	6.7	52.9	49.3	13.3
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	50.1	42.5	0.3	60.5	43.9	4.1	75.4	33.3	6.7	52.9	49.3	13.3
Queue Length 50th (ft)	91	61	0	170	124	0	64	272	12	30	359	81
Queue Length 95th (ft)	170	92	0	#379	181	21	#170	#514	69	74	#689	266
Internal Link Dist (ft)		2563			2568			323			652	
Turn Bay Length (ft)	200		200	200		200	200		200	200		424
Base Capacity (vph)	316	892	500	345	895	501	142	751	746	142	697	877
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.22	0.03	0.83	0.45	0.20	0.73	0.70	0.29	0.35	0.91	0.72

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	142	179	16	263	372	90	96	480	197	46	581	583
Future Volume (veh/h)	142	179	16	263	372	90	96	480	197	46	581	583
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	154	195	17	286	404	98	104	522	214	50	632	634
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	194	313	139	321	550	245	145	763	647	145	763	647
Arrive On Green	0.11	0.09	0.09	0.18	0.15	0.15	0.08	0.41	0.41	0.08	0.41	0.41
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	154	195	17	286	404	98	104	522	214	50	632	634
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	7.7	4.8	0.9	14.3	9.9	5.1	5.2	20.8	8.4	2.4	27.5	35.9
Cycle Q Clear(g_c), s	7.7	4.8	0.9	14.3	9.9	5.1	5.2	20.8	8.4	2.4	27.5	35.9
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	194	313	139	321	550	245	145	763	647	145	763	647
V/C Ratio(X)	0.79	0.62	0.12	0.89	0.73	0.40	0.72	0.68	0.33	0.34	0.83	0.98
Avail Cap(c_a), veh/h	347	977	436	351	981	438	157	763	647	157	763	647
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	39.5	40.0	38.2	36.4	36.6	34.6	40.7	22.1	18.4	39.4	24.1	26.5
Incr Delay (d2), s/veh	7.1	2.0	0.4	22.3	1.9	1.1	13.3	4.9	1.4	1.4	10.0	30.8
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	3.6	2.1	0.3	7.8	4.2	1.9	2.7	9.3	3.1	1.1	13.0	17.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.6	42.0	38.6	58.7	38.6	35.7	54.0	27.0	19.8	40.8	34.1	57.4
LnGrp LOS	D	D	D	E	D	D	D	C	B	D	C	E
Approach Vol, veh/h		366			788			840			1316	
Approach Delay, s/veh		43.8			45.5			28.5			45.6	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	42.9	21.8	13.4	12.8	42.9	15.3	19.9
Change Period (Y+Rc), s	5.4	5.8	5.4	5.4	5.4	5.8	5.4	* 5.8
Max Green Setting (Gmax), s	8.0	37.1	17.9	25.0	8.0	37.1	17.7	* 25
Max Q Clear Time (g_c+I1), s	4.4	22.8	16.3	6.8	7.2	37.9	9.7	11.9
Green Ext Time (p_c), s	0.0	3.2	0.1	1.0	0.0	0.0	0.2	2.2

Intersection Summary	
HCM 6th Ctrl Delay	41.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	43	26	367	79	8	50	417	1110	103	93	602	202
v/c Ratio	0.35	0.09	0.65	0.64	0.02	0.12	0.87	0.43	0.12	0.60	0.37	0.32
Control Delay	66.0	39.2	9.2	81.6	35.1	0.6	33.1	9.7	0.7	73.1	38.2	7.4
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	66.0	39.2	9.2	81.6	35.1	0.6	33.1	9.7	0.7	73.1	38.2	7.4
Queue Length 50th (ft)	34	21	0	64	7	0	62	54	1	76	132	0
Queue Length 95th (ft)	76	38	72	#150	17	0	m#470	72	m3	133	212	66
Internal Link Dist (ft)		165			163			2549			254	
Turn Bay Length (ft)	200		200	200		200	250		250	255		250
Base Capacity (vph)	124	587	743	124	587	598	485	2572	838	181	1683	647
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.04	0.49	0.64	0.01	0.08	0.86	0.43	0.12	0.51	0.36	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	24	338	73	7	46	384	1021	95	86	554	186
Future Volume (veh/h)	40	24	338	73	7	46	384	1021	95	86	554	186
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		0.94	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	26	367	79	8	50	417	1110	103	93	602	202
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	378	484	409	103	195	155	617	2273	705	116	821	254
Arrive On Green	0.21	0.26	0.26	0.06	0.10	0.10	0.69	0.89	0.89	0.07	0.16	0.16
Sat Flow, veh/h	1781	1870	1581	1781	1870	1488	1781	5106	1583	1781	5106	1580
Grp Volume(v), veh/h	43	26	367	79	8	50	417	1110	103	93	602	202
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1488	1781	1702	1583	1781	1702	1580
Q Serve(g_s), s	2.5	1.4	29.1	5.7	0.5	3.4	17.6	5.5	0.8	6.7	14.6	16.0
Cycle Q Clear(g_c), s	2.5	1.4	29.1	5.7	0.5	3.4	17.6	5.5	0.8	6.7	14.6	16.0
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	378	484	409	103	195	155	617	2273	705	116	821	254
V/C Ratio(X)	0.11	0.05	0.90	0.76	0.04	0.32	0.68	0.49	0.15	0.80	0.73	0.79
Avail Cap(c_a), veh/h	378	590	499	110	590	469	617	2273	705	182	1033	320
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.51	0.51	0.51	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.3	36.2	46.5	60.4	52.4	37.3	15.8	4.3	2.2	59.9	51.9	52.5
Incr Delay (d2), s/veh	0.1	0.0	16.5	25.6	0.1	1.2	1.5	0.4	0.2	12.8	5.7	22.1
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(50%),veh/ln	1.1	0.6	13.1	3.3	0.2	1.5	4.6	1.3	0.4	3.4	6.5	7.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.4	36.3	63.1	86.0	52.5	38.5	17.3	4.6	2.4	72.8	57.6	74.6
LnGrp LOS	D	D	E	F	D	D	B	A	A	E	E	E
Approach Vol, veh/h		436			137			1630			897	
Approach Delay, s/veh		59.3			66.7			7.7			63.0	
Approach LOS		E			E			A			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.3	64.1	12.6	39.0	51.2	27.1	32.7	19.0
Change Period (Y+Rc), s	5.8	6.2	5.1	5.4	6.2	* 6.2	5.1	5.4
Max Green Setting (Gmax), s	13.3	45.2	8.0	41.0	32.2	* 26	8.0	41.0
Max Q Clear Time (g_c+I1), s	8.7	7.5	7.7	31.1	19.6	18.0	4.5	5.4
Green Ext Time (p_c), s	0.1	8.9	0.0	1.0	1.0	2.8	0.0	0.2

Intersection Summary	
HCM 6th Ctrl Delay	33.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	190	621	288	629	363	64	186	1377	891	101	851	97
v/c Ratio	0.66	0.99	0.44	1.75	0.29	0.09	0.77	0.85	1.23	0.94	0.54	0.16
Control Delay	68.8	75.4	12.8	369.7	11.3	0.2	81.7	12.0	125.0	122.0	33.7	5.2
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	68.8	75.4	12.8	369.7	11.3	0.2	81.7	12.0	125.0	122.0	33.7	5.2
Queue Length 50th (ft)	80	518	54	~400	40	0	73	238	~728	86	105	0
Queue Length 95th (ft)	120	#766	134	m#412	m49	m0	m73	m56	m#704	m#187	216	m27
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	330	630	658	359	1270	677	248	1627	724	108	1565	602
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.99	0.44	1.75	0.29	0.09	0.75	0.85	1.23	0.94	0.54	0.16

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	571	265	579	334	59	171	1267	820	93	783	89
Future Volume (veh/h)	175	571	265	579	334	59	171	1267	820	93	783	89
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	190	621	288	629	363	64	186	1377	891	101	851	97
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	243	633	536	362	1336	596	238	1634	507	471	2633	817
Arrive On Green	0.07	0.34	0.34	0.17	0.63	0.63	0.02	0.11	0.11	0.09	0.17	0.17
Sat Flow, veh/h	3456	1870	1584	3456	3554	1585	3456	5106	1585	1781	5106	1585
Grp Volume(v), veh/h	190	621	288	629	363	64	186	1377	891	101	851	97
Grp Sat Flow(s),veh/h/ln	1728	1870	1584	1728	1777	1585	1728	1702	1585	1781	1702	1585
Q Serve(g_s), s	7.0	42.7	20.6	13.6	6.0	1.6	7.0	34.4	41.6	6.9	19.0	6.7
Cycle Q Clear(g_c), s	7.0	42.7	20.6	13.6	6.0	1.6	7.0	34.4	41.6	6.9	19.0	6.7
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	243	633	536	362	1336	596	238	1634	507	471	2633	817
V/C Ratio(X)	0.78	0.98	0.54	1.74	0.27	0.11	0.78	0.84	1.76	0.21	0.32	0.12
Avail Cap(c_a), veh/h	332	633	536	362	1336	596	250	1634	507	471	2633	817
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	0.33	0.33	0.33	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.26	0.26	0.26	0.20	0.20	0.20	0.87	0.87	0.87
Uniform Delay (d), s/veh	59.5	42.6	40.3	53.6	16.2	9.0	62.5	54.9	58.1	46.8	34.0	28.9
Incr Delay (d2), s/veh	5.4	31.3	3.2	336.0	0.1	0.1	2.8	1.2	342.1	0.1	0.3	0.3
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(50%),veh/ln	3.2	24.4	8.3	22.2	2.2	0.7	3.2	15.9	65.9	3.1	8.7	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.9	73.9	43.6	389.6	16.3	9.1	65.3	56.1	400.3	46.8	34.3	29.2
LnGrp LOS	E	E	D	F	B	A	E	E	F	D	C	C
Approach Vol, veh/h		1099			1056			2454			1049	
Approach Delay, s/veh		64.4			238.2			181.8			35.0	
Approach LOS		E			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	74.0	14.5	54.7	41.4	47.4	19.4	49.8
Change Period (Y+Rc), s	5.8	6.2	5.4	5.8	6.2	* 5.8	5.8	* 5.8
Max Green Setting (Gmax), s	9.4	39.8	12.5	45.1	8.0	* 42	13.6	* 44
Max Q Clear Time (g_c+I1), s	9.0	21.0	9.0	8.0	8.9	43.6	15.6	44.7
Green Ext Time (p_c), s	0.0	9.3	0.1	6.8	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	142.3
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	143	168	157	297	96	172	122	2123	445	139	1511	79
v/c Ratio	0.65	0.26	0.38	1.49	0.16	0.42	0.95	1.02	0.56	0.67	0.66	0.10
Control Delay	69.0	43.7	7.2	282.2	42.2	7.8	43.1	24.1	1.1	53.7	26.4	4.8
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	69.0	43.7	7.2	282.2	42.2	7.8	43.1	24.1	1.1	53.7	26.4	4.8
Queue Length 50th (ft)	115	71	0	~344	40	0	96	110	6	95	426	7
Queue Length 95th (ft)	#212	82	48	#526	52	52	m72	m87	m11	m#193	m422	m13
Internal Link Dist (ft)		2597			155			2573			2580	
Turn Bay Length (ft)	200		200	200		200	251		250	250		250
Base Capacity (vph)	220	1105	604	200	1121	609	129	2084	793	206	2304	793
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.15	0.26	1.49	0.09	0.28	0.95	1.02	0.56	0.67	0.66	0.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	155	144	273	88	158	112	1953	409	128	1390	73
Future Volume (veh/h)	132	155	144	273	88	158	112	1953	409	128	1390	73
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	143	168	157	297	96	172	122	2123	445	139	1511	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	168	459	205	203	521	229	452	2629	815	117	1652	512
Arrive On Green	0.09	0.13	0.13	0.11	0.15	0.15	0.51	1.00	1.00	0.04	0.22	0.22
Sat Flow, veh/h	1767	3526	1572	1767	3526	1550	1767	5066	1571	1767	5066	1570
Grp Volume(v), veh/h	143	168	157	297	96	172	122	2123	445	139	1511	79
Grp Sat Flow(s),veh/h/ln	1767	1763	1572	1767	1763	1550	1767	1689	1571	1767	1689	1570
Q Serve(g_s), s	10.4	5.7	7.6	14.9	3.1	11.4	5.1	0.0	0.0	8.6	37.9	5.3
Cycle Q Clear(g_c), s	10.4	5.7	7.6	14.9	3.1	11.4	5.1	0.0	0.0	8.6	37.9	5.3
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	168	459	205	203	521	229	452	2629	815	117	1652	512
V/C Ratio(X)	0.85	0.37	0.77	1.47	0.18	0.75	0.27	0.81	0.55	1.19	0.91	0.15
Avail Cap(c_a), veh/h	196	1112	496	203	1128	496	452	2629	815	117	1652	512
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.67	0.67	0.67
Upstream Filter(I)	0.91	0.91	0.91	1.00	1.00	1.00	0.09	0.09	0.09	0.19	0.19	0.19
Uniform Delay (d), s/veh	57.9	51.6	19.9	57.5	48.5	36.1	24.8	0.0	0.0	62.1	49.0	36.3
Incr Delay (d2), s/veh	21.6	1.2	13.9	234.8	0.5	12.7	0.0	0.3	0.2	100.6	2.1	0.1
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(50%),veh/ln	5.6	2.6	3.5	19.8	1.4	5.1	2.0	0.1	0.1	7.1	16.6	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.6	52.9	33.8	292.4	49.0	48.9	24.9	0.3	0.2	162.7	51.1	36.4
LnGrp LOS	E	D	C	F	D	D	C	A	A	F	D	D
Approach Vol, veh/h		468			565			2690			1729	
Approach Delay, s/veh		54.6			176.9			1.4			59.4	
Approach LOS		D			F			A			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	39.1	48.2	18.1	24.6	14.0	73.3	20.0	22.7
Change Period (Y+Rc), s	5.8	* 5.8	5.8	* 5.4	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	9.6	* 42	14.4	* 42	8.6	43.4	14.9	41.0
Max Q Clear Time (g_c+I1), s	7.1	39.9	12.4	13.4	10.6	2.0	16.9	9.6
Green Ext Time (p_c), s	0.0	2.4	0.0	2.8	0.0	39.6	0.0	3.7

Intersection Summary	
HCM 6th Ctrl Delay	42.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	359	57	393	130	10	118	178	2213	340	224	1577	116
v/c Ratio	0.78	0.09	0.59	0.77	0.03	0.30	1.21	1.46	0.57	1.48	1.02	0.19
Control Delay	58.6	31.9	18.7	85.7	35.9	3.1	141.6	235.2	12.9	280.6	72.1	15.0
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	58.6	31.9	18.7	85.7	35.9	3.1	141.6	235.2	12.9	280.6	72.1	15.0
Queue Length 50th (ft)	257	36	120	108	8	0	146	~873	170	~251	~312	8
Queue Length 95th (ft)	#643	66	219	#204	19	12	m#182	m#913	m144	m#392	m#566	m65
Internal Link Dist (ft)		242			239			2603			2573	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	459	621	680	179	587	597	147	1515	597	151	1543	617
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.09	0.58	0.73	0.02	0.20	1.21	1.46	0.57	1.48	1.02	0.19

