FEHR PEERS

Technical Memorandum

Date: August 29, 2025

To: Jennifer Harmon, Diablo Engineering Group

From: Robert Rees, PE, and Lam Ngo, Fehr & Peers

Subject: 40th Street Multimodal Project – Part 1 and Part 2

OK22-0501

This memorandum summarizes the multimodal safety and operations analysis that Fehr & Peers completed for the 40th Street Multimodal Project (Project) in Emeryville, CA. It compares analysis results with and without the Project for the modeled transportation conditions along the 40th Street corridor, between Adeline Street and IKEA entry, (Part 1) and along the Shellmound Street corridor, between IKEA entry and Christie Avenue, (Part 2). The analysis maintains the overall assumptions and procedures described in the two *40th Street Multimodal Project – Multimodal Transportation Analysis* memorandums (October 2024). While expanding the safety analyses to address crashes between 2013 and 2024. A separate, detailed analysis of commercial vehicle movements, impacts, and proposed rerouting is provided in the *40th Street Multimodal Project - Truck Activity Analysis Memo* (August 2025).

Executive Summary

The 40th Street corridor (Part 1 and Part 2) serves as a critical link between residential areas, commercial centers, and transit hubs, making it essential to provide a facility that caters to a diverse range of users, including commuters, families, shoppers, and recreational cyclists. As noted in this memorandum between 2013 and 2024 there were sixty-three motor vehicle injury or fatal crashes, twenty-nine bicycle injury or fatal crashes, and sixteen pedestrian injury or fatal crashes, making safety a paramount concern in the decision-making process.

In 2018 the city, recognizing the need for safety enhancements, embarked on changing 40th Street (Part 1) between Adeline Street and the IKEA entry to provide a safer environment especially for the most vulnerable users – pedestrians and bicyclists – who experience a higher concentration of fatal and injury crashes on 40th Street. The Project (Part 1) was approved by the City Council in March 2020 and final engineering design began in March 2023. In July 2023, the City Council expanded the Project to include Shellmound Street (Part 2) which extended Part 1 of the Project from the IKEA entry north to Christie Avenue.

Key Project features approved by the City Council in March 2020 and incorporated into the design—eliminating one westbound traffic lane, incorporating a two-way cycle track, protected intersection improvements, improved pedestrian accessibility with shortened crossings, bus lanes, and enhanced bus stop waiting areas with shelters, lighting, and rider amenities—all contribute to making the 40th Street corridor and Transit Hub a safer and more comfortable environment. These features follow the Safe System Approach to proactively address vulnerable road user safety by reducing speed, removing conflicts, and separating users in space and time.

The engineering design was presented to the City Council in July 2023, and they directed the city to proceed with the Project and requested that additional safety features be incorporated that would further separate motor vehicle movements from pedestrian and bicycle movements. The added project features requested by the City Council, and described below, also follow the Safe System Approach.

- Watts Street allows right turning traffic to and from 40th Street. The Project eliminates right turning traffic from Watts Street to 40th Street while allowing right turning traffic from 40th Street. The crosswalk and the two-way cycle track are raised to sidewalk-level crossing Watts Street to slow right turning traffic. The half-closure will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change follows the Safe System Approach by reducing turning vehicle speeds and removing conflicts and responds to community feedback that drivers turning right from Watts Street may not look to the left and right for bicycle riders before proceeding onto 40th Street.
- Haven Street allows right turning traffic to and from 40th Street. The Project includes a cul-de-sac at Haven Street, eliminating right turning traffic both to and from Haven Street at 40th Street. This change will be accompanied with signage and potential curb and parking modifications to make the route changes intuitive to truck drivers. The cul-de-sac will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change follows the Safe System Approach by removing conflicts, and addresses community feedback that drivers turning right from Haven Street may not look to the left and right for bicycle riders before proceeding onto 40th Street as well as community support for expanded landscape treatments.
- Holden Street allows right turning traffic to and from 40th Street. The Project eliminates right turning traffic from Holden Street to 40th Street while allowing right turning traffic from 40th Street. The crosswalk and the two-way cycle track are raised to sidewalk level crossing Holden Street to slow right turning traffic. The half-closure will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change follows the Safe System Approach by reducing turning vehicle speeds and removing conflicts, and it addresses community feedback that drivers turning right from Holden Street may not look to the left and right for bicycle riders before proceeding onto 40th Street.

- Hubbard Street allows right turning traffic to and from 40th Street. The Project includes a cul-de-sac at Hubbard Street eliminating right turning traffic both to and from Hubbard Street. This change will be accompanied with signage and potential curb and parking modifications to make the route changes intuitive to truck drivers. The cul-de-sac will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change follows the Safe System Approach by removing conflicts, and addresses the following safety concerns from stakeholders and decision-makers:
    - Eastbound bicycle riders traveling at high speeds down the Shellmound Bridge (greater than 5% grade) and conflicting with vehicles turning right to and from Hubbard Street.
    - Trees, poles, and signage constraining sight lines between drivers turning right from Hubbard Street and eastbound bicycle riders (with Project construction).
    - The bus lane that ends at Hubbard Street, where buses merge into one shared mixed-flow lane over the bridge, increases rear-end crash potential with right turning traffic onto Hubbard Street.

The City Council, in July, also expanded the project to include Shellmound Street (Part 2) between the IKEA entry, where Part 1 is terminated, and the Christie Avenue intersection. Part 2 includes a two-way cycle track along the west side of Shellmound Street and bus lanes that would operate on weekdays, Monday through Friday. The bus lanes would be open to all traffic on weekends.

The remainder of this memorandum compares transportation conditions with and without the Project along 40th Street (Part 1) and Shellmound Street (Part 2) and includes the following key highlights:

- **Project Design and Implementation**: The Safe System Approach led to a Project that includes a multimodal transportation design, with features such as a two-way cycle track, bus lanes, and full or partial closures of unsignalized intersections to improve safety and accessibility for all road users. The Project is consistent with the City Council original decision in 2018 to embark on changing 40th Street to provide a safer environment for its most vulnerable users. The Project was approved by the City Council in March 2020, and the design was reviewed by the City Council in July 2023. The council, in July 2023, directed the city to proceed with the Project (Part 1 and Part 2) with additional safety features at the unsignalized intersections along the corridor to reduce vehicle speeds and remove vehicle conflicts with pedestrians and bicyclists. To address specific concerns from local businesses regarding commercial vehicle access, a comprehensive truck activity study was conducted; its findings and recommendations for truck routing are detailed in the *40th Street Multimodal Project - Truck Activity Analysis Memo*.
- **Public and Stakeholder Engagement**: Extensive community engagement efforts, including surveys and workshops, have been conducted and are on-going to gather feedback and refine the design. The Project team also engaged with key stakeholders,

including property owners and transit agencies, to address concerns and incorporate feedback into the design. The final design evaluated in this memorandum reflects public preferences for safety and accessibility improvements.

- **Safety Improvements**: The City Council in 2018 prioritized safety for the Project and the City followed the Safe System Approach to proactively address vulnerable road user safety throughout the project's design development. The Project, approved in 2020, addressed high-risk areas through design features such as protected intersections, bulb outs, and high-visibility crosswalks combined with the two-way cycle track with the aim to reduce vehicle speeds, remove conflicts, separate users in space and time, and reduce collisions. The City Council in July 2023, consistent with the Safe System Approach, incorporated additional safety features at unsignalized intersections to reduce speeds and remove conflicts.
- **Public Design**: In response to community feedback regarding safety and security in the newly created public spaces, the project incorporates Crime Prevention Through Environmental Design (CPTED) principles. The design of parklets and cul-de-sacs will maximize visibility, ensuring that activities are easily observed by passersby, adjacent businesses, and law enforcement. This includes strategic placement of lighting, clear sightlines, and open layouts. These design elements, combined with the City's ongoing and active encampment outreach and support programs, are intended to ensure these new public spaces enhance the quality of life for residents and businesses while deterring encampments and illicit behavior.
- **Multimodal Operations**: The analysis in this memorandum used Vissim software for Part 1 to simulate multimodal traffic operations during the weekday PM peak hour to understand multimodal operations without and with the Project. Findings show overall intersection operations along 40th Street remain at LOS D or better with the Project including the unsignalized side street modifications and so there will be no time incentive for drivers to divert to the Park Avenue corridor. Overall, bus travel times on 40th Street improve with the Project. Although delays increase such as through the Transit Hub where pedestrian and bike activities are highest. Intersection operations along Park Avenue and Hollis Street remain at LOS B or better with the Project indicating that changes to the 40th Street unsignalized intersections would not cause traffic congestion on either Park Avenue or Hollis Street. As noted in the *40th Street Multimodal Project - Truck Activity Analysis Memo* trucks are currently using Park Avenue even though truck restriction signs are posted throughout the corridor west of Hollis Street and the multimodal operations analysis assumed that this behavior would continue. To offset these impacts and enhance safety, the city is implementing a holistic strategy for Park Avenue that includes new, clearer truck wayfinding signage to better direct commercial vehicles. The city is also actively improving pedestrian safety on Park Avenue through separate initiatives, such as the 2024 Sustainable Streetscapes project, which is adding high visibility crosswalks and green infrastructure bulb-outs at the Park Avenue and Hollis Street intersection. Multimodal operations analysis was also completed for Part 2 using

the Synchro software. Findings show that overall intersection operations along Shellmound Street remain at LOS D or better with the Project.

The remainder of this memorandum addresses the following topics.

1. Project Features
2. City Decision Process
   2.1. Engagement Efforts
3. Safety Assessment (40th Street and Shellmound Street)
   3.1. Collision Characteristics
   3.2. Vehicle Speed Implications
   3.3. Sight Distance Implications
   3.4. Conflict Points
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   3.6. Adequacy of Traffic Control
   3.7. Adequacy of Bike and Pedestrian Facilities
   3.8. Reduce Behaviors Leading to Crashes
   3.9. Consideration for Two-Way Cycle Track
4. Multimodal Operations (40th Street, Project Part 1)
   4.1. Methodology
      4.1.1. Vissim Model
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      4.2.3. Level of Service
   4.3. Analysis Results
      4.3.1. Bus Maneuvering Time
      4.3.2. Corridor Travel Times
         4.3.2.1. Bus (AC Transit and EGR combined) Travel Times
         4.3.2.2. Auto / Truck Travel Times
      4.3.3. Level of Service and Delay Analysis
5. Multimodal Operations (Shellmound Street, Project Part 2)
   5.1. Methodology and Study Intersections
   5.2. Project Analysis Assumptions
   5.3. Analysis Results
      5.3.1. Level of Service and Delay Analysis
6. Appendix

1. Project Features

Attachment A provides a striping layout of the 40th Street Multimodal Project (Part 1 and Part 2), which was based, in part, on the preferred design concept described in the concept drawings approved by the City Council in 2020. The 2020 concept design for 40th Street (Part 1) converts an existing motor vehicle lane in the westbound direction to a bus lane, adds a new bus lane in the

eastbound direction, and provides a two-way cycle track on the north side of 40th Street by removing the existing on-street bike lanes and the on-street parking on the north side of 40th Street, adjusting the existing medians, and reducing the motor vehicle lane widths. Part 2 provides a two-way cycle track on the west side of Shellmound Street by removing the on-street bike lanes, modifying the median, and narrowing the motor vehicle lane widths.

On 40th Street (Part 1) the new eastbound bus lane starts after the IKEA Entry signalized intersection via a lane drop, east of the intersection, and ends at the Adeline Street intersection. The westbound bus lane starts after the Adeline Street signalized intersection and ends at Hubbard Street, where it merges with one shared mixed-flow lane over the bridge. On Shellmound Street (Part 2) one of the lanes in each direction operates as a bus lane on weekdays, Monday through Friday, and these lanes open to all traffic during the weekends.

A key feature of the 2020 concept is the traffic signal phasing on San Pablo Avenue. Due to high westbound right-turning traffic volume, the right-turn is protected with right-turn red, yellow, and green arrows. As a result, right turning traffic does not conflict with either bicycle or pedestrian movements crossing San Pablo Avenue, which would both go concurrently with the westbound motor vehicle through movement while the westbound right turning traffic has a red arrow.

Following the 2020 concept design, additional Project design features include changes to the unsignalized intersections along westbound 40th Street at Watts Street, Haven Street, Holden Street, and Hubbard Street. The specific design choices for these intersections were informed by a detailed truck activity analysis, which is documented in the *40th Street Multimodal Project - Truck Activity Analysis Memo* and addresses truck routing and circulation.

- Watts Street allows right turning traffic to and from 40th Street. The Project eliminates right turning traffic from Watts Street to 40th Street while allowing right turning traffic from 40th Street. The crosswalk and the two-way cycle track are raised to sidewalk-level crossing Watts Street to slow right turning traffic. The half-closure will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change addresses community feedback that drivers turning right from Watts Street may not look to the left for bicycle riders before proceeding onto 40th Street.
- Haven Street allows right turning traffic to and from 40th Street. The Project includes a cul-de-sac at Haven Street, eliminating right turning traffic both to and from Haven Street at 40th Street. This change will be accompanied with signage and potential curb and parking modifications to make the route changes intuitive to truck drivers. The cul-de-sac will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change addresses community feedback that drivers turning right from Haven Street may not look to the left for bicycle riders before proceeding onto 40th Street as well as community support for expanded landscape treatments.