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	330	52	362	120	9	109	164	2036	313	206	1451	107
Future Volume (veh/h)	330	52	362	120	9	109	164	2036	313	206	1451	107
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	1811	1870	1811	1870	1811	1811	1811	1811	1870
Adj Flow Rate, veh/h	359	57	393	130	10	118	178	2213	340	224	1577	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	6	2	6	2	6	6	6	6	2
Cap, veh/h	461	499	423	154	175	144	132	1483	460	281	1937	621
Arrive On Green	0.26	0.27	0.27	0.09	0.09	0.09	0.10	0.40	0.40	0.05	0.13	0.13
Sat Flow, veh/h	1781	1870	1585	1725	1870	1535	1781	4944	1535	1725	4944	1585
Grp Volume(v), veh/h	359	57	393	130	10	118	178	2213	340	224	1577	116
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1725	1870	1535	1781	1648	1535	1725	1648	1585
Q Serve(g_s), s	24.3	3.0	31.4	9.7	0.6	9.8	9.6	39.0	18.3	16.7	40.3	3.6
Cycle Q Clear(g_c), s	24.3	3.0	31.4	9.7	0.6	9.8	9.6	39.0	18.3	16.7	40.3	3.6
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	461	499	423	154	175	144	132	1483	460	281	1937	621
V/C Ratio(X)	0.78	0.11	0.93	0.84	0.06	0.82	1.35	1.49	0.74	0.80	0.81	0.19
Avail Cap(c_a), veh/h	461	611	518	182	590	484	132	1483	460	281	1937	621
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.09	0.09	0.09	0.57	0.57	0.57
Uniform Delay (d), s/veh	44.7	36.1	46.5	58.3	53.7	57.8	58.6	39.1	19.3	59.4	52.0	6.8
Incr Delay (d2), s/veh	8.2	0.1	21.1	25.7	0.1	10.9	163.5	221.7	1.0	9.0	2.3	0.4
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	11.8	1.4	14.3	5.2	0.3	4.1	10.1	44.4	5.6	8.4	18.2	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	36.2	67.6	84.1	53.8	68.7	222.1	260.8	20.3	68.4	54.2	7.2
LnGrp LOS	D	D	E	F	D	E	F	F	C	E	D	A
Approach Vol, veh/h		809			258			2731			1917	
Approach Delay, s/veh		58.9			75.9			228.3			53.0	
Approach LOS		E			E			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	26.9	44.8	17.4	40.9	15.0	56.7	39.9	18.4
Change Period (Y+Rc), s	5.8	* 5.8	5.8	6.2	5.4	5.8	6.2	* 6.2
Max Green Setting (Gmax), s	11.6	* 39	13.7	42.5	9.6	41.0	15.2	* 41
Max Q Clear Time (g_c+I1), s	18.7	41.0	11.7	33.4	11.6	42.3	26.3	11.8
Green Ext Time (p_c), s	0.0	0.0	0.1	1.2	0.0	0.0	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	138.7
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	400	130	59	137	95	18	35	2325	117	46	1765	301
v/c Ratio	1.81	0.36	0.15	0.78	0.16	0.05	0.33	0.96	0.14	0.43	0.70	0.34
Control Delay	405.0	28.6	5.5	85.5	42.2	0.2	77.2	19.4	2.8	83.8	16.2	2.0
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	405.0	28.6	5.5	85.5	42.2	0.2	77.2	19.4	2.8	83.8	16.2	2.0
Queue Length 50th (ft)	~459	115	15	114	40	0	0	644	0	41	80	1
Queue Length 95th (ft)	#667	176	39	#211	51	0	m25	m#908	m24	m41	m#629	m48
Internal Link Dist (ft)		2568			478			2539			2603	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	221	612	596	186	1094	567	106	2424	813	108	2533	891
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.81	0.21	0.10	0.74	0.09	0.03	0.33	0.96	0.14	0.43	0.70	0.34

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	368	120	54	126	87	17	32	2139	108	42	1624	277
Future Volume (veh/h)	368	120	54	126	87	17	32	2139	108	42	1624	277
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	400	130	59	137	95	18	35	2325	117	46	1765	301
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	224	179	151	162	215	96	77	2958	918	87	2987	927
Arrive On Green	0.21	0.16	0.16	0.09	0.06	0.06	0.01	0.19	0.19	0.02	0.20	0.20
Sat Flow, veh/h	1753	1841	1560	1753	3497	1560	1753	5025	1560	1753	5025	1560
Grp Volume(v), veh/h	400	130	59	137	95	18	35	2325	117	46	1765	301
Grp Sat Flow(s),veh/h/ln	1753	1841	1560	1753	1749	1560	1753	1675	1560	1753	1675	1560
Q Serve(g_s), s	16.6	8.7	4.4	10.0	3.4	1.4	2.6	57.2	8.1	3.4	41.5	21.5
Cycle Q Clear(g_c), s	16.6	8.7	4.4	10.0	3.4	1.4	2.6	57.2	8.1	3.4	41.5	21.5
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	224	179	151	162	215	96	77	2958	918	87	2987	927
V/C Ratio(X)	1.79	0.73	0.39	0.85	0.44	0.19	0.45	0.79	0.13	0.53	0.59	0.32
Avail Cap(c_a), veh/h	224	617	523	189	1103	492	108	2958	918	108	2987	927
HCM Platoon Ratio	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33	0.33	0.33	0.33
Upstream Filter(I)	0.90	0.90	0.90	1.00	1.00	1.00	0.09	0.09	0.09	0.26	0.26	0.26
Uniform Delay (d), s/veh	51.1	52.8	51.0	58.1	58.8	57.9	62.5	44.6	24.8	62.4	37.9	29.9
Incr Delay (d2), s/veh	369.8	5.0	1.5	25.8	1.4	0.9	0.4	0.2	0.0	1.3	0.2	0.2
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	29.4	4.0	1.7	5.5	1.5	0.6	1.1	25.6	3.0	1.5	18.6	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	421.0	57.8	52.5	83.9	60.3	58.8	62.9	44.8	24.8	63.7	38.1	30.1
LnGrp LOS	F	E	D	F	E	E	E	D	C	E	D	C
Approach Vol, veh/h		589			250			2477			2112	
Approach Delay, s/veh		303.9			73.1			44.1			37.5	
Approach LOS		F			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	82.3	17.4	18.4	11.1	83.1	22.0	13.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	42.0	14.0	43.6	8.0	42.0	16.6	41.0
Max Q Clear Time (g_c+I1), s	5.4	59.2	12.0	10.7	4.6	43.5	18.6	5.4
Green Ext Time (p_c), s	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	71.1
HCM 6th LOS	E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	334	243	125	135	276	168	16	1988	66	128	1650	184
v/c Ratio	1.50	0.58	0.26	0.78	0.39	0.38	0.15	1.01	0.10	0.66	0.65	0.22
Control Delay	284.6	48.5	3.0	85.0	44.8	7.1	61.2	62.9	0.9	68.2	14.1	2.5
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	284.6	48.5	3.0	85.0	44.8	7.1	61.2	62.9	0.9	68.2	14.1	2.5
Queue Length 50th (ft)	~389	197	0	112	114	0	13	593	0	81	307	2
Queue Length 95th (ft)	#580	232	21	#208	128	51	38	#856	5	m#212	#642	m57
Internal Link Dist (ft)		507			663			2371			2539	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	223	621	636	185	1105	609	107	1963	681	193	2521	843
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.50	0.39	0.20	0.73	0.25	0.28	0.15	1.01	0.10	0.66	0.65	0.22

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	307	224	115	124	254	155	15	1829	61	118	1518	169
Future Volume (veh/h)	307	224	115	124	254	155	15	1829	61	118	1518	169
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	334	243	125	135	276	168	16	1988	66	128	1650	184
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	226	320	271	160	477	213	422	2526	784	117	1637	502
Arrive On Green	0.13	0.17	0.17	0.09	0.14	0.14	0.24	0.50	0.50	0.13	0.65	0.65
Sat Flow, veh/h	1767	1856	1572	1767	3526	1572	1767	5066	1572	1767	5066	1553
Grp Volume(v), veh/h	334	243	125	135	276	168	16	1988	66	128	1650	184
Grp Sat Flow(s),veh/h/ln	1767	1856	1572	1767	1763	1572	1767	1689	1572	1767	1689	1553
Q Serve(g_s), s	16.6	16.2	5.6	9.8	9.5	13.4	0.9	42.1	2.9	8.6	42.0	4.9
Cycle Q Clear(g_c), s	16.6	16.2	5.6	9.8	9.5	13.4	0.9	42.1	2.9	8.6	42.0	4.9
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	226	320	271	160	477	213	422	2526	784	117	1637	502
V/C Ratio(X)	1.48	0.76	0.46	0.85	0.58	0.79	0.04	0.79	0.08	1.09	1.01	0.37
Avail Cap(c_a), veh/h	226	625	530	188	1112	496	422	2526	784	117	1637	502
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67
Uniform Delay (d), s/veh	56.7	51.2	17.6	58.2	52.7	54.4	38.0	26.9	17.1	56.4	23.0	7.9
Incr Delay (d2), s/veh	238.4	3.7	1.2	25.3	1.1	6.4	0.0	2.6	0.2	95.8	20.2	1.4
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	22.2	7.7	3.5	5.4	4.2	5.6	0.4	16.5	1.0	6.6	11.8	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	295.1	54.9	18.8	83.6	53.8	60.8	38.1	29.5	17.3	152.2	43.2	9.3
LnGrp LOS	F	D	B	F	D	E	D	C	B	F	F	A
Approach Vol, veh/h		702			579			2070			1962	
Approach Delay, s/veh		162.7			62.8			29.1			47.1	
Approach LOS		F			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.0	70.6	17.1	28.2	36.8	47.8	22.0	23.4
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.8	* 5.8	5.4	5.8
Max Green Setting (Gmax), s	8.6	41.4	13.8	43.8	8.0	* 42	16.6	41.0
Max Q Clear Time (g_c+I1), s	10.6	44.1	11.8	18.2	2.9	44.0	18.6	15.4
Green Ext Time (p_c), s	0.0	0.0	0.1	1.6	0.0	0.0	0.0	2.1

Intersection Summary	
HCM 6th Ctrl Delay	57.1
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	15	24	320	1	1683	38	320	1592	14
v/c Ratio	0.10	0.15	0.52	0.01	0.79	0.05	0.81	0.46	0.01
Control Delay	47.6	47.6	3.1	49.0	28.7	0.1	52.9	12.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.6	47.6	3.1	49.0	28.7	0.1	52.9	12.0	0.0
Queue Length 50th (ft)	7	12	0	1	257	0	157	83	0
Queue Length 95th (ft)	36	49	0	7	#697	0	#506	494	0
Internal Link Dist (ft)					337			2371	
Turn Bay Length (ft)	50	200	200	250		250	250		250
Base Capacity (vph)	153	156	962	153	2133	752	397	3471	1127
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.15	0.33	0.01	0.79	0.05	0.81	0.46	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL
Lane Configurations				
Traffic Volume (veh/h)	14	0	0	22
Future Volume (veh/h)	14	0	0	22
Initial Q (Qb), veh	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00
Work Zone On Approach		No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856
Adj Flow Rate, veh/h	15	0	0	24
Peak Hour Factor	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3
Cap, veh/h	50	2	0	311
Arrive On Green	0.03	0.00	0.00	0.18
Sat Flow, veh/h	1767	1856	0	1767
Grp Volume(v), veh/h	15	0	0	24
Grp Sat Flow(s),veh/h/ln	1767	1856	0	1767
Q Serve(g_s), s	0.7	0.0	0.0	1.0
Cycle Q Clear(g_c), s	0.7	0.0	0.0	1.0
Prop In Lane	1.00		0.00	1.00
Lane Grp Cap(c), veh/h	50	2	0	311
V/C Ratio(X)	0.30	0.00	0.00	0.08
Avail Cap(c_a), veh/h	167	903	0	311
HCM Platoon Ratio	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	40.4	0.0	0.0	29.2
Incr Delay (d2), s/veh	3.4	0.0	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.0	0.4
Unsig. Movement Delay, s/veh				
LnGrp Delay(d),s/veh	43.8	0.0	0.0	29.3
LnGrp LOS	D	A	A	C
Approach Vol, veh/h		15		
Approach Delay, s/veh		43.8		
Approach LOS		D		

Movement	WBT	WBR	NBL	NBT
Lane Configurations				
Traffic Volume (veh/h)	0	294	1	1548
Future Volume (veh/h)	0	294	1	1548
Initial Q (Qb), veh	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856
Adj Flow Rate, veh/h	0	320	1	1683
Peak Hour Factor	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3
Cap, veh/h	176	149	4	2081
Arrive On Green	0.00	0.09	0.00	0.41
Sat Flow, veh/h	1856	1572	1767	5066
Grp Volume(v), veh/h	0	320	1	1683
Grp Sat Flow(s),veh/h/ln	1856	1572	1767	1689
Q Serve(g_s), s	0.0	5.0	0.0	24.9
Cycle Q Clear(g_c), s	0.0	5.0	0.0	24.9
Prop In Lane		1.00	1.00	
Lane Grp Cap(c), veh/h	176	149	4	2081
V/C Ratio(X)	0.00	2.15	0.26	0.81
Avail Cap(c_a), veh/h	896	759	167	2297
HCM Platoon Ratio	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.7	42.3	22.1
Incr Delay (d2), s/veh	0.0	520.6	31.7	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	24.3	0.1	9.1
Unsig. Movement Delay, s/veh				
LnGrp Delay(d),s/veh	0.0	535.3	74.0	24.1
LnGrp LOS	A	F	E	C
Approach Vol, veh/h	344			1722
Approach Delay, s/veh	500.0			24.0
Approach LOS	F			C