- Holden Street allows right turning traffic to and from 40th Street. The Project eliminates right turning traffic from Holden Street to 40th Street while allowing right turning traffic from 40th Street. The crosswalk and the two-way cycle track are raised to sidewalk level crossing Holden Street to slow right turning traffic. The half-closure will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change addresses community feedback that drivers turning right from Holden Street may not look to the left for bicycle riders before proceeding onto 40th Street.
- Hubbard Street allows right turning traffic to and from 40th Street. The Project includes a cul-de-sac at Hubbard Street eliminating right turning traffic both to and from Hubbard Street at 40th Street. This change will be accompanied with signage and potential curb and parking modifications to make the route changes intuitive to truck drivers. The cul-de-sac will be designed to accommodate the turning radii of emergency vehicles, large delivery vehicles (SU-30), and WB-40 trucks. This change addresses the following concerns from stakeholders and decision-makers:
    - Eastbound bicycle riders traveling at high speeds down the Shellmound Bridge (greater than 5% grade) and conflicting with vehicles turning right to and from Hubbard Street.
    - Trees, poles, and signage constraining sight lines between drivers turning right from Hubbard Street and eastbound bicycle riders (with Project construction).
    - The bus lane that ends at Hubbard Street, where buses merge into one shared mixed-flow lane over the bridge, increases rear-end crash potential with right turning traffic onto Hubbard Street.

2. City Decision Process

The city presented the Project to the Transportation Committee in May 2023 and to the City Council in July 2023. **Attachment B** provides the Action Minutes for the Transportation Committee meeting, City Council Meeting, as well as the Adopted City Council Resolution (Number 23-105).

The May 2023 Transportation Committee meeting provided an update on the planning process, grant funding, public engagement, and anticipated schedule. Three alternatives were presented including the base project as well two alternatives that incorporated unsignalized intersection side street closures: one with a Horton diverter and one without the diverter. The committee raised concerns with the base project's design at the Hubbard Street/40th Street intersection. Specifically, bicycle riders descending Shellmound Bridge would travel at high speeds approaching Hubbard Street, conflicting with drivers turning to and from Hubbard Street. The committee was also concerned that two westbound vehicle lanes merging into a single lane at Hubbard Street would complicate driver decisions turning to and from Hubbard Street, that drivers would tend to speed

up when approaching Shellmound Street Bridge, and that bus merging would further complicate the condition. The committee passed a motion to recommend to the City Council a design alternative that includes the closure of the four unsignalized side streets i.e., Watts Street, Haven Street, Holden Street, and Hubbard Street.

The July 2023 City Council meeting was well attended with people speaking in support of and against the modified Project. Property owners along Hubbard Street, Holden Street, and Watts Street urged the council members not to fully close the connections to the side streets at 40th Street. The following are property owners' opinions on the modified Project:

- Property owners along Haven Street voiced support for the modified Project and closure of Haven Street at 40th Street to support weekend and evening events.
- Property owners on Holden Street expressed concerns about impacts on customers, including losing parking, but showed support for the modified Project if the council voted to allow the right turning traffic from 40th Street at Holden Street to accommodate delivery trucks and customer loading. Property owners on Watts Street expressed similar sentiments.
- An attorney for the property owner between Hubbard Street and Halleck Street expressed concern that closing Hubbard Street at 40th Street was a significant impact on the property's access.

The council members discussed these topics, and others, and directed the City to proceed with the modified Project including a cul-de-sac at Haven Street and accommodating right turning traffic from 40th Street onto Watts Street and onto Holden Street. After discussion, the council members determined that the Hubbard Street closure was necessary to improve the Project's safety, reducing the conflicts between high-speed bicycle riders and drivers turning to/from Hubbard Street as well as the merging and turning conflicts between drivers at Hubbard Street. The council members noted that Hubbard Street had parallel street access via Park Avenue. The 40th Street Multimodal Project (Attachment A) evaluated in this memorandum responds to the City Council direction.

2.1 Engagement Efforts

In 2018, public engagement focused on design options. Invitations mailed to over 10,000 addresses in Emeryville and Oakland included an online survey link, which received ninety-three responses. Four out of five respondents preferred the final concept. A community workshop and survey in 2019 reaffirmed this preference, with over 70% of more than fifty respondents supporting it despite traffic trade-offs. The city council provided input on the concept design in December 2018 based on public input, technical assessment, and feedback from transit agencies. The final report and design were approved by the City Council in March 2020.

The final engineering design phase began in March 2023. The design was refined to assess full or partial closures of unsignalized intersections north of 40th Street, balancing local access and

reducing vehicle/bicycle conflicts. For example, AC Transit provided input through multiple meetings and plan reviews, leading to bus stop design refinements. Similarly, property owners, employees, and residents provided input, leading to design refinements.

Over six hundred Project postcards with multilingual contact information were mailed in June 2023 to residents and businesses in the broader area, and over 450 detailed letters were sent to those residing on 40th Street and the northside streets to convey the proposed side street closures. A dedicated Project phone number and email address were provided along with a Project webpage link. The Project team engaged with key stakeholders through phone calls, emails, and fourteen meetings with over seventy stakeholders. These meetings, held either at the stakeholders' business/property locations or via Zoom, aimed to reduce barriers to engagement.

The Project team contacted businesses along the side streets impacted by the street closures and met with specific businesses that requested a meeting to address the Project's implications to their business operations such as customer and delivery access, parking, and pedestrian and bicycle circulation. This outreach began in June 2023 and is on-going.

An online survey from February to June 2024 received 137 responses, with over 90% of bicyclists and transit riders and about 80% of pedestrians saying the Project with the side street closures would improve their travel. Almost 30% of drivers said the improvements would encourage them to take the bus or ride their bike.[1] The survey was publicized by contacting local employers, distributing the link to employees, emailing those on the Project email list, providing a QR code for the survey and Project website on sidewalk decals on 40th Street, and distributing the QR code to over 200 people at two project area energizer stations during 2024's Bike to Wherever Day on May 16. Spanish-speaking staff members were available at the stations.

The engagement efforts will continue and include information and education as the Project design is finalized, and the Project is constructed. Once the online survey is completed, a summary of input will be prepared, along with an update to the Project website to provide additional information and a frequently asked questions (FAQ) document responding to questions raised by respondents to the survey. The Project email list of more than eighty individuals and organizations will be notified when the website is updated. Additional meetings with adjacent businesses, property owners, and other stakeholders or stakeholder groups will occur as needed before the design phase concludes.

[1] https://fp.mysocialpinpoint.com/40thstreetmultimodal

3. Safety Assessment

The 40th Street Multimodal Project is intended to improve transportation infrastructure, emphasizing first/last mile connections and safety for residents on the corridor, employees commuting to their jobs, and people exploring the Bay Trail in the area. Safety features of the Project include the two-way cycle track providing a dedicated and protected space for riding; enhanced intersections with shorter crossing distances, accessible waiting areas, protected bicycle movements, and upgraded signal timing and phasing; side street full and partial closures to minimize conflicts between pedestrians, bike riders, and motor vehicles; and transit islands to separate bike riders from buses and pedestrian (un)loading activities. These features follow the Safe System Approach to proactively address vulnerable road user safety by reducing speed, removing conflicts, and separating users in space and time.

3.1 Collision Characteristics

The project area collision summaries (**Table 1** through **Table 4**) show forty-five crashes over a 12-year period (2013 to 2024) between vehicles and both cyclists and pedestrians that resulted in injury or fatality. During this same period there were sixty-three auto-only collisions with an injury or fatality. These collisions are also noted in **Figures 1A** through **Figure 1D**.

Collision records prior to 2013 are not available from the Statewide Integrated Traffic Records System (SWITRS) database which is managed by the California Highway Patrol or the Transportation Injury Mapping System (TIMS) database which is managed by SafeTREC at UC Berkeley. The 2023 and 2024 collision data are considered provisional by both agencies managing these databases and are, therefore, subject to change. Last, the COVID pandemic in 2020 and 2021 dampened traffic volumes which explains why there were fewer collisions in these two years compared to the earlier years between 2013 and 2019.

The remaining discussion in this section addresses the most vulnerable users – pedestrians and bicyclists – who experience a higher concentration of fatal and injury crashes compared to the total number of people traveling in the corridor.

Table 1A: Auto Collisions – 2013 Through 2018

Figure ID #	Case ID	Collision Date	Collision Severity	Type of Collision
1	6193510	7/3/2013	Complaint of pain	Rear End
2	5997040	1/19/2013	Complaint of pain	Rear End
3	6876971	2/5/2015	Injury (Other Visible)	Broadside
4	6859549	12/21/2014	Complaint of pain	Hit Object
5	8351677	9/6/2015	Injury (Other Visible)	Broadside
6	6693615	8/21/2014	Complaint of pain	Rear End

Figure ID #	Case ID	Collision Date	Collision Severity	Type of Collision
7	8365891	4/3/2017	Complaint of pain	Rear End
8	6699493	9/20/2014	Complaint of pain	Broadside
9	8620568	11/22/2017	Complaint of pain	Sideswipe
10	6418516	1/24/2014	Complaint of pain	Rear End
11	6537536	3/2/2014	Complaint of pain	Broadside
12	8351604	1/22/2017	Complaint of pain	Hit Object
13	8351602	11/24/2015	Complaint of pain	Sideswipe
14	8625210	8/10/2017	Complaint of pain	Rear End
15	8351610	12/11/2015	Complaint of pain	Broadside
16	8351609	7/29/2015	Complaint of pain	Sideswipe
17	90261275	8/30/2016	Complaint of pain	Head-on
18	8618347	10/21/2017	Injury (Other Visible)	Rear End
19	8620576	11/4/2017	Complaint of pain	Rear End
20	8351613	2/18/2016	Complaint of pain	Rear End
21	6698881	8/15/2014	Injury (Severe)	Not Stated
22	8351674	1/29/2016	Complaint of pain	Broadside
23	8351636	7/3/2016	Complaint of pain	Broadside
24	6859545	12/18/2014	Complaint of pain	Broadside
25	8351628	7/9/2016	Complaint of pain	Rear End
26	8351670	2/8/2017	Complaint of pain	Hit Object
27	6942267	1/9/2015	Complaint of pain	Rear End
28	8769211	12/5/2018	Injury (Other Visible)	Rear End
29	8351601	6/20/2015	Complaint of pain	Rear End
30	6296070	9/25/2013	Complaint of pain	Rear End
31	6942729	4/25/2015	Complaint of pain	Rear End
32	8363436	4/13/2017	Complaint of pain	Rear End
33	8618351	10/8/2017	Complaint of pain	Rear End
34	8624223	8/28/2017	Complaint of pain	Broadside
35	6516655	3/1/2014	Complaint of pain	Rear End
36	8351615	11/5/2015	Complaint of pain	Overturned
37	8695573	8/9/2018	Complaint of pain	Rear End
38	6942699	3/17/2015	Complaint of pain	Sideswipe

Source: SWITRS and TIMS databases (2013 through 2018), Fehr & Peers 2025

Table 1B: Auto Collisions – 2019 Through 2024

Figure ID #	Case ID	Collision Date	Collision Severity	Type of Collision
1	8897786	6/6/2019	Injury (Other Visible)	Broadside
2	82356747	2/27/2024	Complaint of pain	Rear End
3	9463379	6/27/2022	Injury (Other Visible)	Broadside
4	9546726	12/22/2022	Complaint of pain	Broadside
5	8970835	9/15/2019	Injury (Other Visible)	Rear End
6	8907495	7/7/2019	Complaint of pain	Rear End
7	9301796	7/14/2021	Fatal	Head-on
8	9435254	3/17/2022	Injury (Severe)	Sideswipe
9	8877134	5/7/2019	Complaint of pain	Rear End
10	9546829	8/17/2022	Complaint of pain	Broadside
11	9547117	8/9/2022	Complaint of pain	Hit Object
12	84514380	11/30/2024	Complaint of pain	Rear End
13	82877692	6/27/2024	Complaint of pain	Rear End
14	8943597	8/15/2019	Injury (Other Visible)	Rear End
15	84472530	11/4/2024	Complaint of pain	Broadside
16	82367255	3/30/2024	Complaint of pain	Rear End
17	9016746	1/28/2020	Injury (Other Visible)	Rear End
18	8943530	8/1/2019	Injury (Other Visible)	Head-on
19	8907483	7/16/2019	Injury (Other Visible)	Rear End
20	9547052	10/5/2022	Complaint of pain	Rear End
21	9547067	9/21/2022	Complaint of pain	Sideswipe
22	9221278	12/22/2020	Injury (Other Visible)	Head-on
23	84420296	9/20/2024	Injury (Severe)	Broadside
24	8975255	10/26/2019	Complaint of pain	Sideswipe
25	9546725	12/12/2022	Complaint of pain	Rear End