Movement	NBR	SBL	SBT	SBR
Lane Configurations				
Traffic Volume (veh/h)	35	294	1465	13
Future Volume (veh/h)	35	294	1465	13
Initial Q (Qb), veh	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00
Work Zone On Approach			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856
Adj Flow Rate, veh/h	38	320	1592	14
Peak Hour Factor	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3
Cap, veh/h	646	360	3125	970
Arrive On Green	0.41	0.20	0.62	0.62
Sat Flow, veh/h	1572	1767	5066	1572
Grp Volume(v), veh/h	38	320	1592	14
Grp Sat Flow(s),veh/h/ln	1572	1767	1689	1572
Q Serve(g_s), s	1.2	14.9	14.9	0.3
Cycle Q Clear(g_c), s	1.2	14.9	14.9	0.3
Prop In Lane	1.00	1.00		1.00
Lane Grp Cap(c), veh/h	646	360	3125	970
V/C Ratio(X)	0.06	0.89	0.51	0.01
Avail Cap(c_a), veh/h	713	429	3125	970
HCM Platoon Ratio	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.1	32.9	9.1	6.3
Incr Delay (d2), s/veh	0.0	17.8	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	7.7	4.3	0.1
Unsig. Movement Delay, s/veh				
LnGrp Delay(d),s/veh	15.1	50.7	9.2	6.3
LnGrp LOS	B	D	A	A
Approach Vol, veh/h			1926	
Approach Delay, s/veh			16.1	
Approach LOS			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.1	40.7	21.1	0.0	5.6	58.2	6.9	14.2
Change Period (Y+Rc), s	5.8	* 5.8	6.2	* 4.6	5.4	5.8	4.5	6.2
Max Green Setting (Gmax), s	20.6	* 39	8.0	* 41	8.0	51.1	8.0	41.0
Max Q Clear Time (g_c+I1), s	16.9	26.9	3.0	0.0	2.0	16.9	2.7	7.0
Green Ext Time (p_c), s	0.3	8.0	0.0	0.0	0.0	14.3	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	61.1
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	586	609	192	141	540	45	117	329	158	30	216	297
v/c Ratio	1.18	0.74	0.24	0.78	1.12	0.08	1.08	0.67	0.29	0.28	0.52	0.51
Control Delay	117.9	26.4	3.6	48.2	103.0	0.9	166.6	52.4	6.4	65.1	49.9	7.9
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	117.9	26.4	3.6	48.2	103.0	0.9	166.6	52.4	6.4	65.1	49.9	7.9
Queue Length 50th (ft)	~587	389	12	110	~536	0	~110	264	0	25	162	0
Queue Length 95th (ft)	m#492	m333	m7	m132	m#693	m0	#237	#404	48	58	245	76
Internal Link Dist (ft)		2528			2598			168			294	
Turn Bay Length (ft)	250		250	250		250	200		200	273		273
Base Capacity (vph)	498	818	790	191	484	534	108	489	541	108	412	581
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.18	0.74	0.24	0.74	1.12	0.08	1.08	0.67	0.29	0.28	0.52	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	539	560	177	130	497	41	108	303	145	28	199	273
Future Volume (veh/h)	539	560	177	130	497	41	108	303	145	28	199	273
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	586	609	192	141	540	45	117	329	158	30	216	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	502	844	715	167	486	412	471	839	711	73	414	351
Arrive On Green	0.28	0.45	0.45	0.06	0.17	0.17	0.26	0.45	0.45	0.04	0.22	0.22
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	586	609	192	141	540	45	117	329	158	30	216	297
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	36.6	34.5	7.2	10.2	33.8	3.4	6.7	15.3	7.9	2.1	13.2	23.3
Cycle Q Clear(g_c), s	36.6	34.5	7.2	10.2	33.8	3.4	6.7	15.3	7.9	2.1	13.2	23.3
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	502	844	715	167	486	412	471	839	711	73	414	351
V/C Ratio(X)	1.17	0.72	0.27	0.85	1.11	0.11	0.25	0.39	0.22	0.41	0.52	0.85
Avail Cap(c_a), veh/h	502	844	715	193	486	412	471	839	711	110	414	351
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.09	0.09	0.09	0.55	0.55	0.55	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.7	29.0	12.1	60.0	53.7	50.3	37.6	24.0	22.0	60.8	44.5	48.5
Incr Delay (d2), s/veh	78.0	0.3	0.0	15.4	65.3	0.1	0.3	1.4	0.7	3.7	4.6	21.5
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(50%),veh/ln	26.5	14.7	3.4	5.3	24.9	1.2	2.9	6.9	3.0	1.0	6.5	11.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	124.7	29.3	12.1	75.4	119.0	50.3	37.9	25.4	22.7	64.6	49.2	69.9
LnGrp LOS	F	C	B	E	F	D	D	C	C	E	D	E
Approach Vol, veh/h		1387			726			604			543	
Approach Delay, s/veh		67.2			106.2			27.1			61.4	
Approach LOS		E			F			C			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	64.9	18.0	64.4	41.0	34.6	42.4	40.0
Change Period (Y+Rc), s	5.4	5.8	5.8	5.8	5.8	* 5.8	5.8	* 6.2
Max Green Setting (Gmax), s	8.0	28.8	14.1	56.3	8.0	* 29	36.6	* 34
Max Q Clear Time (g_c+I1), s	4.1	17.3	12.2	36.5	8.7	25.3	38.6	35.8
Green Ext Time (p_c), s	0.0	1.8	0.1	4.2	0.0	0.8	0.0	0.0

Intersection Summary	
HCM 6th Ctrl Delay	67.5
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	224	471	32	13	590	86	26	378	99	46	284	154
v/c Ratio	0.86	0.51	0.04	0.10	0.93	0.13	0.24	0.69	0.17	0.43	0.49	0.25
Control Delay	67.3	9.0	0.1	56.0	63.5	0.4	63.9	51.0	0.6	71.3	42.7	4.7
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	67.3	9.0	0.1	56.0	63.5	0.4	63.9	51.0	0.6	71.3	42.7	4.7
Queue Length 50th (ft)	199	85	0	11	463	0	21	304	0	38	214	0
Queue Length 95th (ft)	m#293	247	m0	31	#673	0	53	#461	0	81	313	39
Internal Link Dist (ft)		2598			234			299			264	
Turn Bay Length (ft)	250		250	250		250	200		200	200		200
Base Capacity (vph)	275	954	892	130	670	709	108	545	585	108	583	617
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.49	0.04	0.10	0.88	0.12	0.24	0.69	0.17	0.43	0.49	0.25

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	433	29	12	543	79	24	348	91	42	261	142
Future Volume (veh/h)	206	433	29	12	543	79	24	348	91	42	261	142
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	224	471	32	13	590	86	26	378	99	46	284	154
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	252	533	452	340	626	530	174	553	469	89	458	388
Arrive On Green	0.05	0.09	0.09	0.19	0.33	0.33	0.10	0.30	0.30	0.05	0.24	0.24
Sat Flow, veh/h	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	224	471	32	13	590	86	26	378	99	46	284	154
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	1870	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	16.3	32.3	2.4	0.8	39.9	3.9	1.7	23.2	3.7	3.3	17.6	10.6
Cycle Q Clear(g_c), s	16.3	32.3	2.4	0.8	39.9	3.9	1.7	23.2	3.7	3.3	17.6	10.6
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	252	533	452	340	626	530	174	553	469	89	458	388
V/C Ratio(X)	0.89	0.88	0.07	0.04	0.94	0.16	0.15	0.68	0.21	0.52	0.62	0.40
Avail Cap(c_a), veh/h	277	849	719	340	673	571	174	553	469	110	458	388
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.73	0.73	0.73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.0	56.8	43.2	42.8	42.0	19.0	53.7	40.4	12.5	60.2	43.7	41.1
Incr Delay (d2), s/veh	20.8	5.2	0.0	0.0	21.0	0.1	0.4	6.7	1.0	4.6	6.2	3.0
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	9.2	16.9	0.9	0.3	21.1	1.8	0.8	11.4	2.3	1.6	8.7	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	81.8	61.9	43.2	42.9	63.0	19.2	54.1	47.1	13.5	64.8	49.9	44.1
LnGrp LOS	F	E	D	D	E	B	D	D	B	E	D	D
Approach Vol, veh/h		727			689			503			484	
Approach Delay, s/veh		67.2			57.2			40.9			49.5	
Approach LOS		E			E			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	44.2	30.6	43.2	18.5	37.6	24.2	49.7
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.8	* 5.8	5.8	6.2
Max Green Setting (Gmax), s	8.0	31.8	8.0	59.0	8.0	* 32	20.2	46.8
Max Q Clear Time (g_c+I1), s	5.3	25.2	2.8	34.3	3.7	19.6	18.3	41.9
Green Ext Time (p_c), s	0.0	1.3	0.0	2.7	0.0	1.6	0.1	1.6

Intersection Summary	
HCM 6th Ctrl Delay	55.3
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	105	338	53	77	177	29	39	925	98	42	586	33
v/c Ratio	0.78	0.54	0.14	0.57	0.34	0.09	0.29	0.92	0.10	0.31	0.58	0.04
Control Delay	86.2	44.6	0.7	67.7	42.4	0.5	56.2	39.8	0.2	56.9	21.5	0.1
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	86.2	44.6	0.7	67.7	42.4	0.5	56.2	39.8	0.2	56.9	21.5	0.1
Queue Length 50th (ft)	75	121	0	54	60	0	27	614	0	29	286	0
Queue Length 95th (ft)	#190	169	0	#131	93	0	67	#1031	0	70	472	0
Internal Link Dist (ft)		176			2597			70			117	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	135	847	475	135	847	473	135	1009	938	135	1009	938
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.78	0.40	0.11	0.57	0.21	0.06	0.29	0.92	0.10	0.31	0.58	0.04

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	311	49	71	163	27	36	851	90	39	539	30
Future Volume (veh/h)	97	311	49	71	163	27	36	851	90	39	539	30
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	105	338	53	77	177	29	39	925	98	42	586	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	131	451	201	121	445	198	96	1002	849	96	1002	849
Arrive On Green	0.07	0.13	0.13	0.07	0.13	0.13	0.05	0.54	0.54	0.05	0.54	0.54
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	105	338	53	77	177	29	39	925	98	42	586	33
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	6.1	9.7	3.2	4.4	4.8	1.4	2.2	48.0	3.2	2.4	22.4	0.6
Cycle Q Clear(g_c), s	6.1	9.7	3.2	4.4	4.8	1.4	2.2	48.0	3.2	2.4	22.4	0.6
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	131	451	201	121	445	198	96	1002	849	96	1002	849
V/C Ratio(X)	0.80	0.75	0.26	0.64	0.40	0.15	0.41	0.92	0.12	0.44	0.58	0.04
Avail Cap(c_a), veh/h	135	841	375	135	841	375	135	1002	849	135	1002	849
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	48.2	44.5	41.7	48.0	42.5	27.5	48.4	22.5	12.1	48.5	16.6	4.4
Incr Delay (d2), s/veh	27.8	2.5	0.7	8.2	0.6	0.3	2.8	15.0	0.3	3.2	2.5	0.1
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(50%),veh/ln	3.6	4.3	1.2	2.2	2.1	0.7	1.0	22.6	1.1	1.1	9.3	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	76.0	47.0	42.3	56.1	43.1	27.9	51.1	37.6	12.4	51.6	19.1	4.5
LnGrp LOS	E	D	D	E	D	C	D	D	B	D	B	A
Approach Vol, veh/h		496			283			1062			661	
Approach Delay, s/veh		52.6			45.1			35.7			20.4	
Approach LOS		D			D			D			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.1	62.4	13.0	19.2	11.1	62.4	13.2	19.0
Change Period (Y+Rc), s	5.4	5.8	5.8	* 5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	56.6	8.0	* 25	8.0	56.6	8.0	25.0
Max Q Clear Time (g_c+I1), s	4.4	50.0	6.4	11.7	4.2	24.4	8.1	6.8
Green Ext Time (p_c), s	0.0	3.5	0.0	1.7	0.0	3.9	0.0	0.9

Intersection Summary	
HCM 6th Ctrl Delay	36.1
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	430	380	32	83	347	15	12	855	176	38	589	266
v/c Ratio	1.32	0.56	0.07	0.31	0.69	0.04	0.11	0.99	0.21	0.35	0.63	0.29
Control Delay	206.6	52.3	0.3	39.7	49.4	0.3	60.2	64.5	5.4	68.0	29.6	3.7
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	206.6	52.3	0.3	39.7	49.4	0.3	60.2	64.5	5.4	68.0	29.6	3.7
Queue Length 50th (ft)	~468	163	0	52	136	0	10	~769	7	31	315	0
Queue Length 95th (ft)	#676	207	0	74	136	0	31	#1106	55	69	593	54
Internal Link Dist (ft)		2563			2568			323			652	
Turn Bay Length (ft)	200		200	200		200	200		200	200		424
Base Capacity (vph)	325	1025	576	284	680	433	108	863	819	108	939	930
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.32	0.37	0.06	0.29	0.51	0.03	0.11	0.99	0.21	0.35	0.63	0.29

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	350	29	76	319	14	11	787	162	35	542	245
Future Volume (veh/h)	396	350	29	76	319	14	11	787	162	35	542	245
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	430	380	32	83	347	15	12	855	176	38	589	266
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	327	484	216	301	438	196	39	734	622	227	937	794
Arrive On Green	0.18	0.14	0.14	0.06	0.04	0.04	0.02	0.39	0.39	0.13	0.50	0.50
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	1870	1585	1781	1870	1585
Grp Volume(v), veh/h	430	380	32	83	347	15	12	855	176	38	589	266
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1870	1585	1781	1870	1585
Q Serve(g_s), s	23.9	13.4	2.0	5.8	12.6	0.9	0.9	51.0	9.9	2.5	29.8	13.1
Cycle Q Clear(g_c), s	23.9	13.4	2.0	5.8	12.6	0.9	0.9	51.0	9.9	2.5	29.8	13.1
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	327	484	216	301	438	196	39	734	622	227	937	794
V/C Ratio(X)	1.31	0.79	0.15	0.28	0.79	0.08	0.31	1.17	0.28	0.17	0.63	0.33
Avail Cap(c_a), veh/h	327	995	444	301	683	305	110	734	622	227	937	794
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.96	0.96	0.96	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.0	54.3	38.2	53.8	60.7	31.3	62.6	39.5	27.0	50.6	23.6	19.4
Incr Delay (d2), s/veh	161.0	2.9	0.3	0.5	3.3	0.2	4.5	88.8	1.1	0.3	3.2	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(50%),veh/ln	25.0	6.1	0.9	2.7	6.2	0.5	0.4	40.3	3.8	1.1	13.3	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	214.1	57.2	38.5	54.2	64.0	31.5	67.1	128.3	28.1	50.9	26.8	20.6
LnGrp LOS	F	E	D	D	E	C	E	F	C	D	C	C
Approach Vol, veh/h		842			445			1043			893	
Approach Delay, s/veh		136.6			61.1			110.7			26.0	
Approach LOS		F			E			F			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	22.4	56.8	27.7	23.1	8.2	71.0	29.0	21.8
Change Period (Y+Rc), s	5.8	* 5.8	5.8	* 5.4	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	8.0	* 51	12.6	* 36	8.0	51.0	23.9	25.0
Max Q Clear Time (g_c+I1), s	4.5	53.0	7.8	15.4	2.9	31.8	25.9	14.6
Green Ext Time (p_c), s	0.0	0.0	0.1	2.2	0.0	4.3	0.0	1.5

Intersection Summary	
HCM 6th Ctrl Delay	87.1
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

APPENDIX N

MITIGATED 2035 PROJECT CONDITIONS

INTERSECTION LEVELS OF SERVICE CALCULATIONS

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	146	35	293	142	14	84	126	812	37	40	1168	113
v/c Ratio	0.75	0.12	0.59	0.73	0.05	0.21	0.68	0.31	0.04	0.37	0.51	0.14
Control Delay	79.0	40.3	8.6	76.9	37.2	1.2	44.7	9.0	0.1	68.5	30.8	1.9
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	79.0	40.3	8.6	76.9	37.2	1.2	44.7	9.0	0.1	68.5	30.8	1.9
Queue Length 50th (ft)	119	29	0	116	11	0	91	58	0	33	213	0
Queue Length 95th (ft)	#206	46	64	#197	24	0	#133	83	m0	73	396	16
Internal Link Dist (ft)		509			451			2549			519	
Turn Bay Length (ft)	200		200	200		200	250		250	255		250
Base Capacity (vph)	217	587	692	217	587	598	202	2606	869	109	2307	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.06	0.42	0.65	0.02	0.14	0.62	0.31	0.04	0.37	0.51	0.14

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	134	32	270	131	13	77	116	747	34	37	1075	104
Future Volume (veh/h)	134	32	270	131	13	77	116	747	34	37	1075	104
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		0.96	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	146	35	293	142	14	84	126	812	37	40	1168	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	172	411	348	168	412	335	438	2367	734	84	1337	414
Arrive On Green	0.10	0.22	0.22	0.09	0.22	0.22	0.49	0.93	0.93	0.05	0.26	0.26
Sat Flow, veh/h	1781	1870	1581	1781	1870	1522	1781	5106	1583	1781	5106	1582
Grp Volume(v), veh/h	146	35	293	142	14	84	126	812	37	40	1168	113
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1522	1781	1702	1583	1781	1702	1582
Q Serve(g_s), s	10.5	1.9	23.1	10.2	0.8	5.9	5.4	2.2	0.2	2.8	28.5	5.5
Cycle Q Clear(g_c), s	10.5	1.9	23.1	10.2	0.8	5.9	5.4	2.2	0.2	2.8	28.5	5.5
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	172	411	348	168	412	335	438	2367	734	84	1337	414
V/C Ratio(X)	0.85	0.09	0.84	0.85	0.03	0.25	0.29	0.34	0.05	0.48	0.87	0.27
Avail Cap(c_a), veh/h	218	590	499	218	590	480	438	2367	734	110	1430	443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.94	0.94	0.94	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.8	40.3	48.5	58.0	39.8	41.9	26.3	2.6	1.1	60.4	45.9	21.6
Incr Delay (d2), s/veh	21.8	0.1	8.7	20.7	0.0	0.4	0.3	0.4	0.1	4.2	8.2	1.6
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	5.7	0.9	9.8	5.5	0.4	2.2	2.1	0.7	0.1	1.4	12.5	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	79.6	40.4	57.3	78.7	39.9	42.2	26.7	3.0	1.2	64.6	54.1	23.2
LnGrp LOS	E	D	E	E	D	D	C	A	A	E	D	C
Approach Vol, veh/h		474			240			975			1321	
Approach Delay, s/veh		62.9			63.7			6.0			51.8	
Approach LOS		E			E			A			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	66.5	17.6	34.0	38.1	40.2	17.6	34.0
Change Period (Y+Rc), s	5.8	6.2	5.4	* 5.4	6.2	* 6.2	5.1	5.4
Max Green Setting (Gmax), s	8.0	42.6	15.9	* 41	14.2	* 36	15.9	41.0
Max Q Clear Time (g_c+I1), s	4.8	4.2	12.2	25.1	7.4	30.5	12.5	7.9
Green Ext Time (p_c), s	0.0	5.8	0.1	1.0	0.1	3.6	0.1	0.3

Intersection Summary	
HCM 6th Ctrl Delay	39.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	127	375	238	882	834	87	390	761	582	68	1220	308
v/c Ratio	0.55	0.38	0.41	2.66	0.76	0.14	0.74	0.37	0.39	0.32	0.82	0.51
Control Delay	67.6	37.7	8.5	777.1	31.6	0.5	46.6	18.4	5.6	58.1	42.1	17.8
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	67.6	37.7	8.5	777.1	31.6	0.5	46.6	18.4	5.6	58.1	42.1	17.8
Queue Length 50th (ft)	54	134	20	~660	211	0	144	180	66	28	357	118
Queue Length 95th (ft)	88	160	77	#794	203	m1	#333	232	134	m44	296	133
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	250	1279	696	332	1363	712	530	2066	1478	211	1486	604
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.29	0.34	2.66	0.61	0.12	0.74	0.37	0.39	0.32	0.82	0.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	117	345	219	811	767	80	359	700	535	63	1122	283
Future Volume (veh/h)	117	345	219	811	767	80	359	700	535	63	1122	283
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	127	375	238	882	834	87	390	761	582	68	1220	308
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	210	961	428	335	1089	486	255	1555	850	517	1958	608
Arrive On Green	0.06	0.27	0.27	0.16	0.51	0.51	0.12	0.51	0.51	0.10	0.26	0.26
Sat Flow, veh/h	3456	3554	1583	3456	3554	1585	3456	5106	2790	3456	5106	1585
Grp Volume(v), veh/h	127	375	238	882	834	87	390	761	582	68	1220	308
Grp Sat Flow(s),veh/h/ln	1728	1777	1583	1728	1777	1585	1728	1702	1395	1728	1702	1585
Q Serve(g_s), s	4.7	11.2	16.8	12.6	24.5	2.5	9.6	12.7	15.1	2.3	27.5	21.6
Cycle Q Clear(g_c), s	4.7	11.2	16.8	12.6	24.5	2.5	9.6	12.7	15.1	2.3	27.5	21.6
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	210	961	428	335	1089	486	255	1555	850	517	1958	608
V/C Ratio(X)	0.60	0.39	0.56	2.63	0.77	0.18	1.53	0.49	0.68	0.13	0.62	0.51
Avail Cap(c_a), veh/h	253	1285	572	335	1370	611	255	1555	850	517	1958	608
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.67	1.67	1.67	0.67	0.67	0.67
Upstream Filter(I)	1.00	1.00	1.00	0.67	0.67	0.67	0.83	0.83	0.83	0.82	0.82	0.82
Uniform Delay (d), s/veh	59.5	38.7	40.7	54.5	28.0	9.7	57.0	25.3	14.8	50.8	40.0	37.8
Incr Delay (d2), s/veh	1.1	1.0	4.3	740.8	3.1	0.5	253.6	0.9	3.7	0.0	1.2	2.5
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(50%),veh/ln	2.0	4.9	6.9	39.4	8.5	1.4	12.9	4.4	4.0	1.0	12.0	9.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.6	39.7	45.0	795.2	31.1	10.2	310.6	26.2	18.5	50.8	41.2	40.3
LnGrp LOS	E	D	D	F	C	B	F	C	B	D	D	D
Approach Vol, veh/h		740			1803			1733			1596	
Approach Delay, s/veh		45.0			403.9			87.6			41.4	
Approach LOS		D			F			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.0	56.1	13.3	45.6	25.7	45.4	18.0	40.9
Change Period (Y+Rc), s	5.4	6.2	5.4	5.8	6.2	* 5.8	5.4	5.8
Max Green Setting (Gmax), s	9.6	38.0	9.5	50.1	8.0	* 40	12.6	47.0
Max Q Clear Time (g_c+I1), s	11.6	29.5	6.7	26.5	4.3	17.1	14.6	18.8
Green Ext Time (p_c), s	0.0	7.0	0.0	13.2	0.0	13.7	0.0	8.6

Intersection Summary	
HCM 6th Ctrl Delay	166.8
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	38	155	66	402	198	277	130	1249	264	245	2054	160
v/c Ratio	0.14	0.23	0.15	1.29	0.25	0.49	0.60	0.55	0.32	1.45	0.84	0.19
Control Delay	56.3	42.2	0.8	199.3	40.7	6.6	83.2	10.8	1.2	237.9	16.7	2.9
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	56.3	42.2	0.8	199.3	40.7	6.6	83.2	10.8	1.2	237.9	16.7	2.9
Queue Length 50th (ft)	15	65	0	~222	82	0	48	127	0	~289	93	0
Queue Length 95th (ft)	33	74	0	#326	91	61	81	180	0	m#263	m549	m24
Internal Link Dist (ft)		2597			719			2573			2580	
Turn Bay Length (ft)	200		200	200		200	251		250	250		250
Base Capacity (vph)	267	1186	636	311	1294	743	217	2267	834	169	2434	828
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.13	0.10	1.29	0.15	0.37	0.60	0.55	0.32	1.45	0.84	0.19

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	143	61	370	182	255	120	1149	243	225	1890	147
Future Volume (veh/h)	35	143	61	370	182	255	120	1149	243	225	1890	147
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	38	155	66	402	198	277	130	1249	264	245	2054	160
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	157	675	301	314	827	366	209	1535	476	426	2462	763
Arrive On Green	0.05	0.19	0.19	0.09	0.23	0.23	0.08	0.40	0.40	0.08	0.16	0.16
Sat Flow, veh/h	3428	3526	1572	3428	3526	1558	3428	5066	1569	1767	5066	1571
Grp Volume(v), veh/h	38	155	66	402	198	277	130	1249	264	245	2054	160
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1558	1714	1689	1569	1767	1689	1571
Q Serve(g_s), s	1.4	4.8	4.6	11.9	5.9	21.5	4.8	28.5	12.6	17.4	51.1	8.5
Cycle Q Clear(g_c), s	1.4	4.8	4.6	11.9	5.9	21.5	4.8	28.5	12.6	17.4	51.1	8.5
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	157	675	301	314	827	366	209	1535	476	426	2462	763
V/C Ratio(X)	0.24	0.23	0.22	1.28	0.24	0.76	0.62	0.81	0.56	0.58	0.83	0.21
Avail Cap(c_a), veh/h	211	1193	532	314	1302	575	211	1535	476	426	2462	763
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	0.33	0.33	0.33
Upstream Filter(I)	0.98	0.98	0.98	1.00	1.00	1.00	0.85	0.85	0.85	0.09	0.09	0.09
Uniform Delay (d), s/veh	59.8	44.5	44.4	59.1	40.3	46.3	58.3	35.5	18.0	53.4	49.5	17.9
Incr Delay (d2), s/veh	0.3	0.5	1.0	148.7	0.4	8.5	3.5	4.1	3.9	0.1	0.3	0.1
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(50%),veh/ln	0.6	2.1	1.9	11.6	2.6	9.0	2.1	11.0	4.6	8.2	23.1	3.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.1	44.9	45.3	207.7	40.7	54.8	61.7	39.7	21.9	53.5	49.8	17.9
LnGrp LOS	E	D	D	F	D	D	E	D	C	D	D	B
Approach Vol, veh/h		259			877			1643			2459	
Approach Delay, s/veh		47.3			121.7			38.6			48.1	
Approach LOS		D			F			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	69.0	11.8	35.9	37.1	45.2	17.0	30.7
Change Period (Y+Rc), s	5.4	5.8	5.8	* 5.4	5.8	* 5.8	5.1	5.8
Max Green Setting (Gmax), s	8.0	44.0	8.0	* 48	12.6	* 39	11.9	44.0
Max Q Clear Time (g_c+I1), s	6.8	53.1	3.4	23.5	19.4	30.5	13.9	6.8
Green Ext Time (p_c), s	0.0	0.0	0.0	5.1	0.0	7.9	0.0	2.7

Intersection Summary	
HCM 6th Ctrl Delay	57.4
HCM 6th LOS	E

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	48	2	68	460	55	262	434	1279	190	176	1879	413
v/c Ratio	0.17	0.00	0.17	1.62	0.09	0.55	1.56	0.52	0.22	0.67	0.76	0.44
Control Delay	56.7	31.5	0.9	331.4	39.4	8.8	298.1	22.9	7.6	61.0	15.4	5.9
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	56.7	31.5	0.9	331.4	39.4	8.8	298.1	22.9	7.6	61.0	15.4	5.9
Queue Length 50th (ft)	19	1	0	~286	23	7	~269	96	3	65	304	44
Queue Length 95th (ft)	40	3	0	#395	32	65	#364	290	m80	m77	m#736	m251
Internal Link Dist (ft)		680			592			2603			2573	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	278	1197	645	284	1284	715	279	2474	861	264	2463	929
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.00	0.11	1.62	0.04	0.37	1.56	0.52	0.22	0.67	0.76	0.44

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	2	63	423	51	241	399	1177	175	162	1729	380
Future Volume (veh/h)	44	2	63	423	51	241	399	1177	175	162	1729	380
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	1811	1870	1811	1870	1811	1811	1811	1811	1870
Adj Flow Rate, veh/h	48	2	68	460	55	262	434	1279	190	176	1879	413
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	6	2	6	2	6	6	6	6	2
Cap, veh/h	175	364	162	288	479	207	1087	2795	867	227	1559	500
Arrive On Green	0.05	0.10	0.10	0.09	0.13	0.13	0.63	1.00	1.00	0.02	0.10	0.10
Sat Flow, veh/h	3456	3554	1585	3346	3554	1535	3456	4944	1535	3346	4944	1585
Grp Volume(v), veh/h	48	2	68	460	55	262	434	1279	190	176	1879	413
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1673	1777	1535	1728	1648	1535	1673	1648	1585
Q Serve(g_s), s	1.7	0.1	2.9	11.2	1.8	14.3	8.1	0.0	0.0	6.8	41.0	33.2
Cycle Q Clear(g_c), s	1.7	0.1	2.9	11.2	1.8	14.3	8.1	0.0	0.0	6.8	41.0	33.2
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	175	364	162	288	479	207	1087	2795	867	227	1559	500
V/C Ratio(X)	0.27	0.01	0.42	1.60	0.11	1.27	0.40	0.46	0.22	0.77	1.20	0.83
Avail Cap(c_a), veh/h	213	1203	536	288	1290	557	1087	2795	867	245	1559	500
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.74	0.74	0.74	0.32	0.32	0.32
Uniform Delay (d), s/veh	59.4	52.4	16.4	59.4	49.4	37.7	18.0	0.0	0.0	62.6	58.2	54.7
Incr Delay (d2), s/veh	0.8	0.0	1.7	283.8	0.1	128.6	0.2	0.4	0.4	4.7	94.4	5.1
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(50%),veh/ln	0.8	0.0	2.1	16.0	0.8	12.6	2.7	0.1	0.1	3.1	31.7	14.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.2	52.4	18.1	343.2	49.5	166.2	18.2	0.4	0.4	67.2	152.6	59.9
LnGrp LOS	E	D	B	F	D	F	B	A	A	E	F	E
Approach Vol, veh/h		118			777			1903			2468	
Approach Delay, s/veh		35.8			262.8			4.5			131.0	
Approach LOS		D			F			A			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.2	79.3	17.0	19.5	46.7	46.8	12.8	23.7
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.8	* 5.8	6.2	* 6.2
Max Green Setting (Gmax), s	9.5	42.1	11.2	44.0	10.6	* 41	8.0	* 47
Max Q Clear Time (g_c+I1), s	3.8	2.0	13.2	4.9	10.1	43.0	3.7	16.3
Green Ext Time (p_c), s	0.0	12.0	0.0	0.2	0.1	0.0	0.0	1.1

Intersection Summary	
HCM 6th Ctrl Delay	102.6
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	291	107	72	224	215	30	64	1636	99	12	1979	471
v/c Ratio	0.74	0.14	0.15	0.90	0.34	0.07	0.56	0.62	0.11	0.11	0.82	0.52
Control Delay	67.8	37.9	0.7	96.3	45.6	0.3	77.5	14.8	0.7	67.3	30.4	16.3
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	67.8	37.9	0.7	96.3	45.6	0.3	77.5	14.8	0.7	67.3	30.4	16.3
Queue Length 50th (ft)	120	41	0	98	92	0	41	316	3	9	223	50
Queue Length 95th (ft)	#226	55	0	#175	102	0	m#88	m554	m4	m10	m#645	m213
Internal Link Dist (ft)		2568			850			2539			2603	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	393	1134	617	248	1094	603	114	2649	902	106	2420	914
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.09	0.12	0.90	0.20	0.05	0.56	0.62	0.11	0.11	0.82	0.52

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	268	98	66	206	198	28	59	1505	91	11	1821	433
Future Volume (veh/h)	268	98	66	206	198	28	59	1505	91	11	1821	433
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	291	107	72	224	215	30	64	1636	99	12	1979	471
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	290	350	156	251	299	134	97	1836	570	500	3006	933
Arrive On Green	0.09	0.10	0.10	0.07	0.09	0.09	0.02	0.12	0.12	0.38	0.80	0.80
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1753	5025	1560	1753	5025	1560
Grp Volume(v), veh/h	291	107	72	224	215	30	64	1636	99	12	1979	471
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1753	1675	1560	1753	1675	1560
Q Serve(g_s), s	11.1	3.7	5.7	8.5	7.8	2.3	4.7	41.7	5.5	0.6	22.0	7.6
Cycle Q Clear(g_c), s	11.1	3.7	5.7	8.5	7.8	2.3	4.7	41.7	5.5	0.6	22.0	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	290	350	156	251	299	134	97	1836	570	500	3006	933
V/C Ratio(X)	1.00	0.31	0.46	0.89	0.72	0.22	0.66	0.89	0.17	0.02	0.66	0.50
Avail Cap(c_a), veh/h	290	1143	510	251	1103	492	108	1836	570	500	3006	933
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.33	1.33	1.33
Upstream Filter(I)	0.96	0.96	0.96	1.00	1.00	1.00	0.77	0.77	0.77	0.29	0.29	0.29
Uniform Delay (d), s/veh	59.4	54.3	55.2	59.7	57.9	55.4	62.6	54.6	22.1	29.0	7.6	2.1
Incr Delay (d2), s/veh	52.3	0.5	2.0	30.3	3.2	0.8	9.4	5.5	0.5	0.0	0.3	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	6.8	1.6	2.3	4.6	3.5	0.9	2.4	19.6	2.9	0.2	4.7	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	111.7	54.8	57.2	90.0	61.1	56.3	72.0	60.2	22.6	29.0	7.9	2.7
LnGrp LOS	F	D	E	F	E	E	E	E	C	C	A	A
Approach Vol, veh/h		470			469			1799			2462	
Approach Delay, s/veh		90.4			74.6			58.5			7.0	
Approach LOS		F			E			E			A	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	42.9	53.3	15.0	18.8	12.6	83.6	16.9	16.9
Change Period (Y+Rc), s	5.8	* 5.8	5.4	5.8	5.4	5.8	5.8	* 5.8
Max Green Setting (Gmax), s	8.0	* 48	9.6	42.5	8.0	47.5	11.1	* 41
Max Q Clear Time (g_c+I1), s	2.6	43.7	10.5	7.7	6.7	24.0	13.1	9.8
Green Ext Time (p_c), s	0.0	3.0	0.0	0.8	0.0	17.1	0.0	1.3