Source: SWITRS and TIMS databases (2019 through 2024), Fehr & Peers 2025

Table 1C: Bicycle Collisions – 2013 Through 2024

Figure ID #	Case ID	Collision Date	Collision Severity	Type of Collision
1	6699150	10/13/2014	Complaint of pain	Broadside
2	82356738	2/17/2024	Complaint of pain	Other
3	8351625	2/15/2016	Injury (Other Visible)	Broadside
4	8855841	4/24/2019	Injury (Other Visible)	Rear End
5	6203353	8/10/2013	Complaint of pain	Broadside
6	8625084	4/25/2018	Complaint of pain	Broadside
7	8975787	10/2/2019	Injury (Other Visible)	Broadside
8	82376433	3/23/2024	Complaint of pain	Head-on
9	6436788	2/26/2014	Complaint of pain	Other
10	6698905	8/16/2014	Complaint of pain	Not Stated
11	6835732	11/25/2014	Complaint of pain	Rear End
12	8003055	11/14/2015	Complaint of pain	Broadside
13	6430197	2/24/2014	Injury (Other Visible)	Head-on
14	6623331	5/9/2014	Complaint of pain	Broadside
15	8351605	8/27/2016	Complaint of pain	Broadside
16	6699513	9/12/2014	Injury (Other Visible)	Not Stated
17	9548591	9/4/2022	Complaint of pain	Head-on
18	6537548	3/13/2014	Complaint of pain	Not Stated
19	6699166	10/13/2014	Injury (Other Visible)	Broadside
20	6298964	10/26/2013	Complaint of pain	Broadside
21	6630001	6/18/2014	Injury (Other Visible)	Not Stated
22	8351665	7/20/2015	Injury (Other Visible)	Sideswipe
23	9456342	5/23/2022	Injury (Other Visible)	Other
24	6623916	7/5/2014	Injury (Other Visible)	Broadside
25	8351645	10/15/2015	Complaint of pain	Head-on
26	84359241	8/5/2024	Complaint of pain	Broadside
27	8351671	6/22/2016	Injury (Other Visible)	Broadside
28	8351631	10/20/2015	Complaint of pain	Rear End
29	84518724	12/5/2024	Complaint of pain	Broadside

Source: SWITRS and TIMS databases (2013 through 2024), Fehr & Peers 2025

Table 1D: Pedestrian Collisions – 2013 Through 2024

Figure ID #	Case ID	Collision Date	Collision Severity	Type of Collision
1	5997036	1/28/2013	Complaint of pain	Vehicle/Pedestrian
2	9168089	9/9/2020	Injury (Other Visible)	Vehicle/Pedestrian
3	6204825	6/12/2013	Complaint of pain	Vehicle/Pedestrian
4	8880116	5/3/2019	Injury (Other Visible)	Vehicle/Pedestrian
5	9554440	1/29/2023	Injury (Severe)	Vehicle/Pedestrian
6	8351603	11/8/2015	Complaint of pain	Vehicle/Pedestrian
7	8774390	12/16/2018	Injury (Other Visible)	Vehicle/Pedestrian
8	9548599	10/20/2022	Injury (Other Visible)	Head-on
9	6699505	9/20/2014	Complaint of pain	Vehicle/Pedestrian
10	6106326	2/12/2013	Complaint of pain	Vehicle/Pedestrian
11	6299543	9/6/2013	Injury (Other Visible)	Vehicle/Pedestrian
12	6418488	1/26/2014	Complaint of pain	Vehicle/Pedestrian
13	5997020	1/31/2013	Injury (Other Visible)	Vehicle/Pedestrian
14	8756515	11/17/2018	Injury (Other Visible)	Head-on

Source: SWITRS and TIMS databases (2013 through 2024), Fehr & Peers 2025

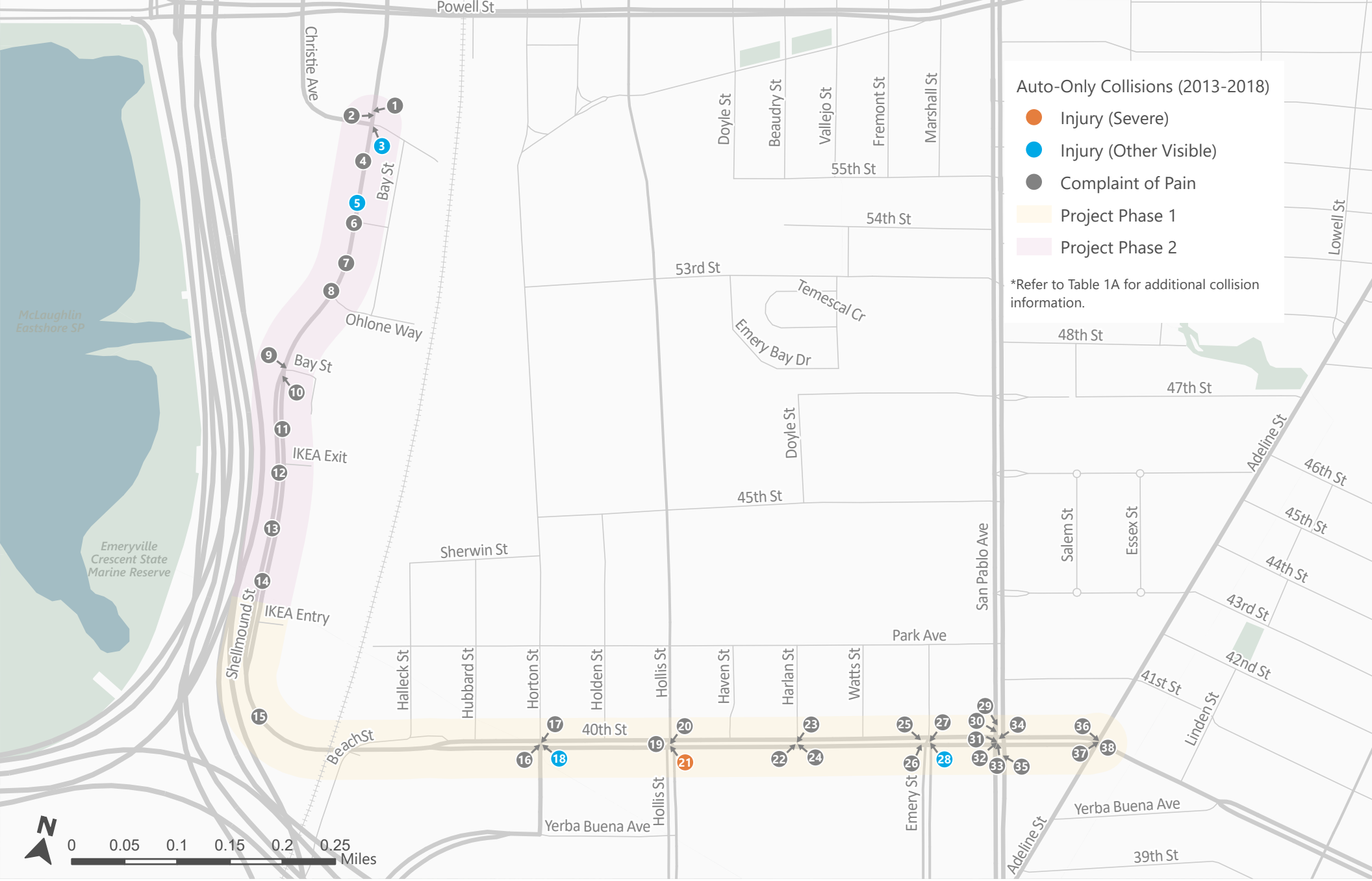


Figure 1A

40th Street Multimodal Project

Auto-Only Collisions Map (2013-2018)

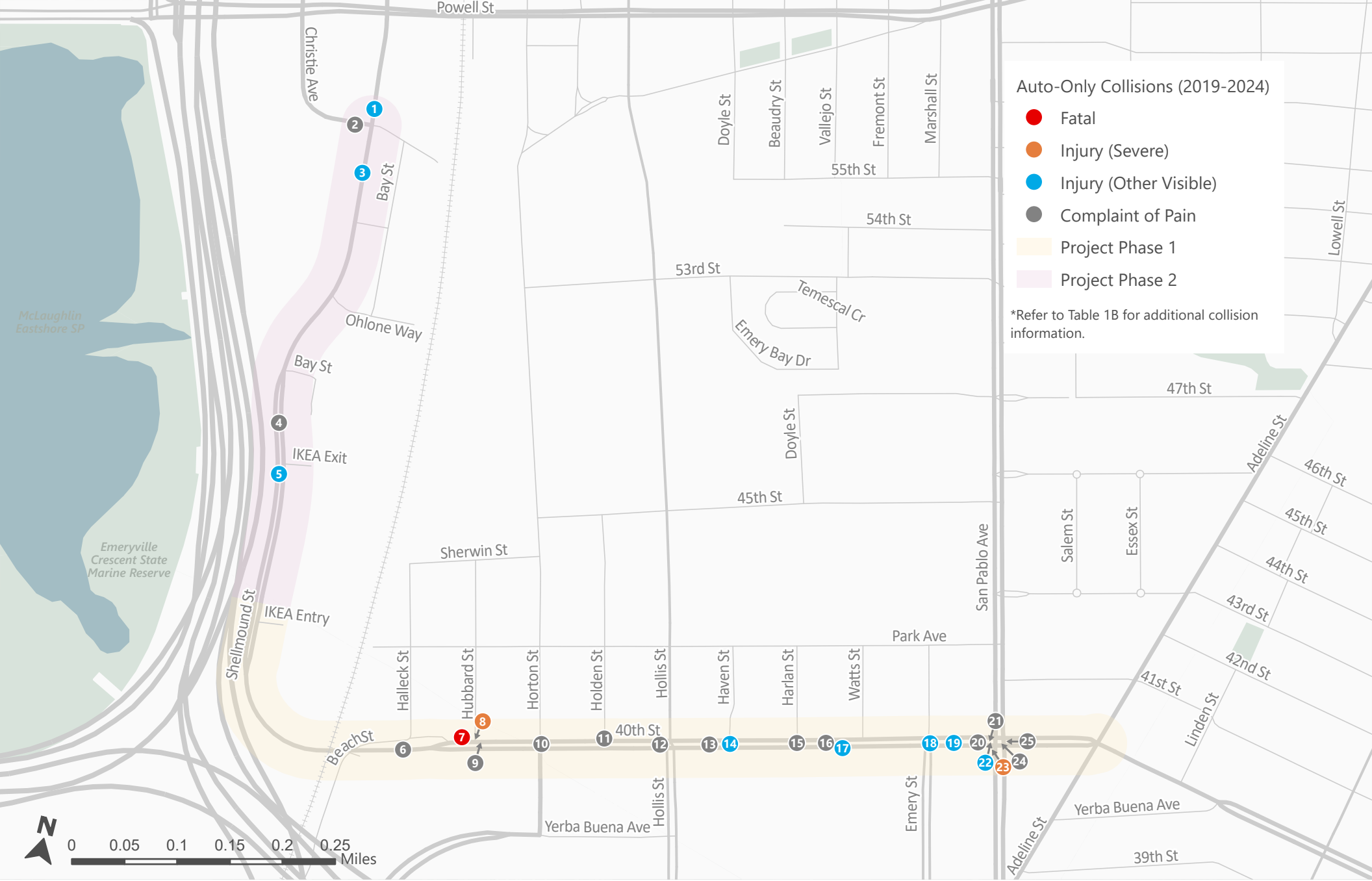


Figure 1B

40th Street Multimodal Project

Auto-Only Collisions Map (2019-2024)