Intersection Summary	
HCM 6th Ctrl Delay	38.5
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	232	113	48	130	363	192	101	1350	65	155	1771	345
v/c Ratio	0.92	0.18	0.12	0.34	0.49	0.41	0.48	0.57	0.08	0.63	0.73	0.40
Control Delay	99.8	42.3	0.6	57.3	45.4	9.8	67.2	28.7	0.2	69.3	12.7	3.7
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	99.8	42.3	0.6	57.3	45.4	9.8	67.2	28.7	0.2	69.3	12.7	3.7
Queue Length 50th (ft)	102	48	0	50	154	19	43	268	0	56	183	16
Queue Length 95th (ft)	#182	57	0	89	160	69	73	427	0	m74	#656	m114
Internal Link Dist (ft)		507			663			2371			2539	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	251	1210	650	380	1186	640	209	2358	820	246	2410	871
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.09	0.07	0.34	0.31	0.30	0.48	0.57	0.08	0.63	0.73	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	213	104	44	120	334	177	93	1242	60	143	1629	317
Future Volume (veh/h)	213	104	44	120	334	177	93	1242	60	143	1629	317
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	232	113	48	130	363	192	101	1350	65	155	1771	345
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	253	217	97	562	545	243	831	2725	846	210	1792	549
Arrive On Green	0.07	0.06	0.06	0.16	0.15	0.15	0.24	0.54	0.54	0.06	0.35	0.35
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	5066	1572	3428	5066	1553
Grp Volume(v), veh/h	232	113	48	130	363	192	101	1350	65	155	1771	345
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1689	1572	1714	1689	1553
Q Serve(g_s), s	8.7	4.0	3.8	4.3	12.6	15.3	3.0	21.8	1.2	5.8	45.2	18.1
Cycle Q Clear(g_c), s	8.7	4.0	3.8	4.3	12.6	15.3	3.0	21.8	1.2	5.8	45.2	18.1
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	253	217	97	562	545	243	831	2725	846	210	1792	549
V/C Ratio(X)	0.92	0.52	0.50	0.23	0.67	0.79	0.12	0.50	0.08	0.74	0.99	0.63
Avail Cap(c_a), veh/h	253	1218	543	562	1193	532	831	2725	846	224	1792	549
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	0.49	0.49	0.49
Uniform Delay (d), s/veh	59.8	59.1	59.0	47.2	51.8	52.9	38.5	18.9	3.0	60.0	41.7	19.8
Incr Delay (d2), s/veh	35.1	1.9	3.9	0.2	1.4	5.7	0.1	0.6	0.2	5.8	12.3	2.7
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(50%),veh/ln	4.9	1.8	1.6	1.8	5.6	6.3	1.2	8.2	0.9	2.6	20.0	6.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	94.9	61.1	62.9	47.4	53.2	58.6	38.5	19.6	3.1	65.8	54.1	22.4
LnGrp LOS	F	E	E	D	D	E	D	B	A	E	D	C
Approach Vol, veh/h		393			685			1516			2271	
Approach Delay, s/veh		81.2			53.6			20.1			50.1	
Approach LOS		F			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.4	75.7	27.1	13.8	37.3	51.8	15.0	25.9
Change Period (Y+Rc), s	5.4	5.8	5.8	* 5.8	5.8	* 5.8	5.4	5.8
Max Green Setting (Gmax), s	8.5	45.5	8.7	* 45	8.0	* 46	9.6	44.0
Max Q Clear Time (g_c+I1), s	7.8	23.8	6.3	6.0	5.0	47.2	10.7	17.3
Green Ext Time (p_c), s	0.0	9.7	0.1	0.8	0.1	0.0	0.0	2.8

Intersection Summary	
HCM 6th Ctrl Delay	43.8
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	8	16	145	61	60	1	1364	20	49	1940	2
v/c Ratio	0.05	0.06	0.63	0.17	0.14	0.01	0.51	0.02	0.27	0.64	0.00
Control Delay	45.7	24.3	51.9	9.8	0.7	48.0	18.6	0.1	45.8	16.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	45.7	24.3	51.9	9.8	0.7	48.0	18.6	0.1	45.8	16.9	0.0
Queue Length 50th (ft)	3	3	54	2	0	0	141	0	18	131	0
Queue Length 95th (ft)	24	23	#266	36	0	7	421	0	84	#734	0
Internal Link Dist (ft)		444		493			882			2371	
Turn Bay Length (ft)	50		200		200	250		250	250		250
Base Capacity (vph)	172	874	231	834	869	172	3124	1029	198	3192	1049
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.02	0.63	0.07	0.07	0.01	0.44	0.02	0.25	0.61	0.00

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	8	6	133	5	107	1	1255	18	45	1785	2
Future Volume (veh/h)	7	8	6	133	5	107	1	1255	18	45	1785	2
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	8	9	7	145	0	119	1	1364	20	49	1940	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	29	94	73	180	0	579	4	2303	715	118	2605	809
Arrive On Green	0.02	0.10	0.10	0.10	0.00	0.18	0.00	0.45	0.45	0.07	0.51	0.51
Sat Flow, veh/h	1767	968	753	1767	0	3145	1767	5066	1572	1767	5066	1572
Grp Volume(v), veh/h	8	0	16	145	0	119	1	1364	20	49	1940	2
Grp Sat Flow(s),veh/h/ln	1767	0	1720	1767	0	1572	1767	1689	1572	1767	1689	1572
Q Serve(g_s), s	0.4	0.0	0.7	6.3	0.0	2.5	0.0	15.8	0.3	2.1	23.8	0.0
Cycle Q Clear(g_c), s	0.4	0.0	0.7	6.3	0.0	2.5	0.0	15.8	0.3	2.1	23.8	0.0
Prop In Lane	1.00		0.44	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	29	0	167	180	0	579	4	2303	715	118	2605	809
V/C Ratio(X)	0.28	0.00	0.10	0.80	0.00	0.21	0.26	0.59	0.03	0.42	0.74	0.00
Avail Cap(c_a), veh/h	179	0	895	240	0	1733	179	3054	948	206	3131	972
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.3	0.0	32.4	34.6	0.0	27.2	39.2	16.0	3.4	35.3	15.1	4.5
Incr Delay (d2), s/veh	5.1	0.0	0.2	13.4	0.0	0.2	31.7	0.2	0.0	2.3	0.8	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	0.0	0.3	3.2	0.0	0.9	0.1	5.3	0.2	0.9	7.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.4	0.0	32.7	48.0	0.0	27.4	70.9	16.3	3.4	37.6	15.9	4.5
LnGrp LOS	D	A	C	D	A	C	E	B	A	D	B	A
Approach Vol, veh/h		24			264			1385			1991	
Approach Delay, s/veh		36.2			38.7			16.1			16.4	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	41.6	14.2	12.3	6.0	46.3	5.8	20.7
Change Period (Y+Rc), s	5.4	5.8	6.2	* 4.6	5.8	* 5.8	4.5	6.2
Max Green Setting (Gmax), s	9.2	47.5	10.7	* 41	8.0	* 49	8.0	43.4
Max Q Clear Time (g_c+I1), s	4.1	17.8	8.3	2.7	2.0	25.8	2.4	4.5
Green Ext Time (p_c), s	0.0	11.0	0.1	0.1	0.0	14.8	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	18.0
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	210	621	139	117	813	49	120	182	228	41	318	685
v/c Ratio	0.65	0.78	0.28	0.46	0.84	0.09	0.59	0.12	0.29	0.38	0.26	0.51
Control Delay	59.1	38.8	7.5	30.4	28.4	0.2	66.7	26.1	4.6	69.2	33.5	7.6
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	59.1	38.8	7.5	30.4	28.4	0.2	66.7	26.1	4.6	69.2	33.5	7.6
Queue Length 50th (ft)	75	273	16	49	112	0	96	52	0	34	105	35
Queue Length 95th (ft)	135	222	31	m97	154	m1	163	83	55	73	153	97
Internal Link Dist (ft)		2528			2598			493			587	
Turn Bay Length (ft)	250		250	250		250	200		200	273		273
Base Capacity (vph)	359	1015	575	253	1083	597	223	1467	789	108	1207	1333
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.61	0.24	0.46	0.75	0.08	0.54	0.12	0.29	0.38	0.26	0.51

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	193	571	128	108	748	45	110	167	210	38	293	630
Future Volume (veh/h)	193	571	128	108	748	45	110	167	210	38	293	630
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	210	621	139	117	813	49	120	182	228	41	318	685
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	763	340	211	919	410	358	1252	558	243	1022	803
Arrive On Green	0.03	0.07	0.07	0.16	0.34	0.34	0.20	0.35	0.35	0.14	0.29	0.29
Sat Flow, veh/h	3456	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	2790
Grp Volume(v), veh/h	210	621	139	117	813	49	120	182	228	41	318	685
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1395
Q Serve(g_s), s	7.9	22.4	10.9	7.9	28.0	1.9	7.5	4.5	14.1	2.6	9.1	23.2
Cycle Q Clear(g_c), s	7.9	22.4	10.9	7.9	28.0	1.9	7.5	4.5	14.1	2.6	9.1	23.2
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	268	763	340	211	919	410	358	1252	558	243	1022	803
V/C Ratio(X)	0.78	0.81	0.41	0.55	0.88	0.12	0.34	0.15	0.41	0.17	0.31	0.85
Avail Cap(c_a), veh/h	362	1020	455	221	1088	485	358	1252	558	243	1022	803
HCM Platoon Ratio	0.33	0.33	0.33	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	0.61	0.61	0.61	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.3	57.8	52.5	51.6	40.8	15.7	44.5	28.7	31.8	49.6	36.2	25.9
Incr Delay (d2), s/veh	7.3	3.6	0.7	1.7	5.0	0.1	0.5	0.2	2.2	0.3	0.8	11.2
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	3.8	11.0	4.6	3.4	11.5	1.0	3.3	2.0	5.6	1.2	4.0	8.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.5	61.4	53.2	53.3	45.8	15.8	45.1	29.0	34.1	50.0	37.0	37.1
LnGrp LOS	E	E	D	D	D	B	D	C	C	D	D	D
Approach Vol, veh/h		970			979			530			1044	
Approach Delay, s/veh		62.0			45.2			34.8			37.6	
Approach LOS		E			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.1	51.6	21.6	33.7	31.5	43.2	15.5	39.8
Change Period (Y+Rc), s	5.4	5.8	6.2	* 5.8	5.4	5.8	5.4	6.2
Max Green Setting (Gmax), s	8.0	45.8	16.1	* 37	16.4	37.4	13.6	39.8
Max Q Clear Time (g_c+I1), s	4.6	16.1	9.9	24.4	9.5	25.2	9.9	30.0
Green Ext Time (p_c), s	0.0	1.9	0.1	3.5	0.1	3.9	0.2	3.6

Intersection Summary	
HCM 6th Ctrl Delay	46.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	273	453	43	11	778	70	47	328	12	50	489	336
v/c Ratio	0.83	0.28	0.05	0.10	0.87	0.13	0.44	0.27	0.02	0.44	0.40	0.44
Control Delay	44.7	14.6	0.1	59.9	57.9	0.5	71.8	34.7	0.1	70.7	36.2	5.7
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	44.7	14.6	0.1	59.9	57.9	0.5	71.8	34.7	0.1	70.7	36.2	5.7
Queue Length 50th (ft)	78	42	0	9	325	0	39	114	0	41	176	0
Queue Length 95th (ft)	165	87	m0	30	403	0	81	162	0	85	238	75
Internal Link Dist (ft)		2598			605			570			522	
Turn Bay Length (ft)	250		250	250		250	200		200	200		200
Base Capacity (vph)	383	1655	828	108	947	548	108	1200	650	118	1211	763
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.27	0.05	0.10	0.82	0.13	0.44	0.27	0.02	0.42	0.40	0.44

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	251	417	40	10	716	64	43	302	11	46	450	309
Future Volume (veh/h)	251	417	40	10	716	64	43	302	11	46	450	309
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	273	453	43	11	778	70	47	328	12	50	489	336
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1399	624	36	869	388	230	1266	565	92	979	436
Arrive On Green	0.33	0.79	0.79	0.02	0.24	0.24	0.13	0.36	0.36	0.05	0.28	0.28
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	273	453	43	11	778	70	47	328	12	50	489	336
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	19.2	4.7	0.5	0.8	27.5	3.7	3.1	8.5	0.6	3.6	15.0	25.3
Cycle Q Clear(g_c), s	19.2	4.7	0.5	0.8	27.5	3.7	3.1	8.5	0.6	3.6	15.0	25.3
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	296	1399	624	36	869	388	230	1266	565	92	979	436
V/C Ratio(X)	0.92	0.32	0.07	0.31	0.90	0.18	0.20	0.26	0.02	0.55	0.50	0.77
Avail Cap(c_a), veh/h	386	1503	671	110	951	424	230	1266	565	118	979	436
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.73	0.73	0.73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.6	8.9	3.4	62.8	47.5	25.7	50.6	29.7	27.1	60.2	39.6	43.3
Incr Delay (d2), s/veh	18.5	0.1	0.0	4.7	10.4	0.2	0.4	0.5	0.1	5.0	1.8	12.3
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(50%),veh/ln	8.1	1.5	0.3	0.4	13.0	1.7	1.4	3.6	0.2	1.7	6.6	11.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.1	9.0	3.4	67.5	57.9	25.9	51.1	30.2	27.2	65.2	41.4	55.6
LnGrp LOS	E	A	A	E	E	C	D	C	C	E	D	E
Approach Vol, veh/h		769			859			387			875	
Approach Delay, s/veh		27.2			55.4			32.6			48.2	
Approach LOS		C			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.1	52.1	8.4	57.4	22.6	41.6	27.8	38.0
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.8	* 5.8	6.2	* 6.2
Max Green Setting (Gmax), s	8.6	35.2	8.0	55.0	8.0	* 36	28.2	* 35
Max Q Clear Time (g_c+I1), s	5.6	10.5	2.8	6.7	5.1	27.3	21.2	29.5
Green Ext Time (p_c), s	0.0	1.9	0.0	3.0	0.0	2.7	0.4	2.3