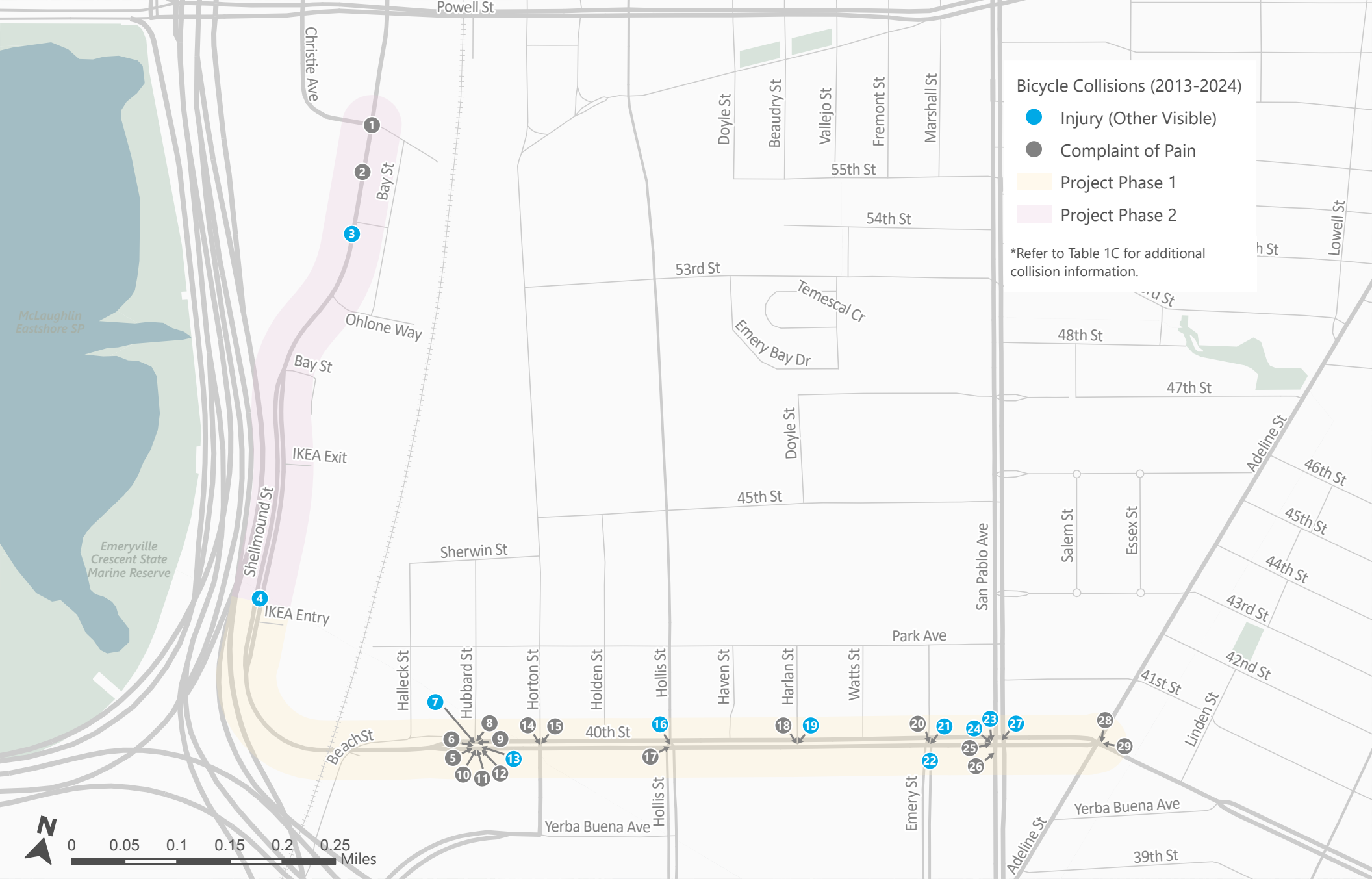


Figure 1C

40th Street Multimodal Project

Bicycle Collisions (2013-2024) Map

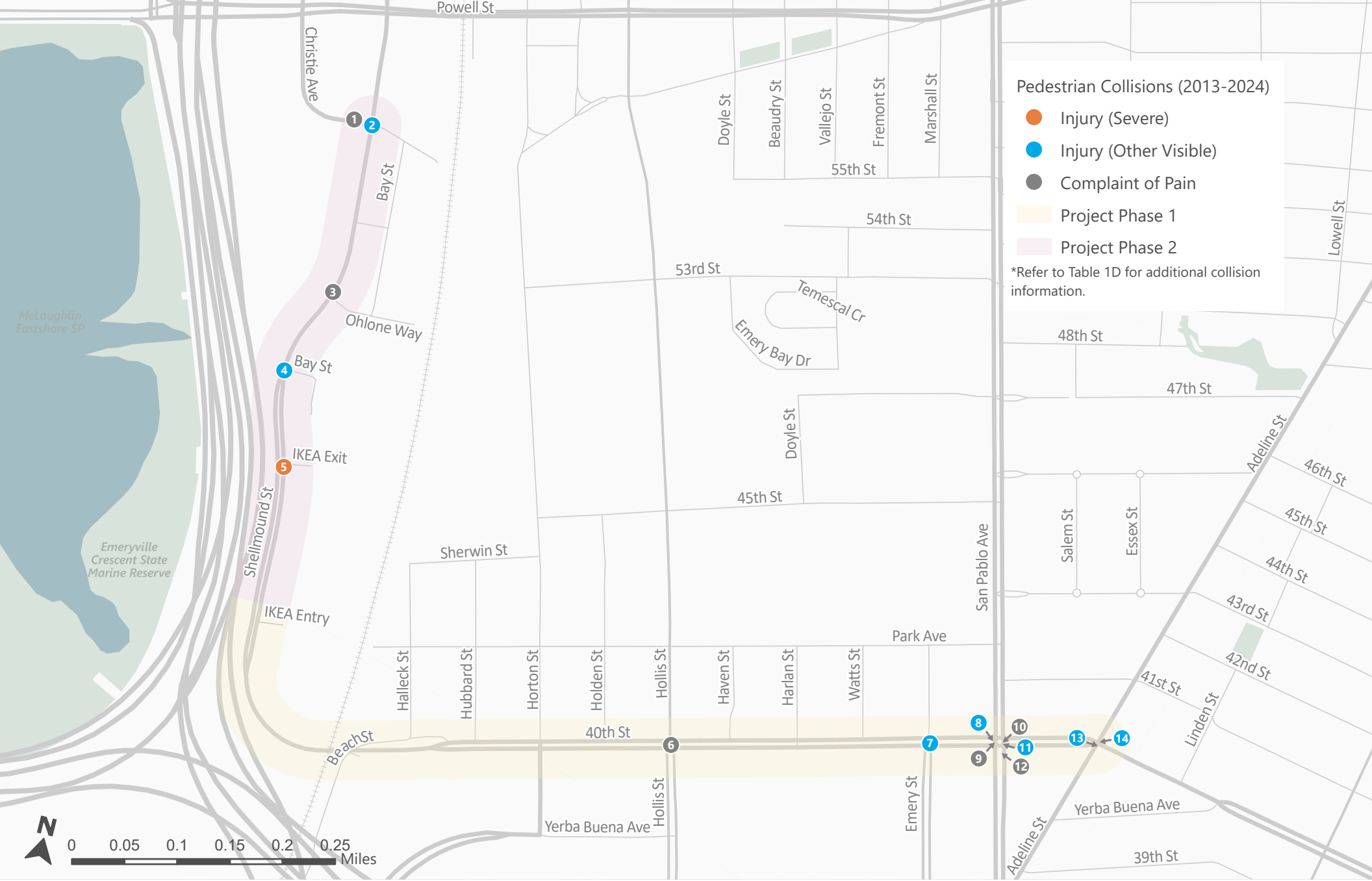


Figure 1D

40th Street Multimodal Project

Pedestrian Collisions (2013-2024) Map

Along 40th Street (Part 1), nine bike injuries, or complaints of pain, occurred at the intersection of 40th Street and Hubbard Street. This intersection is a concern because it tees into an uncontrolled part of 40th Street where the two existing westbound lanes merge together into a single lane over the bridge. Drivers tend to speed through the merge to be the first to go over the bridge. Vehicles are also able to turn into Hubbard uncontrolled. The Project proposes fully closing vehicular access to and from 40th Street at Hubbard, except for emergency vehicles, to minimize the safety risk to bicycle riders. Cyclists coming down off the bridge on the newly constructed two-way cycle track will not need to worry about a vehicle exiting Hubbard and forgetting to look both ways.

At the signalized intersection of 40th Street and Horton Street two bike collisions occurred, two each occurred at Hollis Street and Harlan Street, and three occurred at Emery Street. The Project will reduce the crossing length of 40th Street and will provide a protected intersection on the north side to minimize these collisions.

Pedestrian collisions occurred at the 40th Street signalized intersections with Hollis Street (1), Emery Street (1), San Pablo Avenue (5), and Adeline Street (2). Pedestrian crossing distances at these intersections will be decreased and directional curb ramps will be constructed, providing better visibility at these corners that have existing buildings at the back of the sidewalk.

Forty feet west of San Pablo Avenue there was a bike collision on 40th Street that could have been the result of a vehicle not looking for cyclists when pulling in and out of the on-street parking area or a vehicle parking and swinging their door open into a cyclist. The property facing this area, Black & White Liquor, has excess off-street parking, but this on-street parking (20-minute maximum) is available for customers who want to quickly access the liquor store. City staff worked with the property owner to create an opening through the property's fence so that customers will be able to park in the off-street parking and still quickly access the liquor store.

Within the San Pablo Avenue Transit Hub area, seven bike collisions occurred on 40th Street, five at San Pablo Avenue and two at Adeline Street; five pedestrian collisions also occurred at San Pablo Avenue and two pedestrian collisions also occurred at Adeline Street. The Transit Hub area has a high concentration of pedestrians and cyclists, in addition to a high concentration of vehicular traffic, including heavy bus traffic. The elimination of one traffic lane and the incorporation of the two-way cycle track, protected intersection improvements, improved pedestrian accessibility with shortened crossings, and enhanced bus stop waiting areas will all contribute to making the Transit Hub a safer and more comfortable environment.

There were fewer collisions along Shellmound Street (Part 2) where during the same 12-year period there were four bicycle injury collisions and five pedestrian injury collisions.

The data shows a clear trend of high-risk intersections and midblock areas, particularly where visibility is poor, and vehicle speeds are high. Speeding, poor sight distance, inadequate traffic control devices, and conflicts between vehicles, pedestrians, and cyclists are common factors in

these collisions. The Project's comprehensive approach targets these specific issues by implementing measures such as lane reductions to calm traffic, protected bikeways to separate cyclists from vehicular traffic, removing vehicle movements at unsignalized intersections that conflict with pedestrians and bicycle riders, and enhanced signalization to improve compliance with traffic laws.

The Project's design addresses each identified collision type and location with targeted safety improvements. For instance, merge and pedestrian conflict points at uncontrolled intersections will be mitigated by closing or controlling these access points. Enhanced pedestrian crossings will reduce crossing distances and improve visibility, addressing common collision points. The two-way cycle track and protected intersections will reduce conflict points between vehicles and cyclists, providing a safer environment for all nonmotorized users.

3.2 Vehicle Speed Implications

The Project incorporates a road diet reducing the number of motor vehicle lanes from two in each direction to one lane in the westbound direction. The change means that driving speeds will be determined by the drivers traveling at a slower speed, sometimes referred to as the "prudent driver." On a street with two lanes each way drivers make lane changes to pass slower moving drivers and this tends to increase driving speeds along a corridor. The Project reduces the number of lanes to one lane in the westbound direction and so drivers cannot change lanes to pass slower moving drivers.

Driving speeds with the Project are expected to decrease such that average driving speed before the Project becomes the 85th percentile speed after the Project's road diet. This is because average driving speeds before the Project dictate the predominant speed when drivers are unable to pass slower moving drivers with the Project. The net benefit is a speed reduction of 4 to 6 miles per hour. Because speed is exponentially related to severe injuries and fatalities when a collision occurs, this speed reduction is meaningful for vulnerable road users in the corridor.

3.3 Sight Distance Implications

Currently, intersections have narrow sidewalks with buildings that come up to the back of sidewalk, causing inadequate intersection sight distance. The sidewalks narrow to four feet in areas where there is a history of pedestrian collisions, such as at Hollis and Horton Streets. There are also areas where proper daylighting at intersections is not provided, thus limiting visibility.

The Project improvements will resolve these sight distance and visibility issues by providing bulb outs and protected intersections, shifting the motor vehicle travel lanes away from the buildings, and red curbing intersections to the currently recommended distances of 20 feet minimum near side and far side of each intersection with a 30-foot minimum near side at each signalized intersection. These proven countermeasures will be effective in reducing collisions along the

corridor: the Caltrans Local Roadway Safety Manual gives the following values for crash reduction factors: 1) NS11, "Improve sight distance to intersection" (Crash Reduction Factor = 20%).

3.4 Conflict Points

Currently, nonmotorized users, including pedestrians and cyclists, are proximate to high-speed vehicles with no protection. These conflicts occur midblock, at crossings, and at intersections. The highest kinetic energy risk (injury risk) occurs when speed and mass are high in conflict with vulnerable road users. High speed locations include midblock, high speed right turns (with large radii), and high speed left turns (on and off the corridor where turns are not protected). These conflict points are exacerbated where heavy vehicles (trucks and buses) are also present.

The Project will address conflict severity by reducing speed throughout the corridor by 4 to 6 mph. To address midblock conflicts, the physical raised median that will be constructed to separate motorized and nonmotorized users on the north side of 40th Street will provide a significant benefit to pedestrians and cyclists. Pedestrians will be separated from motorized traffic by the raised median and the two-way cycle track. Cyclists will be separated from the motorized traffic by the raised median and green infrastructure improvements. Conflicts with buses will be addressed with bus stop enhancements and dedicated bus lanes. Finally, turning movement conflicts will be addressed with intersection geometry and signal adjustments to separate users in space and time. These proven countermeasures will be effective in reducing collisions along the corridor: the Caltrans Local Roadway Safety Manual gives the following value for crash reduction factors: R34PB, "Install Separated Bike Lanes" (Crash Reduction Factor = 45%).