Intersection Summary	
HCM 6th Ctrl Delay	42.7
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	55	122	49	162	280	54	61	513	42	74	967	83
v/c Ratio	0.29	0.22	0.13	0.68	0.36	0.12	0.34	0.35	0.06	0.41	0.66	0.11
Control Delay	43.6	31.8	0.7	53.8	29.5	0.5	45.2	21.0	0.2	47.2	26.0	0.9
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	43.6	31.8	0.7	53.8	29.5	0.5	45.2	21.0	0.2	47.2	26.0	0.9
Queue Length 50th (ft)	27	31	0	81	71	0	30	96	0	37	215	0
Queue Length 95th (ft)	76	53	0	#235	106	0	83	197	0	#103	#443	6
Internal Link Dist (ft)		596			2597			490			450	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	201	1462	736	242	1544	770	182	1462	736	182	1462	736
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.08	0.07	0.67	0.18	0.07	0.34	0.35	0.06	0.41	0.66	0.11

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	51	112	45	149	258	50	56	472	39	68	890	76
Future Volume (veh/h)	51	112	45	149	258	50	56	472	39	68	890	76
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	55	122	49	162	280	54	61	513	42	74	967	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	128	367	164	199	510	228	134	1468	655	147	1493	666
Arrive On Green	0.07	0.10	0.10	0.11	0.14	0.14	0.08	0.41	0.41	0.08	0.42	0.42
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	55	122	49	162	280	54	61	513	42	74	967	83
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	2.3	2.5	2.2	6.9	5.7	2.3	2.5	7.7	1.2	3.1	16.8	2.5
Cycle Q Clear(g_c), s	2.3	2.5	2.2	6.9	5.7	2.3	2.5	7.7	1.2	3.1	16.8	2.5
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	128	367	164	199	510	228	134	1468	655	147	1493	666
V/C Ratio(X)	0.43	0.33	0.30	0.81	0.55	0.24	0.45	0.35	0.06	0.50	0.65	0.12
Avail Cap(c_a), veh/h	202	1468	655	244	1551	692	184	1468	655	184	1493	666
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	34.4	32.2	32.1	33.6	30.8	29.4	34.3	15.6	13.7	34.0	17.9	13.7
Incr Delay (d2), s/veh	2.3	0.5	1.0	15.6	0.9	0.5	2.4	0.7	0.2	2.7	2.2	0.4
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	1.0	1.0	0.8	3.6	2.3	0.9	1.1	2.8	0.4	1.4	6.4	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.7	32.8	33.1	49.2	31.7	29.9	36.6	16.2	13.9	36.7	20.1	14.1
LnGrp LOS	D	C	C	D	C	C	D	B	B	D	C	B
Approach Vol, veh/h		226			496			616			1124	
Approach Delay, s/veh		33.8			37.3			18.1			20.7	
Approach LOS		C			D			B			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.8	37.8	14.1	13.8	11.2	38.3	10.9	16.9
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	32.0	10.6	32.0	8.0	32.0	8.8	33.8
Max Q Clear Time (g_c+I1), s	5.1	9.7	8.9	4.5	4.5	18.8	4.3	7.7
Green Ext Time (p_c), s	0.0	3.2	0.1	0.8	0.0	5.4	0.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	24.6
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	154	195	17	286	404	98	104	522	214	50	632	634
v/c Ratio	0.77	0.37	0.05	1.03	0.59	0.23	0.66	0.35	0.27	0.32	0.50	0.79
Control Delay	66.7	35.6	0.2	100.8	36.5	3.0	63.4	21.4	4.6	47.2	25.4	19.6
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	66.7	35.6	0.2	100.8	36.5	3.0	63.4	21.4	4.6	47.2	25.4	19.6
Queue Length 50th (ft)	84	54	0	158	111	0	57	110	0	26	138	125
Queue Length 95th (ft)	#222	79	0	#442	155	16	#161	200	53	71	246	#400
Internal Link Dist (ft)		2563			2568			683			652	
Turn Bay Length (ft)	200		200	200		200	200		200	200		424
Base Capacity (vph)	199	1257	653	279	1273	659	157	1497	793	157	1273	806
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.16	0.03	1.03	0.32	0.15	0.66	0.35	0.27	0.32	0.50	0.79

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	142	179	16	263	372	90	96	480	197	46	581	583
Future Volume (veh/h)	142	179	16	263	372	90	96	480	197	46	581	583
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	154	195	17	286	404	98	104	522	214	50	632	634
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	188	335	149	317	576	257	154	1357	605	154	1357	605
Arrive On Green	0.11	0.09	0.09	0.18	0.16	0.16	0.09	0.38	0.38	0.09	0.38	0.38
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	154	195	17	286	404	98	104	522	214	50	632	634
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	7.2	4.5	0.8	13.3	9.1	4.7	4.8	9.0	8.2	2.2	11.3	32.4
Cycle Q Clear(g_c), s	7.2	4.5	0.8	13.3	9.1	4.7	4.8	9.0	8.2	2.2	11.3	32.4
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	188	335	149	317	576	257	154	1357	605	154	1357	605
V/C Ratio(X)	0.82	0.58	0.11	0.90	0.70	0.38	0.68	0.38	0.35	0.33	0.47	1.05
Avail Cap(c_a), veh/h	212	1341	598	317	1357	605	168	1357	605	168	1357	605
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	37.1	36.8	35.2	34.1	33.6	31.7	37.6	19.0	18.7	36.4	19.7	26.2
Incr Delay (d2), s/veh	19.7	1.6	0.3	27.1	1.6	0.9	9.3	0.8	1.6	1.2	1.1	49.5
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(50%),veh/ln	4.0	1.9	0.3	7.8	3.8	1.8	2.4	3.5	3.0	1.0	4.4	19.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.9	38.4	35.5	61.3	35.2	32.7	46.9	19.8	20.3	37.7	20.9	75.7
LnGrp LOS	E	D	D	E	D	C	D	B	C	D	C	F
Approach Vol, veh/h		366			788			840			1316	
Approach Delay, s/veh		46.0			44.3			23.3			47.9	
Approach LOS		D			D			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.7	38.2	20.5	13.4	12.7	38.2	14.4	19.5
Change Period (Y+Rc), s	5.4	5.8	5.4	5.4	5.4	5.8	5.4	* 5.8
Max Green Setting (Gmax), s	8.0	32.4	10.6	32.0	8.0	32.4	10.1	* 32
Max Q Clear Time (g_c+I1), s	4.2	11.0	15.3	6.5	6.8	34.4	9.2	11.1
Green Ext Time (p_c), s	0.0	3.8	0.0	1.1	0.0	0.0	0.0	2.6

Intersection Summary	
HCM 6th Ctrl Delay	40.6
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	43	26	367	79	8	50	417	1110	103	93	602	202
v/c Ratio	0.31	0.09	0.65	0.57	0.02	0.12	0.91	0.52	0.14	0.32	0.36	0.32
Control Delay	62.9	39.2	9.2	74.0	35.1	0.6	45.6	10.6	1.6	52.6	37.7	7.3
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	62.9	39.2	9.2	74.0	35.1	0.6	45.6	10.6	1.6	52.6	37.7	7.3
Queue Length 50th (ft)	34	21	0	64	7	0	133	52	0	68	130	0
Queue Length 95th (ft)	76	38	72	#150	17	0	#570	412	m19	132	212	66
Internal Link Dist (ft)		617			527			2549			676	
Turn Bay Length (ft)	200		200	200		200	250		250	255		250
Base Capacity (vph)	138	587	743	138	587	600	465	2254	775	293	1693	650
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.04	0.49	0.57	0.01	0.08	0.90	0.49	0.13	0.32	0.36	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	24	338	73	7	46	384	1021	95	86	554	186
Future Volume (veh/h)	40	24	338	73	7	46	384	1021	95	86	554	186
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		0.94	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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	26	367	79	8	50	417	1110	103	93	602	202
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	374	484	409	103	195	155	441	1422	440	407	1340	415
Arrive On Green	0.21	0.26	0.26	0.06	0.10	0.10	0.08	0.09	0.09	0.23	0.26	0.26
Sat Flow, veh/h	1781	1870	1581	1781	1870	1488	1781	5106	1582	1781	5106	1582
Grp Volume(v), veh/h	43	26	367	79	8	50	417	1110	103	93	602	202
Grp Sat Flow(s),veh/h/ln	1781	1870	1581	1781	1870	1488	1781	1702	1582	1781	1702	1582
Q Serve(g_s), s	2.5	1.4	29.1	5.7	0.5	4.0	30.3	27.6	6.3	5.5	12.8	8.3
Cycle Q Clear(g_c), s	2.5	1.4	29.1	5.7	0.5	4.0	30.3	27.6	6.3	5.5	12.8	8.3
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	374	484	409	103	195	155	441	1422	440	407	1340	415
V/C Ratio(X)	0.11	0.05	0.90	0.76	0.04	0.32	0.95	0.78	0.23	0.23	0.45	0.49
Avail Cap(c_a), veh/h	374	590	499	110	590	469	441	1775	550	407	1340	415
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.70	0.70	0.70	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	36.2	46.5	60.4	52.4	54.0	58.8	55.1	29.5	40.8	40.1	14.3
Incr Delay (d2), s/veh	0.1	0.0	16.5	25.6	0.1	1.2	23.2	3.1	0.9	0.3	1.1	4.0
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	1.1	0.6	13.1	3.3	0.2	1.6	17.2	13.0	3.3	2.4	5.3	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.7	36.3	63.1	86.0	52.5	55.2	82.0	58.2	30.4	41.1	41.2	18.3
LnGrp LOS	D	D	E	F	D	E	F	E	C	D	D	B
Approach Vol, veh/h		436			137			1630			897	
Approach Delay, s/veh		59.3			72.8			62.5			36.0	
Approach LOS		E			E			E			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	35.9	42.4	12.6	39.0	38.0	40.3	32.7	19.0				
Change Period (Y+Rc), s	6.2	* 6.2	5.1	5.4	5.8	6.2	5.4	* 5.4				
Max Green Setting (Gmax), s	13.3	* 45	8.0	41.0	32.2	26.3	8.0	* 41				
Max Q Clear Time (g_c+I1), s	7.5	29.6	7.7	31.1	32.3	14.8	4.5	6.0				
Green Ext Time (p_c), s	0.1	6.5	0.0	1.0	0.0	3.3	0.0	0.2				
Intersection Summary												
HCM 6th Ctrl Delay			54.9									
HCM 6th LOS			D									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	190	621	288	629	363	64	186	1377	891	101	851	97
v/c Ratio	0.36	0.63	0.53	1.63	0.44	0.14	0.88	0.72	0.63	0.48	0.45	0.14
Control Delay	52.5	43.4	19.3	321.1	23.0	1.3	71.7	13.8	4.9	60.0	22.6	2.2
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	52.5	43.4	19.3	321.1	23.0	1.3	71.7	13.8	4.9	60.0	22.6	2.2
Queue Length 50th (ft)	71	253	94	~390	123	1	86	236	81	45	205	15
Queue Length 95th (ft)	118	269	158	#498	m144	m2	m#110	#486	47	73	283	1
Internal Link Dist (ft)		851			2528			2580			2549	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	532	1279	665	385	1336	675	211	1900	1413	211	1884	691
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.49	0.43	1.63	0.27	0.09	0.88	0.72	0.63	0.48	0.45	0.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	175	571	265	579	334	59	171	1267	820	93	783	89
Future Volume (veh/h)	175	571	265	579	334	59	171	1267	820	93	783	89
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	190	621	288	629	363	64	186	1377	891	101	851	97
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	750	955	426	388	572	255	533	1477	807	533	1461	454
Arrive On Green	0.22	0.27	0.27	0.19	0.27	0.27	0.15	0.29	0.29	0.05	0.09	0.09
Sat Flow, veh/h	3456	3554	1583	3456	3554	1585	3456	5106	2790	3456	5106	1585
Grp Volume(v), veh/h	190	621	288	629	363	64	186	1377	891	101	851	97
Grp Sat Flow(s),veh/h/ln	1728	1777	1583	1728	1777	1585	1728	1702	1395	1728	1702	1585
Q Serve(g_s), s	5.9	20.1	14.1	14.6	11.7	4.1	6.3	34.1	27.1	3.6	20.8	7.4
Cycle Q Clear(g_c), s	5.9	20.1	14.1	14.6	11.7	4.1	6.3	34.1	27.1	3.6	20.8	7.4
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	750	955	426	388	572	255	533	1477	807	533	1461	454
V/C Ratio(X)	0.25	0.65	0.68	1.62	0.63	0.25	0.35	0.93	1.10	0.19	0.58	0.21
Avail Cap(c_a), veh/h	750	1285	572	388	1342	599	533	1477	807	533	1461	454
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.76	0.76	0.76	0.50	0.50	0.50	0.87	0.87	0.87
Uniform Delay (d), s/veh	42.2	42.1	18.9	52.8	44.2	41.4	49.1	45.0	24.0	53.9	51.4	45.3
Incr Delay (d2), s/veh	0.1	2.9	7.0	288.2	3.4	1.5	0.1	6.9	56.7	0.1	1.5	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(50%),veh/ln	2.5	9.0	5.8	21.2	4.9	1.7	2.7	14.8	14.8	1.6	9.6	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.2	45.0	25.9	341.0	47.6	42.9	49.2	51.8	80.7	54.0	52.9	46.3
LnGrp LOS	D	D	C	F	D	D	D	D	F	D	D	D
Approach Vol, veh/h		1099			1056			2454			1049	
Approach Delay, s/veh		39.5			222.1			62.1			52.4	
Approach LOS		D			F			E			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.9	43.4	34.0	26.7	25.9	43.4	20.0	40.7
Change Period (Y+Rc), s	5.8	6.2	5.8	* 5.8	5.8	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	37.2	12.5	* 49	8.0	37.6	14.6	47.0
Max Q Clear Time (g_c+I1), s	8.3	22.8	7.9	13.7	5.6	36.1	16.6	22.1
Green Ext Time (p_c), s	0.0	7.8	0.1	6.7	0.0	1.4	0.0	12.6

Intersection Summary	
HCM 6th Ctrl Delay	85.8
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	143	168	157	297	96	172	122	2123	445	139	1511	79
v/c Ratio	0.48	0.25	0.36	1.15	0.15	0.41	0.90	0.85	0.49	0.63	0.62	0.10
Control Delay	62.8	42.4	6.7	155.0	40.8	8.2	56.3	11.1	1.7	56.9	18.4	2.6
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	62.8	42.4	6.7	155.0	40.8	8.2	56.3	11.1	1.7	56.9	18.4	2.6
Queue Length 50th (ft)	59	71	0	~151	40	5	102	105	17	55	268	4
Queue Length 95th (ft)	96	79	46	#244	50	54	m99	m#715	m22	m75	m292	m13
Internal Link Dist (ft)		2597			571			2573			2580	
Turn Bay Length (ft)	200		200	200		200	251		250	250		250
Base Capacity (vph)	296	1186	636	258	1240	652	136	2496	902	221	2432	829
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.14	0.25	1.15	0.08	0.26	0.90	0.85	0.49	0.63	0.62	0.10