3.5 Compliance with Laws

The Project incorporates design elements to prevent motorists from speeding and ensure compliance with California Vehicle Code 21209 VC, which prohibits vehicles from being driven in bicycle lanes. The Project introduces physically protected bicycle lanes with barriers, putting both eastbound and westbound bicycle riders on the north side of the street in a two-way separated bikeway, making it difficult for vehicles to encroach on these lanes. This separation enhances the safety of cyclists by clearly delineating the space for bicycles and motor vehicles. Additionally, the Project reduces the number of westbound vehicle travel lanes to a single lane. This design change significantly impacts driver behavior by eliminating opportunities to pass slower traffic, naturally calming traffic flow and reducing speeds. The narrower roadway and single westbound travel lane create a visual and physical environment that encourages drivers to adhere to the posted speed limit. The implementation of these measures, including the two-way protected bike lanes and reduced lane widths, not only discourages speeding but also promotes safer interactions between motorists and cyclists. By designing the roadway to control and moderate vehicle speeds, the Project ensures a safer, more predictable environment for all road users, aligning with the goals of improving safety and accessibility in Emeryville.

3.6 Adequacy of Traffic Control

Uncontrolled movements at unsignalized intersections on the north side of 40th Street (at Hubbard, Holden, Haven, and Watts) encourage vehicle encroachment into the crosswalk, bike lane, and parking as motorists look for a gap in traffic flow on 40th Street. Uncontrolled movements and permissive conflicts present significant risks, as they allow vehicles to move freely into crosswalks and bike lanes without dedicated signals or barriers that protect nonmotorized users, increasing the likelihood of crashes. This lack of control creates dangerous interactions. The Safe System hierarchy of pro-active countermeasures to address kinetic energy risk emphasizes the need for physical separation and controlled movements to minimize risk of collisions and injuries.

AC Transit buses are impacted by the traffic signal operations at Emery Street, San Pablo Avenue, and Hollis Street, illustrating the negative effects the current signal configuration has on near side bus stop operations. This inadequacy not only affects bus operations but also exacerbates conflicts with other road users, highlighting the need for improved, pro-active, traffic controls.

On higher speed, higher volume roadways, vulnerable road users should be separated in space and time to ensure their safety. The current traffic controls along 40th Street are inadequate because they do not provide this essential separation, particularly where heavy vehicles such as trucks and buses interact with cyclists and pedestrians.

The Project incorporates design elements to separate vulnerable users in space and time. Uncontrolled turns at unsignalized intersections will be eliminated with full closures or minimized to right-turns only with partial closures, eliminating or minimizing vehicle encroachments into crosswalks and bike lanes. A key feature of the concept design is the traffic signal phasing on San Pablo Avenue. Due to high westbound right turning traffic volume, the right-turn should be protected with right-turn red, yellow, and green arrows. As a result, right turning traffic will not conflict with either bicycle or pedestrian movements crossing San Pablo Avenue, which would both go concurrently with the westbound motor vehicle through movement. Bicycle signal heads and phasing will further separate bicycle movements, where applicable.

3.7 Adequacy of Bike and Pedestrian Facilities

Currently, pedestrians and bicyclists using the corridor are confronted with Class II bike lanes with no intersection treatments or dedicated bicycle signal phasing, pedestrian facilities that do not meet accessibility standards, and inadequate crosswalks and sidewalks. As noted in Caltrans DIB 94 (https://dot.ca.gov/-/media/dotmedia/ programs/design/documents/dib-94-010224-a11y.pdf), Class II bike lanes are not appropriate for the speed and volume of the corridor. Additionally, the wide pedestrian crossings increase exposure, and the cross slopes do not meet the needs of community members with disabilities. Lack of bicycle treatments at intersections increases the risk of right-hook and left-hook bicycle-vehicle collisions at intersections.

The Project follows the Safe System Approach to proactively address vulnerable road user safety by reducing speed, removing conflicts, and separating users in space and time. The Project replaces the existing Class II bike lanes with a two-way cycle track (Class IV bike lanes), which may reduce bicycle-vehicle crashes by up to 53% according to the California Local Road Safety Manual (LRSM). The addition of advanced stop bars may reduce pedestrian crashes by up to 25%. The Project includes high-visibility crosswalks at all intersections, which may reduce vehicle-pedestrian crashes by up to 40%, and adds curb extensions to reduce pedestrian crossing distance. Bike boxes, green-backed sharrows, protected corners, and dedicated bicycle phasing reduce conflict at intersections by separating bicyclists from other road users in space and time. The Project reduces the number of vehicles crossing bicycle and pedestrian movements throughout the corridor by up to 100% at Hubbard and Haven Streets. The Project will also improve accessibility by constructing a new accessible sidewalk on the west side of Hubbard Street and bringing the cross slopes of intersections into compliance with accessibility regulations.

3.8 Reduce Behaviors Leading to Crashes

Following the Safe System Approach, this Project seeks to create a self-enforcing design where "safe behaviors are the easy behaviors" and mistakes do not have lethal consequences. Behaviors that will be eliminated or reduced include speeding, right-hook crashes, contra-flow bicycle riding, and motorist encroachment into the bike lane. As noted above, the road diet is expected to reduce corridor speeds and reduce pedestrian crossing distances.

The two-way separated bikeway and increased multimodal accessibility at intersections will reduce contra-flow bicycle travel. The separation also provides a barrier that prevents moving vehicles from passing, loading, or parking in the bike lane. The Project separates users in time using protected left and right turn phases at high-volume conflict points, reducing crashes associated with turning movements.

3.9 Considerations for Two-Way Cycle Track

Strictly from a traffic engineering perspective, the average daily traffic, posted speeds, and observed speeds were assessed. Observed motor vehicle speeds exceeded 20 mph along the corridor and ADT was above 10,000. Caltrans guidance (DIB 94) recommends a Class I or Class IV bicycle facility for this speed and volume context. But when evaluating and selecting the bikeway facility type for the Project, multiple factors were considered to ensure the chosen design would best serve community needs while addressing safety, accessibility, and connectivity concerns.

The decision to implement a two-way cycle track (Class IV facility) was influenced by critical considerations. Community engagement has been a cornerstone of the Project's development since its inception. In 2018, a series of workshops, surveys, and public meetings were held to gather input on design options. These engagement activities included morning and evening pop-ups at bus stops, community workshops, and an online survey. Invitations were mailed to over 10,000 addresses in Emeryville and Oakland, ensuring broad participation. Feedback from these

sessions highlighted a strong community preference for a separate bikeway to enhance safety and encourage cycling.

Emeryville is an urban environment with high pedestrian and cyclist activity. The selected bikeway facility needed to reflect the urban context and support the City's goals for active transportation. The 40th Street corridor serves as a regional bike corridor connecting residential areas, commercial centers, and transit hubs. It is an essential bike corridor serving a diverse range of users, including commuters, families, shoppers, and recreational cyclists. The Project creates a single, seamless, and safe arterial bike corridor connecting three distinct networks: the local bicycle network, the regional transit network (with direct links to MacArthur BART and West Oakland BART), and the recreational Bay Trail system. This strategic connection justifies the investment in 40th Street itself, as it serves a broader regional function beyond what Emeryville's local bike network connections provide.

Safety was a paramount concern in the decision-making process. The corridor has experienced a considerable number of vehicle-cyclist and vehicle-pedestrian collisions, particularly at intersections. Community feedback underscored the need for a design that minimizes conflict points between vehicles and nonmotorized users. The two-way cycle track addresses these concerns by providing a physical barrier between cyclists and motor vehicles, thereby reducing the risk of collisions. In addition to the bikeway, the Project incorporates traffic calming measures to further enhance safety. The reduction of vehicle travel lanes and the implementation of full and partial closures at unsignalized intersections were designed to slow down traffic and create a more predictable environment for all users. These measures complement the two-way cycle track by ensuring that motor vehicles operate at safer speeds along the corridor. Even with closures, the two-way cycle track could be integrated into the existing right-of-way without significant roadway widening or the removal of essential pedestrian amenities.

4. Multimodal Operations (40th Street Project Part 1)

4.1 Methodology

The multimodal operations analysis was prepared using Vissim multimodal microsimulation software, which provides outputs for a range of measures of effectiveness (MOE). The MOEs calculated from the Vissim model were based on an average of ten simulation runs to account for random vehicle, pedestrian, and bicycle arrivals. Conditions for weekday PM commute peak hour were modeled and the results documented. The model used new multimodal traffic counts taken for all study intersections in January 2023 and in March 2024 and reflect the recently opened Chick-fil-A on the southwest corner of Horton Street at 40th Street. The model also included traffic from yet to be built major development projects including buildout of the Sherwin Williams and BMR developments. Two alternatives were evaluated, and **Attachment C** provides the multimodal traffic volumes used in the analysis.

- **Alternative 1 (2025 Forecast)** – Existing traffic volumes plus traffic from approved major development projects yet to be built. This includes the buildout of the Sherwin Williams and BMR sites with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the Project geometry approved by City Council in July 2023, including unsignalized side street closures and optimized traffic signal operations.

4.1.1 Vissim Model

Multimodal operations for pedestrians, bicycles, motor vehicles, and transit modes were modeled during the weekday PM commute peak hour. Bicycle, pedestrian, and vehicle volumes were loaded into the model to simulate how individual bicycles, pedestrians, buses, trucks, and cars interact with transit along the 40th Street corridor. Buses entered and exited the network according to posted bus times on AC Transit and Emery Go-Round (EGR) websites.

The Vissim model was validated to the City of Emeryville's citywide Synchro software network and field observations. Both software platforms (Vissim and Synchro) use the methods outlined in the *Highway Capacity Manual* (HCM) to evaluate multimodal traffic operations.

The Vissim model accounts for intersections interacting with each other across the length of the corridor while the Synchro model looks at each intersection in isolation. The increase in vehicle delay is especially important at the San Pablo Avenue and 40th Street intersection where, during the PM peak hour, vehicle queues spill back to upstream intersections. The Vissim model captures

the effect of this spillback on upstream intersection operations, leading to results that better reflect field observations.

Given the bus stop modifications analyzed with this Project, special focus was placed on simulating transit operations in the corridor for the AC Transit and Emery Go-Round (EGR) services. At existing stops with width for cars to pass, buses were assumed to pull up to the curb and out of the travel lane, allowing vehicles to pass. This requires the bus to merge back into traffic after completing the stop, which is consistent with field observations. Bus dwell times, defined as the time when a bus is stationary with doors open at a stop, were based on field observation averages. Based on observations, AC Transit buses have longer dwell times than EGR buses. This is likely because AC Transit buses require passengers to pay fares individually during boarding, which increases dwell time. EGR service does not require a fare; therefore, the boarding process is faster. The model used average dwell time for AC Transit and EGR buses.[2]

The dwell time for all buses in the model is constant because the objective of this analysis is to compare the location and type of stops on the corridor between existing and Plus Project conditions and their respective impact on multimodal operations. By keeping dwell time constant, the maneuvering time into and out of each stop becomes the analysis focus, which aligns with the goal of analyzing the location and type of stops on the corridor. For AC Transit buses the dwell time is 12 seconds; for EGR buses the dwell time is 8 seconds.

All buses were assumed to stop on 40th Street at the San Pablo Avenue and Emery Street stops, while buses stop 50% of the time at all other stops on the corridor. This assumption provides enough data to perform a comprehensive stop analysis and captures the lower observed stop rate at the other stops in the corridor.

The calibrated Vissim model used for the *40th Street Multimodal Project – Multimodal Transportation Analysis* (August 2023) was used for this analysis. The model was expanded to include the following additional intersections on Park Avenue, north of 40th Street, to assess travel times and traffic operations with the Project and the unsignalized side street closures. The added Park Avenue intersections are:

- Park Avenue at Hubbard Street
- Park Avenue at Holden Street
- Park Avenue at Haven Street
- Park Avenue at Harlan Street
- Park Avenue at Watts Street
- Park Avenue at Emery Street
- Park Avenue at San Pablo Avenue

[2] Wheelchair loading was not considered in the model. If a bus is stopped 8 to 10 minutes for wheelchair loading this would mean that the bus lane is blocked and buses behind the stopped bus would enter the adjacent travel lane to go around the stopped bus.

4.2 Measures of Effectiveness

Three evaluation metrics were used to develop and evaluate the Project for transit service in the corridor: bus maneuvering time into and out of stops, end-to-end travel time on 40th Street, and intersection level of service.

4.2.1 Bus Maneuvering Time

Bus maneuvering time focuses on the behavior of buses at bus stops and was calculated according to the following equations:

- Total Delay = (Bus Travel Time – Free Flow Time)
- Maneuvering Time = Total Delay – Dwell Time

Free flow time is the time the bus would take to travel through the bus stop area if it did not stop at the bus stop. Free flow time was calculated based on the link segment distance that contains the bus traveling at the posted speed. **Bus travel time** is output by Vissim and is the actual time it takes the bus to travel the bus stop link segment distance, including time spent stationary at the curbside bus stop and time to merge in and out of the travel lane. **Total delay** is the difference between bus travel time and free flow time and represents the amount of time the bus spends making the stop. **Dwell time** is also output by Vissim. For this study, this time was kept fixed based on field observations. Maneuvering time is the difference between total delay and dwell time and represents the amount of time the bus spends merging out of and into traffic at each bus stop.

4.2.2 End-to-End Travel Time

End-to-end travel time is the actual time vehicles spend in the study corridor and is a measure of travel time performance. This metric is calculated for vehicles traveling eastbound and westbound on 40th Street between the IKEA Entry intersection and Yerba Buena Avenue intersection with 40th Street, about 650 feet east of Adeline Street, and vice versa. The analysis includes the auto/ truck vehicle class and the bus vehicle class i.e., AC Transit and EGR. Note that the findings in this memorandum subdivide the end-to-end travel time to include travel time through the transit hub, travel time west of the transit hub, and travel time east of the transit hub.

4.2.3 Level of Service

Roadway facility operations are typically described with the term level of service (LOS), a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, which reflects free-flow conditions with little interaction between vehicles, to LOS F, where the vehicle demand exceeds the intersection capacity and elevated levels of vehicle delay result. LOS E represents “at-capacity” operations. LOS F occurs when traffic volumes exceed the intersection capacity, stop-and-go conditions result, and a vehicle may wait through multiple signal cycles before passing through the intersection.

4.3 Analysis Results

The following figures and tables present the identified performance metrics in the 40th Street corridor under the three alternatives evaluated.

4.3.1 Bus Maneuvering Time

Figure 2 illustrates the bus maneuvering times from the analysis for the two alternatives.

Overall, the analysis shows that near side stops adjacent to a traffic signal have longer maneuvering times because buses have a harder time merging back into the travel lane. Since the stop is near side of the intersection, traffic signal related delays and queues affect the maneuvering time. Under Alternative 1, the near side eastbound bus stop at 40th Street at Emery Street has the longest maneuvering time.

Under Alternative 2, the delay at the westbound bus stops on 40th Street approaching San Pablo Avenue increase compared to conditions without the Project. The degradation of service at these stops is due to buses leaving the stop that may experience additional delay if the traffic signal indication at San Pablo Avenue for the westbound right turn lane is red. The westbound right turn signal indication is a protected phase to physically separate right turning traffic from the pedestrian and bicyclist crossings. The Harlan near side stops are removed with the Project. The remainder of the bus stops would maintain their maneuvering time with the Project.

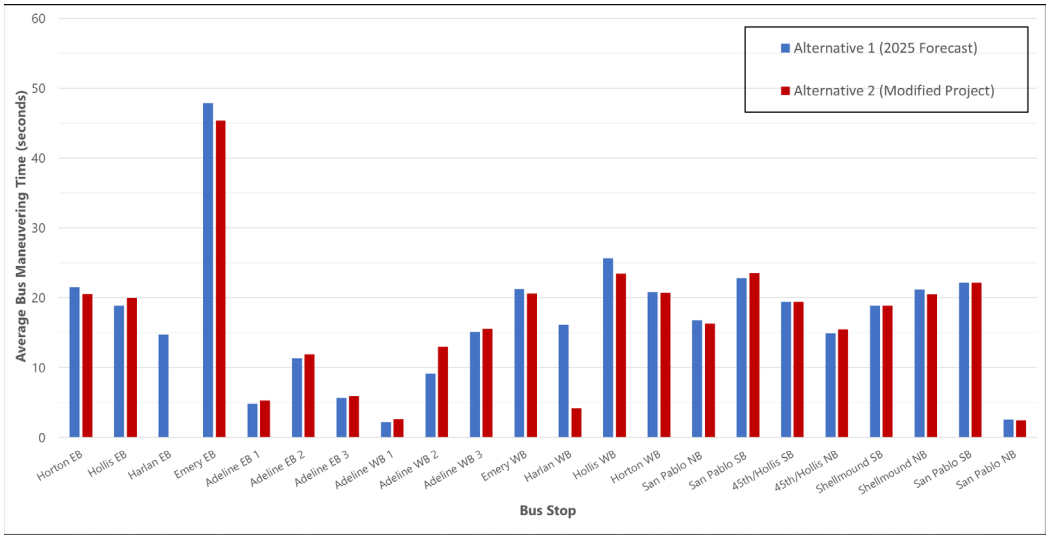


Figure 2: PM Peak Average Bus Maneuvering Times along 40th Street

4.3.2 Corridor Travel Times

This section presents the directional travel times for the weekday PM commute peak hour for Alternative 1 and Alternative 2, by AC Transit / EGR buses and by autos / trucks. Travel time incorporates the average of all vehicles traveling the corridor and includes the travel time between intersections, the time while slowing or stopped at traffic signals, and the time spent maneuvering/(un)loading at bus stops. Travel times were calculated for the following:

- Buses, autos, and trucks traveling eastbound and westbound on 40th Street:
  - Between IKEA Entry and San Pablo Avenue
  - Through the Transit Plaza (between San Pablo Avenue and Adeline Street)
  - Between Adeline Street and Yerba Buena Avenue
- Buses, autos, and trucks traveling northbound and southbound on San Pablo Avenue between 47th Street to 36th Street.

Attachment D presents the Weekday PM commute peak hour average speed plots for buses and autos/trucks to visualize the low-speed zones within the study corridor.

4.3.2.1 Bus (AC Transit and EGR combined) Travel Times

Under Alternative 2, the following travel time findings were identified from the detailed travel times shown in **Table 2a**.

Table 2a: 40th Street Travel Times (Buses Combined) – Alternative 1 versus Alternative 2

Direction		PM Commute Peak Hour Travel Time (minutes)		
		Alt 1	Alt 2	Change (Seconds)
40th WB	Yerba Buena Avenue to Adeline Street	0.5	0.7	+ 6 seconds
	Transit Plaza – (Adeline Street to San Pablo Avenue)	1.5	1.6	+ 6 seconds
	San Pablo Avenue to IKEA	5.4	5.6	+ 12 seconds
40th EB	IKEA to San Pablo Avenue	7.6	6.4	- 72 seconds
	Transit Plaza – (San Pablo Avenue to Adeline Street)	0.8	0.9	+ 6 seconds
	Adeline Street to Yerba Buena Avenue	0.3	0.3	No change
San Pablo Avenue SB (47th Street to 36th Street)		4.5	5.0	+ 30 seconds
San Pablo Avenue NB (36th Street to 47th Street)		2.8	3.4	+ 36 seconds

Source: Fehr & Peers, April 2025.

4.3.2.1.1 Westbound 40th Street

Within the Transit Plaza between San Pablo Avenue and Adeline Street, westbound travel times for combined buses is anticipated to increase about 6 seconds compared to Alternative 1 No

Project, because buses travel with the protected right-turn phase, and must wait for the right-turn signal to be able to cross the intersection.

East of the Transit Plaza, westbound combined bus travel times increase by about 6 seconds (between Yerba Buena Avenue and Adeline Street) because buses, autos, and trucks share one westbound lane east of Adeline Street.

West of the Transit Plaza between San Pablo Avenue and IKEA, the westbound travel times increase about 12 seconds because buses, autos, and trucks share both westbound lanes between San Pablo Avenue and Emery Street. Autos and trucks must share the bus lane because of the dual left-turn lane from San Pablo Avenue onto westbound 40th Street. Auto and truck traffic from the dual left turn lanes merge into the single westbound lane on 40th Street after the Emery Street intersection.

4.3.2.1.2 Eastbound 40th Street

Within the Transit Plaza between San Pablo Avenue and Adeline Street, eastbound travel times for combined buses is anticipated to increase about 6 seconds compared to Alternative 1 No Project. The increase in time spent within the Transit Plaza is due to a slight increase in bus stop delays because buses stop in the bus lane, whereas with Alternative 1 buses pull out of the lane to stop.

East of the Transit Plaza, eastbound combined bus travel times remain unchanged (between Adeline Street and Yerba Buena Avenue).

West of the Transit Plaza between IKEA and San Pablo Avenue, the eastbound bus travel times improve by 72 seconds compared to Alternative 1 because the Project provides a bus lane, removing auto and truck traffic congestion from bus flows.

4.3.2.1.3 San Pablo Avenue

Along San Pablo Avenue, between 36th Street and 47th Street, the bus travel times increase by 30-36 seconds under Alternative 2, because the signal optimization at 40th Street was adjusted to reflect the protected westbound right-turn lane signal phase.

4.3.2.2 Auto / Truck Travel Times

Under Alternative 2, the following travel time findings were identified. Refer to **Table 5b** for the detailed travel times.

Table 5b: 40th Street Travel Times (Autos and Trucks) – Alternative 1 versus Alternative 2

Direction		PM Commute Peak Hour Travel Time (minutes)		
		Alt 1	Alt 2	Change (Seconds)
40th WB	Yerba Buena Avenue to Adeline Street	0.5	0.6	+ 6 seconds
	Transit Plaza – (Adeline Street to San Pablo Avenue)	1.1	0.8	- 18 seconds
	San Pablo Avenue to IKEA	3.4	3.7	+ 18 seconds
40th EB	IKEA to San Pablo Avenue	5.6	5.8	+ 12 seconds
	Transit Plaza – (San Pablo Avenue to Adeline Street)	0.4	0.3	- 6 seconds
	Adeline Street to Yerba Buena Avenue	0.3	0.3	No change
San Pablo Avenue SB (47th Street to 36th Street)		3.1	3.6	+ 30 seconds
San Pablo Avenue NB (36th Street to 47th Street)		2.2	2.3	+ 6 seconds

Source: Fehr & Peers, April 2025.

4.3.2.2.1 Westbound 40th Street

Within the Transit Plaza between San Pablo Avenue and Adeline Street, westbound travel times for autos and trucks is anticipated to improve by about 18 seconds compared to Alternative 1 No Project. The decrease in time spent within the Transit Plaza is because the bus lane separates bus maneuvers from the bus stops from westbound vehicles traveling through the intersection as well as signal optimization for westbound 40th Street to accommodate the protected right-turn phase.

East of the Transit Plaza, the auto and truck westbound travel times are expected to increase by 6 seconds (between Adeline Street and Yerba Buena Avenue) because buses and autos share one westbound lane east of Adeline Street under the Project.

West of the Transit Plaza between San Pablo Avenue and IKEA, the westbound travel times are expected to increase by 18 seconds because the Project removes one westbound travel lane for vehicles and trucks.

4.3.2.2.2 Eastbound 40th Street

Within the Transit Plaza between San Pablo Avenue and Adeline Street, eastbound travel times for autos and trucks is anticipated to improve about 6 seconds compared to Alternative 1 No Project, since the bus lane prevents buses maneuvering at bus stops from disrupting vehicular travel.

East of the Transit Plaza, autos and trucks eastbound travel times remain unchanged (between Adeline Street and Yerba Buena Avenue).

West of the Transit Plaza, between IKEA and San Pablo Avenue, the eastbound travel times are expected to increase by about 12 seconds compared to Alternative 1 because the Project has one eastbound through lane approaching San Pablo Avenue.

4.3.2.2.3 San Pablo Avenue

Along San Pablo Avenue, between 36th Street and 47th Street, the southbound auto and truck travel time increases by 30 seconds and the northbound increases by 6 seconds under Alternative 2, because the signal optimization at 40th Street was adjusted to reflect the protected westbound right-turn lane signal phase.

4.3.3 Level of Service and Delay Analysis

Intersection operations during the PM commute peak hour are presented in **Table 6** on the following page. All intersections operate at LOS D or better with Alternative 1 and Alternative 2. The San Pablo Avenue / 40th Street intersection operations are expected to be similar between the two alternatives because of signal optimization which balances the delay across the intersection approaches. While the Emery Street intersection operations are expected to deteriorate from LOS C to D because green time is prioritized for the 40th Street movements.

Intersection delay along Park Avenue increases slightly but operations remain at LOS B or higher. As noted in the *40th Street Multimodal Project - Truck Activity Analysis Memo* trucks are currently using Park Avenue even though truck restriction signs are posted throughout the corridor west of Hollis Street and the multimodal operations analysis assumed that this behavior would continue. To offset these impacts and enhance safety, the city is implementing a holistic strategy for Park Avenue that includes new, clearer truck wayfinding signage to better direct commercial vehicles. The city is also actively improving pedestrian safety on Park Avenue through separate initiatives, such as the 2024 Sustainable Streetscapes project, which is adding high visibility crosswalks and green infrastructure bulb-outs at the Park Avenue and Hollis Street intersection.

Attachment E provides the intersection analysis worksheets.