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	132	155	144	273	88	158	112	1953	409	128	1390	73
Future Volume (veh/h)	132	155	144	273	88	158	112	1953	409	128	1390	73
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		0.99	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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	143	168	157	297	96	172	122	2123	445	139	1511	79
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	210	489	218	261	534	235	485	2806	870	210	1711	530
Arrive On Green	0.06	0.14	0.14	0.08	0.15	0.15	0.55	1.00	1.00	0.02	0.11	0.11
Sat Flow, veh/h	3428	3526	1572	3428	3526	1551	1767	5066	1571	3428	5066	1570
Grp Volume(v), veh/h	143	168	157	297	96	172	122	2123	445	139	1511	79
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1551	1767	1689	1571	1714	1689	1570
Q Serve(g_s), s	5.3	5.6	7.2	9.9	3.1	11.4	4.7	0.0	0.0	5.2	38.2	5.9
Cycle Q Clear(g_c), s	5.3	5.6	7.2	9.9	3.1	11.4	4.7	0.0	0.0	5.2	38.2	5.9
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	210	489	218	261	534	235	485	2806	870	210	1711	530
V/C Ratio(X)	0.68	0.34	0.72	1.14	0.18	0.73	0.25	0.76	0.51	0.66	0.88	0.15
Avail Cap(c_a), veh/h	211	1193	532	261	1247	549	485	2806	870	211	1711	530
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	0.33	0.33	0.33
Upstream Filter(I)	0.92	0.92	0.92	1.00	1.00	1.00	0.15	0.15	0.15	0.35	0.35	0.35
Uniform Delay (d), s/veh	59.8	50.6	17.9	60.1	48.1	36.3	22.3	0.0	0.0	62.4	55.2	40.9
Incr Delay (d2), s/veh	6.6	1.1	10.7	97.9	0.4	11.5	0.0	0.3	0.3	2.2	2.7	0.2
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	2.5	2.5	5.3	7.8	1.4	5.0	1.8	0.1	0.1	2.4	17.7	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.4	51.7	28.6	158.0	48.6	47.7	22.4	0.3	0.3	64.5	57.9	41.1
LnGrp LOS	E	D	C	F	D	D	C	A	A	E	E	D
Approach Vol, veh/h		468			565			2690			1729	
Approach Delay, s/veh		48.4			105.8			1.3			57.7	
Approach LOS		D			F			A			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	41.5	49.7	13.8	25.1	13.3	77.8	15.0	23.8
Change Period (Y+Rc), s	5.8	* 5.8	5.8	* 5.4	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	10.1	* 44	8.0	* 46	8.0	46.0	9.9	44.0
Max Q Clear Time (g_c+I1), s	6.7	40.2	7.3	13.4	7.2	2.0	11.9	9.2
Green Ext Time (p_c), s	0.0	3.5	0.0	2.9	0.0	42.0	0.0	3.8

Intersection Summary	
HCM 6th Ctrl Delay	34.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	359	57	393	130	10	118	178	2213	340	224	1577	116
v/c Ratio	0.65	0.06	0.72	0.55	0.02	0.29	0.68	1.06	0.45	1.10	0.78	0.15
Control Delay	57.7	33.9	31.0	67.0	33.9	2.9	57.3	57.6	8.9	141.7	41.8	13.9
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	57.7	33.9	31.0	67.0	33.9	2.9	57.3	57.6	8.9	141.7	41.8	13.9
Queue Length 50th (ft)	138	21	189	55	4	0	68	605	123	~108	282	8
Queue Length 95th (ft)	#303	33	262	89	10	12	m77	m#912	m143	m#184	m552	m71
Internal Link Dist (ft)		776			652			2603			2573	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	556	1205	654	251	1197	628	262	2082	760	203	2009	751
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.05	0.60	0.52	0.01	0.19	0.68	1.06	0.45	1.10	0.78	0.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	330	52	362	120	9	109	164	2036	313	206	1451	107
Future Volume (veh/h)	330	52	362	120	9	109	164	2036	313	206	1451	107
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	1811	1870	1811	1870	1811	1811	1811	1811	1870
Adj Flow Rate, veh/h	359	57	393	130	10	118	178	2213	340	224	1577	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	6	2	6	2	6	6	6	6	2
Cap, veh/h	800	950	424	204	334	144	213	1696	527	492	2134	684
Arrive On Green	0.23	0.27	0.27	0.06	0.09	0.09	0.04	0.23	0.23	0.05	0.14	0.14
Sat Flow, veh/h	3456	3554	1585	3346	3554	1535	3456	4944	1535	3346	4944	1585
Grp Volume(v), veh/h	359	57	393	130	10	118	178	2213	340	224	1577	116
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1673	1777	1535	1728	1648	1535	1673	1648	1585
Q Serve(g_s), s	11.6	1.6	31.4	4.9	0.3	9.8	6.6	44.6	20.1	8.5	39.7	3.6
Cycle Q Clear(g_c), s	11.6	1.6	31.4	4.9	0.3	9.8	6.6	44.6	20.1	8.5	39.7	3.6
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	800	950	424	204	334	144	213	1696	527	492	2134	684
V/C Ratio(X)	0.45	0.06	0.93	0.64	0.03	0.82	0.84	1.30	0.65	0.46	0.74	0.17
Avail Cap(c_a), veh/h	800	1211	540	255	1203	519	213	1696	527	492	2134	684
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.67	0.67	0.67	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	0.23	0.23	0.23	0.68	0.68	0.68
Uniform Delay (d), s/veh	42.8	35.4	46.4	59.6	53.5	57.8	61.7	50.1	25.5	56.8	48.7	6.5
Incr Delay (d2), s/veh	0.4	0.0	19.4	3.5	0.0	10.8	6.8	138.1	1.4	0.4	1.6	0.4
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	5.0	0.7	14.1	2.1	0.1	4.1	3.1	40.3	7.8	3.7	17.8	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.2	35.5	65.8	63.1	53.6	68.6	68.5	188.2	27.0	57.2	50.3	6.9
LnGrp LOS	D	D	E	E	D	E	E	F	C	E	D	A
Approach Vol, veh/h		809			258			2731			1917	
Approach Delay, s/veh		53.6			65.3			160.3			48.5	
Approach LOS		D			E			F			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.9	50.4	13.7	41.0	13.4	61.9	36.3	18.4
Change Period (Y+Rc), s	5.8	* 5.8	5.8	6.2	5.4	5.8	6.2	* 6.2
Max Green Setting (Gmax), s	8.0	* 45	9.9	44.3	8.0	44.6	10.2	* 44
Max Q Clear Time (g_c+I1), s	10.5	46.6	6.9	33.4	8.6	41.7	13.6	11.8
Green Ext Time (p_c), s	0.0	0.0	0.1	1.4	0.0	2.3	0.0	0.4

Intersection Summary	
HCM 6th Ctrl Delay	103.4
HCM 6th LOS	F

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	400	130	59	137	95	18	35	2325	117	46	1765	301
v/c Ratio	1.33	0.21	0.16	0.56	0.17	0.05	0.33	0.88	0.13	0.43	0.64	0.31
Control Delay	215.5	42.8	0.9	67.2	43.0	0.3	87.5	17.5	1.3	87.0	14.8	1.9
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	215.5	42.8	0.9	67.2	43.0	0.3	87.5	17.5	1.3	87.0	14.8	1.9
Queue Length 50th (ft)	~225	55	0	58	41	0	30	524	3	41	80	1
Queue Length 95th (ft)	#329	65	0	93	51	0	m33	m#947	m15	m49	#665	m65
Internal Link Dist (ft)		2568			826			2539			2603	
Turn Bay Length (ft)	200		200	200		200	250		250	250		250
Base Capacity (vph)	300	1137	585	259	1094	567	106	2652	879	108	2761	958
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.33	0.11	0.10	0.53	0.09	0.03	0.33	0.88	0.13	0.43	0.64	0.31

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	368	120	54	126	87	17	32	2139	108	42	1624	277
Future Volume (veh/h)	368	120	54	126	87	17	32	2139	108	42	1624	277
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	400	130	59	137	95	18	35	2325	117	46	1765	301
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	303	314	140	208	215	96	77	3151	978	87	3180	987
Arrive On Green	0.09	0.09	0.09	0.06	0.06	0.06	0.06	0.83	0.83	0.05	0.63	0.63
Sat Flow, veh/h	3401	3497	1560	3401	3497	1560	1753	5025	1560	1753	5025	1560
Grp Volume(v), veh/h	400	130	59	137	95	18	35	2325	117	46	1765	301
Grp Sat Flow(s),veh/h/ln	1700	1749	1560	1700	1749	1560	1753	1675	1560	1753	1675	1560
Q Serve(g_s), s	11.6	4.6	4.7	5.1	3.4	1.4	2.5	26.0	1.8	3.3	25.8	11.4
Cycle Q Clear(g_c), s	11.6	4.6	4.7	5.1	3.4	1.4	2.5	26.0	1.8	3.3	25.8	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	303	314	140	208	215	96	77	3151	978	87	3180	987
V/C Ratio(X)	1.32	0.41	0.42	0.66	0.44	0.19	0.45	0.74	0.12	0.53	0.56	0.30
Avail Cap(c_a), veh/h	303	1146	511	262	1103	492	108	3151	978	108	3180	987
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	1.00	1.00	1.00	0.42	0.42	0.42	0.57	0.57	0.57
Uniform Delay (d), s/veh	59.2	55.9	56.0	59.7	58.8	57.9	59.7	6.2	4.2	60.3	13.5	10.9
Incr Delay (d2), s/veh	163.2	0.8	1.9	4.1	1.4	0.9	1.7	0.7	0.1	2.8	0.4	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(50%),veh/ln	11.8	2.0	1.9	2.3	1.5	0.6	1.1	4.5	0.6	1.5	8.9	3.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	222.4	56.8	57.9	63.8	60.3	58.8	61.4	6.8	4.3	63.0	13.9	11.3
LnGrp LOS	F	E	E	E	E	E	E	A	A	E	B	B
Approach Vol, veh/h		589			250			2477			2112	
Approach Delay, s/veh		169.4			62.1			7.5			14.6	
Approach LOS		F			E			A			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	87.3	13.3	17.5	11.1	88.1	17.0	13.8
Change Period (Y+Rc), s	5.4	5.8	5.4	5.8	5.4	5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	47.0	10.0	42.6	8.0	47.0	11.6	41.0
Max Q Clear Time (g_c+I1), s	5.3	28.0	7.1	6.7	4.5	27.8	13.6	5.4
Green Ext Time (p_c), s	0.0	15.4	0.1	0.9	0.0	12.8	0.0	0.6

Intersection Summary	
HCM 6th Ctrl Delay	30.3
HCM 6th LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	334	243	125	135	276	168	16	1988	66	128	1650	184
v/c Ratio	1.21	0.36	0.29	0.46	0.40	0.38	0.08	0.82	0.08	0.57	0.60	0.20
Control Delay	171.0	44.6	3.2	62.0	44.9	7.5	58.5	34.4	0.2	61.1	18.9	5.2
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	171.0	44.6	3.2	62.0	44.9	7.5	58.5	34.4	0.2	61.1	18.9	5.2
Queue Length 50th (ft)	~176	104	0	56	118	4	6	442	0	57	380	53
Queue Length 95th (ft)	#274	110	19	91	123	52	19	#811	0	m79	#615	97
Internal Link Dist (ft)		891			1097			2371			2539	
Turn Bay Length (ft)	250		250	250		250	250		250	250		250
Base Capacity (vph)	277	1205	648	295	1186	638	209	2422	838	226	2759	923
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.21	0.20	0.19	0.46	0.23	0.26	0.08	0.82	0.08	0.57	0.60	0.20

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	307	224	115	124	254	155	15	1829	61	118	1518	169
Future Volume (veh/h)	307	224	115	124	254	155	15	1829	61	118	1518	169
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		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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	334	243	125	135	276	168	16	1988	66	128	1650	184
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	280	376	168	368	478	213	896	2784	864	209	1753	537
Arrive On Green	0.08	0.11	0.11	0.11	0.14	0.14	0.26	0.55	0.55	0.02	0.11	0.11
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	5066	1572	3428	5066	1553
Grp Volume(v), veh/h	334	243	125	135	276	168	16	1988	66	128	1650	184
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1689	1572	1714	1689	1553
Q Serve(g_s), s	10.6	8.6	10.0	4.8	9.5	13.4	0.5	37.8	1.4	4.8	42.0	10.6
Cycle Q Clear(g_c), s	10.6	8.6	10.0	4.8	9.5	13.4	0.5	37.8	1.4	4.8	42.0	10.6
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	280	376	168	368	478	213	896	2784	864	209	1753	537
V/C Ratio(X)	1.19	0.65	0.74	0.37	0.58	0.79	0.02	0.71	0.08	0.61	0.94	0.34
Avail Cap(c_a), veh/h	280	1212	541	368	1193	532	896	2784	864	211	1753	537
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.75	0.75
Uniform Delay (d), s/veh	59.7	55.7	56.3	53.9	52.7	54.4	35.6	21.7	4.4	62.2	56.3	24.3
Incr Delay (d2), s/veh	117.2	1.9	6.4	0.6	1.1	6.4	0.0	1.6	0.2	3.8	9.1	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(50%),veh/ln	9.1	3.8	4.2	2.0	4.2	5.6	0.2	14.3	0.9	2.2	20.4	4.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	176.9	57.6	62.8	54.5	53.8	60.7	35.6	23.3	4.5	66.0	65.4	25.6
LnGrp LOS	F	E	E	D	D	E	D	C	A	E	E	C
Approach Vol, veh/h		702			579			2070			1962	
Approach Delay, s/veh		115.3			56.0			22.8			61.7	
Approach LOS		F			E			C			E	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.3	77.3	19.7	19.7	39.8	50.8	16.0	23.4
Change Period (Y+Rc), s	5.4	5.8	5.8	* 5.8	5.8	* 5.8	5.4	5.8
Max Green Setting (Gmax), s	8.0	45.0	9.9	* 45	8.0	* 45	10.6	44.0
Max Q Clear Time (g_c+I1), s	6.8	39.8	6.8	12.0	2.5	44.0	12.6	15.4
Green Ext Time (p_c), s	0.0	4.4	0.1	1.8	0.0	0.8	0.0	2.2

Intersection Summary	
HCM 6th Ctrl Delay	53.0
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	15	24	160	160	1	1683	38	320	1592	14
v/c Ratio	0.10	0.15	0.26	0.26	0.01	0.79	0.05	0.81	0.46	0.01
Control Delay	47.6	47.6	1.1	1.1	49.0	28.7	0.1	52.9	12.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.6	47.6	1.1	1.1	49.0	28.7	0.1	52.9	12.0	0.0
Queue Length 50th (ft)	7	12	0	0	1	257	0	157	83	0
Queue Length 95th (ft)	36	49	0	0	7	#697	0	#506	494	0
Internal Link Dist (ft)			673			337			2371	
Turn Bay Length (ft)	50	200		200	250		250	250		250
Base Capacity (vph)	153	156	926	926	153	2133	752	397	3471	1127
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.15	0.17	0.17	0.01	0.79	0.05	0.81	0.46	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	0	0	22	0	294	1	1548	35	294	1465	13
Future Volume (veh/h)	14	0	0	22	0	294	1	1548	35	294	1465	13
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	15	0	0	24	0	320	1	1683	38	320	1592	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	50	2	0	318	0	312	4	2072	643	359	3114	967
Arrive On Green	0.03	0.00	0.00	0.18	0.00	0.10	0.00	0.41	0.41	0.20	0.61	0.61
Sat Flow, veh/h	1767	1856	0	1767	0	3145	1767	5066	1572	1767	5066	1572
Grp Volume(v), veh/h	15	0	0	24	0	320	1	1683	38	320	1592	14
Grp Sat Flow(s),veh/h/ln	1767	1856	0	1767	0	1572	1767	1689	1572	1767	1689	1572
Q Serve(g_s), s	0.7	0.0	0.0	1.0	0.0	5.2	0.0	25.2	1.3	15.1	15.1	0.3
Cycle Q Clear(g_c), s	0.7	0.0	0.0	1.0	0.0	5.2	0.0	25.2	1.3	15.1	15.1	0.3
Prop In Lane	1.00		0.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	50	2	0	318	0	312	4	2072	643	359	3114	967
V/C Ratio(X)	0.30	0.00	0.00	0.08	0.00	1.03	0.26	0.81	0.06	0.89	0.51	0.01
Avail Cap(c_a), veh/h	165	896	0	318	0	1507	165	2279	707	425	3114	967
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	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.8	0.0	0.0	29.2	0.0	14.8	42.6	22.4	15.3	33.2	9.3	6.4
Incr Delay (d2), s/veh	3.4	0.0	0.0	0.1	0.0	30.9	31.8	2.2	0.0	18.2	0.1	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	0.4	0.0	0.0	0.4	0.0	4.2	0.1	9.2	0.4	7.8	4.4	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.1	0.0	0.0	29.3	0.0	45.7	74.4	24.5	15.4	51.4	9.4	6.4
LnGrp LOS	D	A	A	C	A	F	E	C	B	D	A	A
Approach Vol, veh/h		15			344			1722			1926	
Approach Delay, s/veh		44.1			44.5			24.4			16.4	
Approach LOS		D			D			C			B	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	23.2	40.8	21.6	0.0	5.6	58.4	6.9	14.7
Change Period (Y+Rc), s	5.8	* 5.8	6.2	* 4.6	5.4	5.8	4.5	6.2
Max Green Setting (Gmax), s	20.6	* 39	8.0	* 41	8.0	51.1	8.0	41.0
Max Q Clear Time (g_c+I1), s	17.1	27.2	3.0	0.0	2.0	17.1	2.7	7.2
Green Ext Time (p_c), s	0.3	7.8	0.0	0.0	0.0	14.3	0.0	1.2