Table 6: Intersection Level of Service and Delay – PM Commute Peak Hour – Alternative 1 versus Alternative 2

ID	Intersection	Control [1]	Alternative 1		Alternative 2	
			Delay [2]	LOS [2]	Delay [2]	LOS [2]
1	Adeline St/40th St	Signal	24	C	33	C
2	San Pablo Ave/40th St	Signal	46	D	46	D
3	Emery St/40th St	Signal	26	C	53	D
4	Watts St/40th St[3]	Side-street Stop	8 (EB 16)	A (C)	--	--
5	Harlan St/40th St	Signal	10	A	15	B
6	Haven St/40th St[3]	Side-street Stop	1 (SB 9)	A (A)	--	--
7	Hollis St/40th St	Signal	37	D	28	C
8	Holden St/40th St	Side-street Stop	3 (SB 20)	A (C)	4 (NB 9)	A (A)
9	Horton St/40th St	Signal	39	D	41	D
10	Hubbard St/40th St	Side-street Stop	8 (NB 14)	A (B)	5 (NB 8)	A (A)
11	Shellmound St/ IKEA Entrance	Signal	19	B	8	A
12	San Pablo Ave/Park Ave	Signal	11	B	11	B
13	Emery St/Park Ave	Side-street Stop	5 (NB 18)	A (C)	5 (NB 19)	A (C)
14	Watts St/Park Ave	All-way Stop	7	A	8	A
15	Harlan St/Park Ave	Side-street Stop	2 (NB 11)	A (B)	2 (NB 11)	A (B)
16	Haven St/Park Ave	Side-street Stop	1 (NB 14)	A (B)	1 (NB 14)	A (B)
17	Hollis St/Park Ave	Signal	14	B	15	B
18	Holden St/Park Ave	Side-street Stop	3 (NB 11)	A (B)	3 (NB 10)	A (B)
19	Horton St/Park Ave	All-way Stop	10	B	10	B
20	Hubbard St/Park Ave	Side-street Stop	3 (NB 12)	A (B)	4 (NB 12)	A (B)
21	San Pablo Ave/45th Ave	Signal	10	A	8	A
22	Hollis St/45th Ave	Signal	11	B	11	B

Notes:
1. Signal = Signalized intersection.
2. For signalized intersections, average intersection delay and LOS based on the 2010 HCM method are shown. For side-street stop-controlled intersections, delays for worst movement and average intersection delay are shown.
3. Unsignalized side street intersections at 40th Street to be closed in Alternative 2.

Source: Fehr & Peers, April 2025.

5. Multimodal Operations (Shellmound Street Project Part 2)

5.1 Study Intersections and Methodology

5.1.1 Project Study Intersections

There are five (5) study intersections. **Attachment F** shows the locations and turning movements at the project study intersections evaluated along Shellmound Street. All intersections are signalized and coordinated along Shellmound Street.

1. Shellmound Street at Christie Avenue
2. Shellmound Street at Ohlone Way
3. Shellmound Street at Bay Street
4. Shellmound Street at IKEA Exit
5. Shellmound Street at IKEA Entrance

The analysis was done for five (5) identified peak hour timing plans: AM, Midday, PM, Weekend Midday, and Weekend PM. The study intersections were evaluated for three (3) scenarios:

- **Scenario 1 (Existing Conditions)**: Existing lane configuration, volumes, and timings
- **Scenario 2**: Proposed lane configuration, existing volumes, existing timings
- **Scenario 3**: Proposed lane configuration, existing volumes, optimized timings

5.1.2 Intersection Analysis Methodology

Existing operational conditions at the five study intersections were evaluated using the 2000 Highway Capacity Manual (HCM) Level of Service (LOS) methodology. Synchro software was used for this analysis.

Level of service is an expression, in the form of a scale, of the relationship between the capacity of an intersection and the demand volume of traffic moving through it. The level of service scale describes traffic flow with six ratings ranging from A to F, with A indicating free flow and F indicating jammed conditions with excessive delay.

For signalized intersections, the HCM methodology determines the capacity of each lane group approaching the intersection. The LOS is based on average control delay (in seconds per vehicle) for various movements within the intersection. A combined weighted average control delay and LOS are presented for the intersection. **Appendix G** summarizes the HCM 2000 results for the study intersections. **Table 7** on the next page describes the relationship between LOS and the average control delay at signalized intersections.

Table 7: HCM 2000 Level of Service for Signalized Intersections		
Level of Service	**Delay (seconds per vehicle)**	**Description of Operations**
A	< 10	**Free Flow/Insignificant Delays**: No approach phase fully utilized by traffic and no vehicle waits longer than one red indication. Most vehicles do not stop at all. Progression is favorable and most vehicles arrive during the green phase.
B	> 10 – 20	**Stable Operation/Minimal Delays**: Occasional approach phase is fully utilized. Drivers begin to feel restricted within vehicle platoons. Occurs with good progression and/or short cycles.
C	> 20 – 35	**Stable Operation/Acceptable Delays**: Major approach phases fully utilized. Most drivers feel restricted. Higher delays from fair progression and longer cycles. Individual cycle failures may occur, and the number of vehicles stopping is significant.
D	> 35 – 55	**Approaching Unstable/Tolerable Delays**: Congestion becomes more noticeable. Drivers may wait through more than one red signal indication. Longer delays result from unfavorable progression and long cycle lengths, or high v/c ratios. Proportion of vehicles not stopping declines, and individual cycle failures are noticeable.
E	> 55 – 80	**Unstable Operation/Significant Delays**: Vehicles may wait through multiple cycles. Long queues form upstream from the intersection. High delays indicate poor progression, long cycles, and high v/c ratios. Individual cycle failures are a frequent occurrence.
F	> 80	**Forced Flow/Excessive Delays**: Represents jammed conditions. Queues may block upstream intersections. Arrival flow rates exceed capacity and are unacceptable to most drivers. Poor progression, long cycle lengths, and v/c ratios approaching 1.0 contribute to high delay.

Source: Highway Capacity Manual, Transportation Research Board, Washington D.C.

5.1.3 Synchro Model

The Synchro analysis model was built from the City of Emeryville's (City) citywide Synchro software network and field observations. The same peak hours were used for all analysis scenarios. A peak hour factor of 1.00 is assumed for all scenarios due to even demand volumes across the peak period and the expectation that the Project may cause congestion, thereby dispersing traffic more evenly across the peak hours of analysis.

5.2 Project (Part 2) Assumptions

Scenario 1 assumes existing lane configuration as described in the City's Synchro model. Under Scenarios 2 and Scenario 3, the proposed geometry is sourced from the 40th Street Bay Trail Gap Closure Project which constructs a two-way cycle track on the west side of the Shellmound Street corridor and converts one vehicle lane in each direction to bus lanes.

5.2.1 Two-way Cycle Track Features

The Project (Part 2 of the 40th Street Multimodal Project) proposes a two-way cycle track on the west side of Shellmound Street between the IKEA entry and Christie Avenue. This Project would connect the two-way cycle track as part of Part I of the 40th Street Multimodal Project with the existing east-west two-way cycle track on Christie Avenue. At the IKEA entry, the cycle track shifts from the east side to the west side of Shellmound Street and cyclists cross the southern leg crosswalk at the IKEA entry to make this transition. To enhance the safety of cyclists using the cycle track at the IKEA entry, turning right on red would be prohibited.

5.2.2 Bus Lanes

The concept design assumes no change to the current cross-section along Shellmound Street between the IKEA entry and Bay Street and between Ohlone Way and Christie Avenue. At Ohlone Way, the northbound right turn lane is removed, and the rightmost lane is converted to a transit-only lane where vehicles can merge into the bus lane to turn right. The right turn lane removal was recently completed as part of a separate project.

The southbound bus lane starts south of Christie Avenue and extends to IKEA, where it then continues over the Shellmound Street bridge as part of Phase I of the 40th Street Multimodal Project. The northbound bus lane starts at the IKEA entry and goes up to Christie Avenue where it ends. A future project would extend the transit-only north of Christie Avenue.

5.3 Analysis Results

As a reminder, the analysis was done for five (5) peak hour timing plans: AM, Midday, PM, Weekend Midday, and Weekend PM. And, evaluated for three (3) scenarios:

- **Scenario 1 (Existing Conditions)**: Existing lane configuration, volumes, and timings
- **Scenario 2**: Proposed lane configuration, existing volumes, existing timings
- **Scenario 3**: Proposed lane configuration, existing volumes, optimized timings

5.3.1 Level of Service and Delay Analysis

Table 8a documents the existing level of service conditions at the study intersections. Under existing conditions, all intersections are performing at LOS D or better.

Table 8a: Intersection Level of Service Conditions under Scenario 1							
Intersection along Shellmound Street		Control type	Level of Service (delay in seconds) during peak hour				
			AM	Midday	PM	Weekend Midday	Weekend PM
1	Christie Avenue	Signalized	C (34)	C (30)	C (31)	D (47)	D (51)
2	Ohlone Way	Signalized	B (11)	B (13)	B (18)	B (20)	C (24)
3	Bay Street	Signalized	A (3)	A (7)	B (10)	B (12)	B (14)
4	IKEA Exit	Signalized	A (3)	A (5)	A (5)	A (8)	A (9)
5	IKEA Entrance	Signalized	A (2)	B (11)	A (7)	B (18)	B (13)

Source: Fehr & Peers, April 2025.

Table 8b documents the level of service conditions at the study intersections under Scenario 2. Notably, Christie Avenue intersection experiences LOS F under the new geometry with existing timing plans and the poor operations occur on the weekends in the afternoon and evening. Between Scenarios 1 and Scenario 2, the operations at all study intersections deteriorate during all peak hours. Vehicles are reduced to a single mixed-flow lane of travel in both directions along Shellmound Street through the study corridor. The existing timing plan is not sufficient to serve this concentrated demand; therefore, intersection operations degrade under the proposed lane configurations. But only the Christie Avenue intersection operations fall below LOS D during weekend operations.

Table 8c documents the level of service conditions at the study intersections under Scenario 3. Modifying the existing timing plans in Synchro to serve demand within the new geometry requires re-timing of the signals within the project area. Under Scenario 3 using the built-in Synchro optimization function, the timing plans are coordinated to a cycle length of 55/110 seconds during weekday AM peak hour, 60/120 seconds during weekday midday and weekday PM peak hours, and 75/150 seconds during weekend peak hours. The study intersections are coordinated to the northbound and southbound approaches along Shellmound Street.

Table 8b: Intersection Level of Service Conditions under Scenario 2							
Intersection along Shellmound Street		Control type	Level of Service (delay in seconds) during peak hour				
			AM	Midday	PM	Weekend Midday	Weekend PM
1	Christie Avenue	Signalized	C (30)	D (43)	D (43)	**F (85)**	**F (149)**
2	Ohlone Way	Signalized	B (11)	B (19)	C (23)	C (34)	D (48)
3	Bay Street	Signalized	A (2)	A (10)	B (10)	B (15)	B (14)
4	IKEA Exit	Signalized	A (2)	A (9)	B (11)	B (16)	C (25)
5	IKEA Entrance	Signalized	A (2)	B (12)	B (12)	D (52)	B (18)

Source: Fehr & Peers, April 2025.

Table 8c: Intersection Level of Service Conditions under Scenario 3							
Intersection along Shellmound Street		Control type	Level of Service (delay in seconds) during peak hour				
			AM	Midday	PM	Weekend Midday	Weekend PM
1	Christie Avenue	Signalized	C (27)	C (29)	C (34)	**E (62)**	**E (75)**
2	Ohlone Way	Signalized	B (12)	C (24)	C (22)	C (32)	D (51)
3	Bay Street	Signalized	A (2)	A (8)	A (8)	B (13)	B (15)
4	IKEA Exit	Signalized	A (2)	A (8)	A (9)	B (13)	B (17)
5	IKEA Entrance	Signalized	A (2)	B (14)	B (11)	D (37)	C (21)

Source: Fehr & Peers, April 2025.

Between Scenarios 2 and Scenario 3, weekday operations improve. All intersections perform at LOS D or better during weekday peak travel hours. During weekend operations, the intersection operations at Christie Avenue continue to fail during the weekend midday and PM peak hours. During these two periods, the resulting northbound queues on Shellmound Street are anticipated to extend back through the Ohlone Way and Bay Street intersections.

Based on the intersection operations analysis, bus lanes should be considered for the Shellmound Street study segment (Part 2) for the weekdays but during the weekend the bus lanes should be open to all traffic.