Intersection Summary	
HCM 6th Ctrl Delay	22.3
HCM 6th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	586	609	192	141	540	45	117	329	158	30	216	297
v/c Ratio	0.83	0.59	0.32	0.69	0.76	0.10	0.81	0.23	0.22	0.28	0.18	0.26
Control Delay	51.9	34.0	7.9	40.4	23.4	0.5	96.4	29.2	4.6	65.1	32.5	4.3
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	51.9	34.0	7.9	40.4	23.4	0.5	96.4	29.2	4.6	65.1	32.5	4.3
Queue Length 50th (ft)	247	237	30	60	240	1	99	105	0	25	68	0
Queue Length 95th (ft)	#363	249	54	m105	64	m0	#206	152	42	58	106	36
Internal Link Dist (ft)		2528			2598			521			667	
Turn Bay Length (ft)	250		250	250		250	200		200	273		273
Base Capacity (vph)	703	1094	622	251	952	547	144	1406	731	108	1189	1133
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.56	0.31	0.56	0.57	0.08	0.81	0.23	0.22	0.28	0.18	0.26

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	539	560	177	130	497	41	108	303	145	28	199	273
Future Volume (veh/h)	539	560	177	130	497	41	108	303	145	28	199	273
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	586	609	192	141	540	45	117	329	158	30	216	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	627	983	438	169	663	296	281	1466	654	73	1039	815
Arrive On Green	0.06	0.09	0.09	0.03	0.06	0.06	0.16	0.41	0.41	0.04	0.29	0.29
Sat Flow, veh/h	3456	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	2790
Grp Volume(v), veh/h	586	609	192	141	540	45	117	329	158	30	216	297
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1395
Q Serve(g_s), s	22.0	21.5	9.8	10.2	19.5	2.9	7.7	7.8	8.5	2.1	6.0	11.0
Cycle Q Clear(g_c), s	22.0	21.5	9.8	10.2	19.5	2.9	7.7	7.8	8.5	2.1	6.0	11.0
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	627	983	438	169	663	296	281	1466	654	73	1039	815
V/C Ratio(X)	0.93	0.62	0.44	0.84	0.81	0.15	0.42	0.22	0.24	0.41	0.21	0.36
Avail Cap(c_a), veh/h	627	1096	489	253	957	427	281	1466	654	110	1039	815
HCM Platoon Ratio	0.33	0.33	0.33	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.74	0.74	0.74	0.71	0.71	0.71	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.3	52.5	21.5	62.0	58.8	36.2	49.3	24.7	24.9	60.8	34.7	36.4
Incr Delay (d2), s/veh	17.1	0.7	0.5	10.3	2.6	0.2	1.0	0.4	0.9	3.7	0.5	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(50%),veh/ln	11.7	10.3	3.9	5.2	9.5	1.4	3.5	3.3	3.2	1.0	2.6	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	77.4	53.2	22.0	72.2	61.4	36.4	50.3	25.1	25.8	64.6	35.1	37.7
LnGrp LOS	E	D	C	E	E	D	D	C	C	E	D	D
Approach Vol, veh/h		1387			726			604			543	
Approach Delay, s/veh		59.1			61.9			30.1			38.2	
Approach LOS		E			E			C			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.7	59.4	18.1	41.7	26.3	43.8	29.4	30.5
Change Period (Y+Rc), s	5.4	5.8	5.8	5.8	5.8	* 5.8	5.8	* 6.2
Max Green Setting (Gmax), s	8.0	40.6	18.5	40.1	10.6	* 38	23.6	* 35
Max Q Clear Time (g_c+I1), s	4.1	10.5	12.2	23.5	9.7	13.0	24.0	21.5
Green Ext Time (p_c), s	0.0	2.6	0.2	4.0	0.0	2.4	0.0	2.7

Intersection Summary	
HCM 6th Ctrl Delay	50.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	224	471	32	13	590	86	26	378	99	46	284	154
v/c Ratio	0.77	0.35	0.05	0.12	0.79	0.17	0.24	0.27	0.14	0.39	0.19	0.20
Control Delay	41.4	9.7	0.5	60.3	56.7	0.7	63.9	30.0	0.4	67.6	27.3	4.0
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	41.4	9.7	0.5	60.3	56.7	0.7	63.9	30.0	0.4	67.6	27.3	4.0
Queue Length 50th (ft)	59	24	0	11	248	0	21	116	0	38	84	0
Queue Length 95th (ft)	94	169	m2	33	301	0	53	181	0	80	136	39
Internal Link Dist (ft)		2598			625			658			578	
Turn Bay Length (ft)	250		250	250		250	200		200	200		200
Base Capacity (vph)	383	1451	746	111	892	560	108	1410	733	125	1504	772
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.32	0.04	0.12	0.66	0.15	0.24	0.27	0.14	0.37	0.19	0.20

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	433	29	12	543	79	24	348	91	42	261	142
Future Volume (veh/h)	206	433	29	12	543	79	24	348	91	42	261	142
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	224	471	32	13	590	86	26	378	99	46	284	154
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	256	1125	502	41	697	311	335	1535	685	89	1033	461
Arrive On Green	0.05	0.10	0.10	0.02	0.20	0.20	0.19	0.43	0.43	0.05	0.29	0.29
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	224	471	32	13	590	86	26	378	99	46	284	154
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	16.2	16.1	1.4	0.9	20.8	6.0	1.6	8.8	4.9	3.3	8.0	6.7
Cycle Q Clear(g_c), s	16.2	16.1	1.4	0.9	20.8	6.0	1.6	8.8	4.9	3.3	8.0	6.7
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	256	1125	502	41	697	311	335	1535	685	89	1033	461
V/C Ratio(X)	0.88	0.42	0.06	0.32	0.85	0.28	0.08	0.25	0.14	0.52	0.27	0.33
Avail Cap(c_a), veh/h	386	1443	644	112	897	400	335	1535	685	123	1033	461
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.85	0.85	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.8	47.0	14.2	62.5	50.4	44.4	43.5	23.5	22.4	60.2	35.5	16.3
Incr Delay (d2), s/veh	11.9	0.2	0.0	4.3	6.1	0.5	0.1	0.4	0.4	4.6	0.7	1.9
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(50%),veh/ln	8.6	7.7	0.9	0.5	9.5	2.3	0.7	3.7	1.8	1.6	3.5	3.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.7	47.2	14.3	66.8	56.4	44.9	43.6	23.8	22.8	64.8	36.2	18.3
LnGrp LOS	E	D	B	E	E	D	D	C	C	E	D	B
Approach Vol, veh/h		727			689			503			484	
Approach Delay, s/veh		53.6			55.2			24.7			33.2	
Approach LOS		D			E			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.9	62.0	8.8	47.4	30.2	43.6	24.5	31.7
Change Period (Y+Rc), s	5.4	5.8	5.8	6.2	5.8	* 5.8	5.8	6.2
Max Green Setting (Gmax), s	9.0	36.8	8.2	52.8	8.0	* 38	28.2	32.8
Max Q Clear Time (g_c+I1), s	5.3	10.8	2.9	18.1	3.6	10.0	18.2	22.8
Green Ext Time (p_c), s	0.0	2.6	0.0	3.0	0.0	2.2	0.4	2.7

Intersection Summary	
HCM 6th Ctrl Delay	43.9
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	105	338	53	77	177	29	39	925	98	42	586	33
v/c Ratio	0.50	0.51	0.13	0.40	0.28	0.07	0.21	0.60	0.12	0.22	0.38	0.04
Control Delay	48.2	32.5	0.6	45.9	30.6	0.3	42.7	23.5	0.3	42.9	20.2	0.1
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	48.2	32.5	0.6	45.9	30.6	0.3	42.7	23.5	0.3	42.9	20.2	0.1
Queue Length 50th (ft)	54	89	0	39	45	0	20	208	0	21	117	0
Queue Length 95th (ft)	#145	131	0	99	73	0	59	383	0	63	224	0
Internal Link Dist (ft)		672			2597			422			506	
Turn Bay Length (ft)	200		200	200		200	200		200	200		200
Base Capacity (vph)	225	1579	786	193	1504	753	188	1550	807	188	1550	807
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.47	0.21	0.07	0.40	0.12	0.04	0.21	0.60	0.12	0.22	0.38	0.04

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	97	311	49	71	163	27	36	851	90	39	539	30
Future Volume (veh/h)	97	311	49	71	163	27	36	851	90	39	539	30
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	105	338	53	77	177	29	39	925	98	42	586	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	163	508	226	148	495	221	109	1498	668	109	1498	668
Arrive On Green	0.09	0.14	0.14	0.08	0.14	0.14	0.06	0.42	0.42	0.06	0.42	0.42
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	105	338	53	77	177	29	39	925	98	42	586	33
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	4.5	7.1	2.3	3.2	3.5	1.0	1.6	15.9	3.0	1.8	8.9	0.6
Cycle Q Clear(g_c), s	4.5	7.1	2.3	3.2	3.5	1.0	1.6	15.9	3.0	1.8	8.9	0.6
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	163	508	226	148	495	221	109	1498	668	109	1498	668
V/C Ratio(X)	0.64	0.67	0.23	0.52	0.36	0.13	0.36	0.62	0.15	0.39	0.39	0.05
Avail Cap(c_a), veh/h	218	1526	680	182	1453	648	182	1498	668	182	1498	668
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	34.3	31.8	29.7	34.4	30.5	17.2	35.3	17.7	14.0	35.3	15.7	4.7
Incr Delay (d2), s/veh	4.2	1.5	0.5	2.8	0.4	0.3	2.0	1.9	0.5	2.2	0.8	0.1
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(50%),veh/ln	2.0	2.9	0.9	1.4	1.4	0.5	0.7	6.0	1.0	0.8	3.3	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.5	33.3	30.3	37.2	31.0	17.4	37.2	19.6	14.4	37.5	16.4	4.9
LnGrp LOS	D	C	C	D	C	B	D	B	B	D	B	A
Approach Vol, veh/h		496			283			1062			661	
Approach Delay, s/veh		34.1			31.3			19.8			17.2	
Approach LOS		C			C			B			B	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.2	38.8	12.3	17.0	10.2	38.8	12.6	16.7				
Change Period (Y+Rc), s	5.4	5.8	5.8	* 5.8	5.4	5.8	5.4	5.8				
Max Green Setting (Gmax), s	8.0	33.0	8.0	* 34	8.0	33.0	9.6	32.0				
Max Q Clear Time (g_c+I1), s	3.8	17.9	5.2	9.1	3.6	10.9	6.5	5.5				
Green Ext Time (p_c), s	0.0	5.5	0.0	2.1	0.0	3.7	0.1	1.0				
Intersection Summary												
HCM 6th Ctrl Delay			23.2									
HCM 6th LOS			C									

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	430	380	32	83	347	15	12	855	176	38	589	266
v/c Ratio	0.83	0.43	0.06	0.19	0.60	0.04	0.09	0.78	0.29	0.28	0.46	0.36
Control Delay	52.2	39.2	0.2	33.6	45.2	0.1	53.0	40.8	7.5	56.3	29.2	5.4
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	52.2	39.2	0.2	33.6	45.2	0.1	53.0	40.8	7.5	56.3	29.2	5.4
Queue Length 50th (ft)	284	133	0	44	122	0	8	291	4	26	148	0
Queue Length 95th (ft)	#560	183	0	98	167	0	31	#485	63	67	288	67
Internal Link Dist (ft)		2563			2568			663			652	
Turn Bay Length (ft)	200		200	200		200	200		200	200		424
Base Capacity (vph)	531	1738	865	444	1099	606	137	1099	606	137	1272	739
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.22	0.04	0.19	0.32	0.02	0.09	0.78	0.29	0.28	0.46	0.36

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	396	350	29	76	319	14	11	787	162	35	542	245
Future Volume (veh/h)	396	350	29	76	319	14	11	787	162	35	542	245
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	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	430	380	32	83	347	15	12	855	176	38	589	266
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	467	525	234	437	476	212	40	1151	513	93	1271	567
Arrive On Green	0.26	0.15	0.15	0.25	0.13	0.13	0.02	0.32	0.32	0.05	0.36	0.36
Sat Flow, veh/h	1781	3554	1585	1781	3554	1585	1781	3554	1585	1781	3554	1585
Grp Volume(v), veh/h	430	380	32	83	347	15	12	855	176	38	589	266
Grp Sat Flow(s),veh/h/ln	1781	1777	1585	1781	1777	1585	1781	1777	1585	1781	1777	1585
Q Serve(g_s), s	23.2	10.1	1.5	3.6	9.3	0.7	0.7	21.2	8.3	2.0	12.6	12.8
Cycle Q Clear(g_c), s	23.2	10.1	1.5	3.6	9.3	0.7	0.7	21.2	8.3	2.0	12.6	12.8
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	467	525	234	437	476	212	40	1151	513	93	1271	567
V/C Ratio(X)	0.92	0.72	0.14	0.19	0.73	0.07	0.30	0.74	0.34	0.41	0.46	0.47
Avail Cap(c_a), veh/h	557	1820	812	437	1151	513	144	1151	513	144	1271	567
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	35.5	40.2	26.2	29.5	41.1	24.2	47.5	29.8	25.4	45.3	24.4	24.5
Incr Delay (d2), s/veh	18.8	1.9	0.3	0.2	2.2	0.1	4.0	4.4	1.8	2.8	1.2	2.8
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	11.9	4.4	0.7	1.5	4.0	0.3	0.3	9.1	3.2	0.9	5.2	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	54.3	42.1	26.4	29.7	43.2	24.3	51.5	34.1	27.2	48.2	25.7	27.3
LnGrp LOS	D	D	C	C	D	C	D	C	C	D	C	C
Approach Vol, veh/h		842			445			1043			893	
Approach Delay, s/veh		47.7			40.1			33.1			27.1	
Approach LOS		D			D			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.0	37.8	30.1	20.0	7.6	41.1	31.0	19.0
Change Period (Y+Rc), s	5.8	* 5.8	5.8	* 5.4	5.4	5.8	5.1	5.8
Max Green Setting (Gmax), s	8.0	* 32	12.4	* 51	8.0	32.0	30.9	32.0
Max Q Clear Time (g_c+I1), s	4.0	23.2	5.6	12.1	2.7	14.8	25.2	11.3
Green Ext Time (p_c), s	0.0	3.9	0.1	2.5	0.0	4.2	0.7	2.0

Intersection Summary	
HCM 6th Ctrl Delay	36.2
HCM 6th LOS	D

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.