6. Appendix

Attachment A Modified Project Striping Plan

Attachment B Transportation Committee and Council Agenda Items

Attachment C Alternatives 1 and 2 Peak Hour Intersection Multimodal Traffic Volumes (Part 1)

Attachment D Alternatives 1 and 2 Corridor Speed Plots (Part 1)

Attachment E Intersection LOS and Delay Calculation Worksheets (Part 1)

Attachment F Intersection Multimodal Traffic Volumes (Part 2)

Attachment G Intersection LOS and Delay Calculation Worksheets (Part 2)

Attachment A:
Modified Project Striping Plan

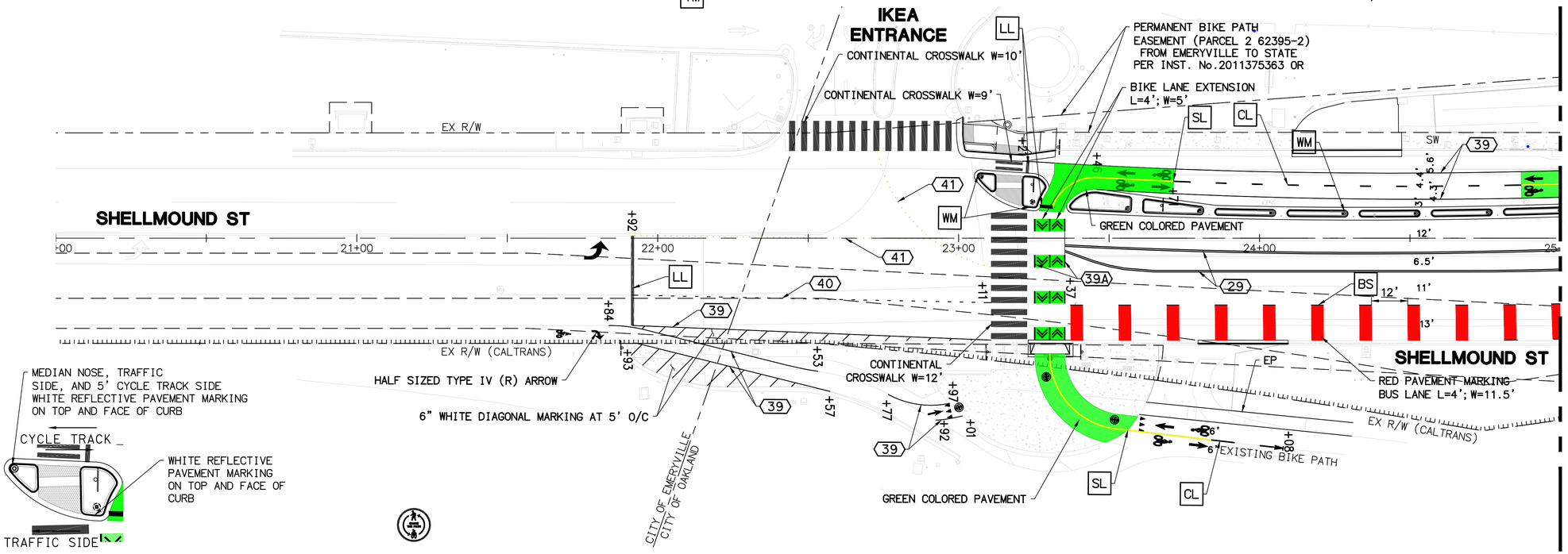
GENERAL NOTES

1. PAVEMENT DELINEATION WORK SHALL BE IN ACCORDANCE WITH THE 2023 CALTRANS STD PLANS, THE CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA-MUTCD) LATEST EDITION, AND THE CONTRACT SPECIAL PROVISIONS. PAVEMENT DELINEATION DETAIL DESIGNATION NUMBERS ARE PER CALTRANS STD PLANS A20A TO A20D. PAVEMENT MARKINGS ARROWS, SYMBOLS, WORDS AND CROSSWALKS ARE PER CALTRANS STD PLANS A24A TO A24F. BIKE PAVEMENT MARKINGS PER CITY OF OAKLAND "DESIGN DETAILS FOR TRANSPORTATION FACILITIES".
2. CONTRACTOR SHALL REMOVE BY WET SANDBLASTING ALL EXISTING AND PAVEMENT MARKINGS WHICH CONFLICT WITH NEW WORK AS SHOWN ON THE PLANS. SANDBLAST AREAS FOR PAVEMENT MARKING LEGENDS AND ARROWS SHALL BE RECTANGULAR ALL SANDBLASTED ARE FOG SEALED.
3. CONTRACTOR SHALL FINISH AND INSTALL ALL CONSTRUCTION MATERIALS FOR PAVEMENT DELINEATION AND SIGN WORK.
4. EXACT LOCATIONS OF ALL NEW SIGNS, PAVEMENT DELINEATION AND MARKINGS SHALL BE MARKED/CAT-TRACED IN THE FIELD BY CONTRACTOR AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
5. LANE WIDTHS SHALL BE MEASURED BETWEEN THE CENTER LINES OF EACH ADJACENT SINGLE OR DOUBLE STRIPE OR TOP FACE OF CURB AS APPROPRIATE.
6. LANE WIDTHS OF CYCLE TRACK SHALL BE MEASURED BETWEEN THE CENTER LINES OF EACH ADJACENT STRIPE OR GUTTER EDGE AS APPROPRIATE.
7. ALL PAVEMENT DELINEATION AND MARKING SHALL BE THERMOPLASTIC.
8. FOR ARROW PAVEMENT MARKINGS REDUCE CALTRANS STANDARD TO HALF-SIZE IN BIKE FACILITIES.
9. FOR CONFLICT ZONES AND BIKE LANE EXTENSIONS, GREEN-COLORED PAVEMENT PATTERN SHALL MATCH THE PATTERN OF THE DOTTED LINES, THUS FILLING IN ONLY THE AREAS THAT ARE DIRECTLY BETWEEN A PAIR OF DASHED LINE SEGMENTS.
10. FOR AREAS WHERE GENERAL TRAFFIC IS PERMITTED TO ENTER INTO THE TRANSIT LANE OR OUT OF THE TRANSIT LANE, RED COLORED PAVEMENT PATTERN SHALL MATCH THE PATTERN OF THE DASHED LANE LINES (SUCH AS DETAIL 8).

LEGEND:

##	STRIPING DETAILS PER 2018 STANDARD PLANS (A20A, A20B, A20C, AND A20D) AND REVISED STANDARD PLANS
LL	12" WHITE LIMIT LINE
CL	6" WIDE 3' LONG YELLOW DASHED CENTERLINE WITH 9' GAP
SL	6" YELLOW SOLID CENTERLINE
	BIKE LANE SYMBOL WITH PERSON AND LANE ARROW PER CITY OF OAKLAND STANDARD RM-1
	BIKE LANE EXTENTION THROUGH INTERSECTION PER CITY OF OAKLAND STANDARD RM-9
	SHARED ROADWAY BIKE SYMBOL PER STANDARD PLAN A24C
	BIKE LANE SYMBOL WITH PERSON PER STANDARD PLAN A24C
	TYPE IV (L) ARROW PER STANDARD PLAN A24A, SEE NOTE 7
	TYPE IV (R) ARROW PER STANDARD PLAN A24A
	TYPE VII (R) ARROW PER STANDARD PLAN A24A
	TYPE VII (L) ARROW PER STANDARD PLAN A24A, SEE NOTE 7
	TYPE III (B) ARROW PER STANDARD PLAN A24B, SEE NOTE 7
FG	INSTALL FG 300 TURNPIKE GRADE CURB SYSTEM OR APPROVED EQUAL SPACED AT 6.5'
WM	INSTALL WHITE REFLECTIVE PAVEMENT MARKING ON TOP AND FACE OF CURB PER DETAIL A
BS	8" WHITE DASHED EDGELINE BORDERING BUS LANE RED PAVEMENT MARKING
YM	INSTALL YELLOW RAISED PAVEMENT MARKER ON MEDIAN NOSE

	TYPE VI ARROW PER STANDARD PLAN A24A
	TYPE III (B) ARROW PER STANDARD PLAN A24B, SEE NOTE 7
	TYPE V ARROW PER STANDARD PLAN A24A
	TYPE I 10'-0" ARROW PER STANDARD PLAN, A24A SEE NOTE 7
	"YIELD LINE" PAVEMENT MARKING PER STANDARD PLAN A24G
STOP	"STOP" PAVEMENT MARKING PER STANDARD PLAN A24D
BUS ONLY	"BUS ONLY" PAVEMENT MARKING PER STANDARD PLAN
	BEGIN/END TRAFFIC STRIPE DETAIL
	CHANGE TRAFFIC STRIPE DETAIL
	"SHARE THE PATH" PAVEMENT MARKING
	PAVEMENT MARKING FOR SPEED TABLE OR SPEED HUMP WITH CROSSWALK PER CA MUTCD FIGURE 3B-30.
	INSTALL CURB MARKING, COLOR AND LENGTH AS NOTED
	24" CONTINENTAL CROSSWALK BARS, WIDTH AS NOTED
	INSTALL SHARROW SYMBOL WITH GREEN PAVEMENT BACKING
	INSTALL "BUS ONLY" LANE. OPTIONAL.
	YELLOW RAISED PAVEMENT MARKING ON MEDIAN NOSE
K72	K72, SEE SIGN PLANS



DETAIL A
TYPICAL CURB MARKING AT INTERSECTION ISLANDS

DETAIL B
SHARE THE PATH PAVEMENT MARKING

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R.C.E. No. 59539 EXPIRES: 12-31-25
DATE 10-08-24

REGISTERED PROFESSIONAL ENGINEER — SHAWN KOWALEWSKI — No. 59539 — Exp. 12/31/25 — CIVIL — STATE OF CALIFORNIA

CALL BEFORE YOU DIG — Underground Service Alert North 811 — Call: TOLL FREE 1-800 227-2600 — TWO WORKING DAYS BEFORE YOU DIG

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CITY OF EMERYVILLE, CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

APPROVED BY	BY	DATE

APPROVED BY
CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

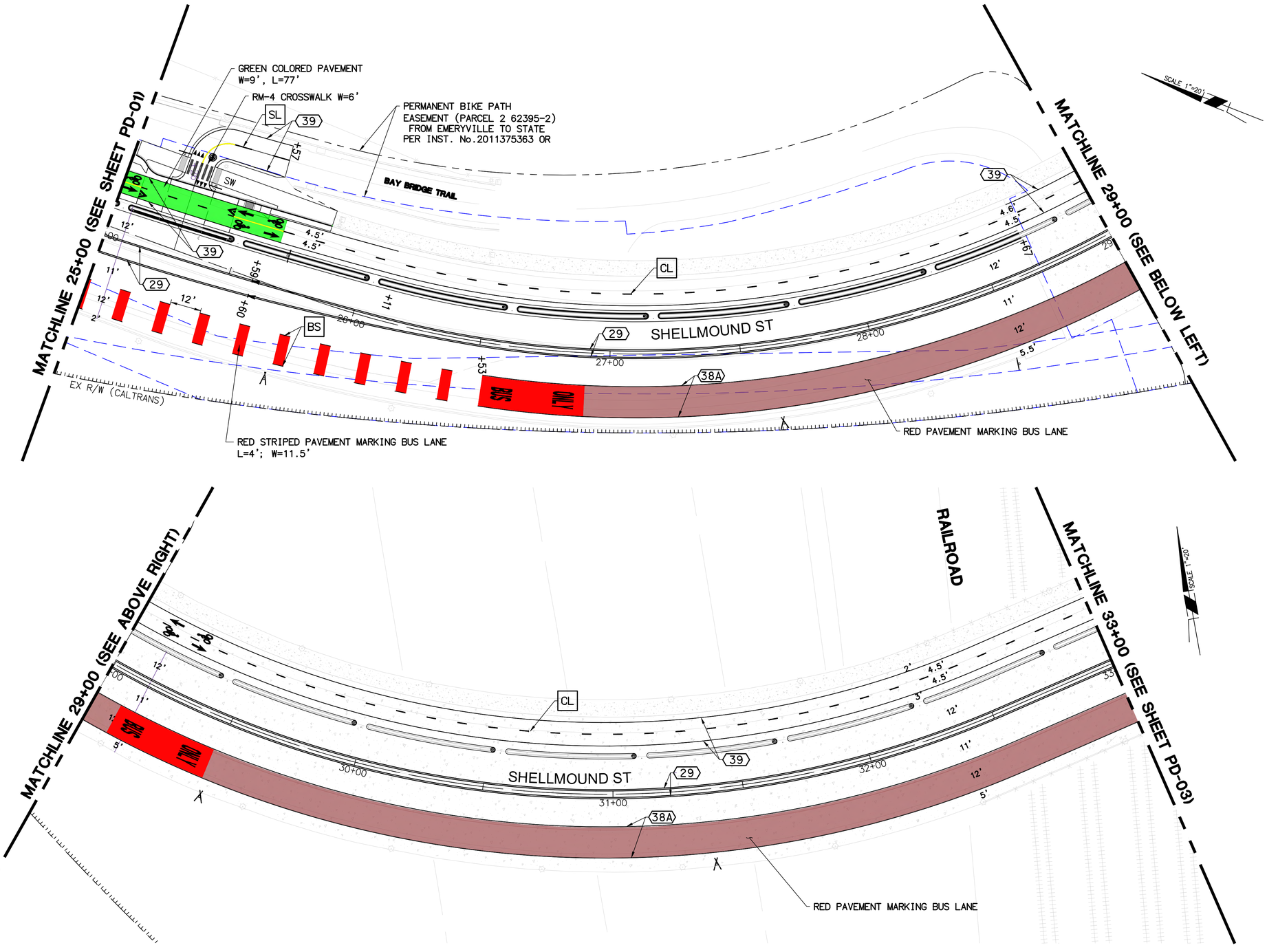
PAVEMENT DELINEATION PLAN

SHELLMOUND STREET AT IKEA FROM BEG TO STA 25+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

PD-01

SHEET 103 OF 273



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CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION PLAN

SHELLMOUND STREET FROM STA 25+00 TO STA33+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

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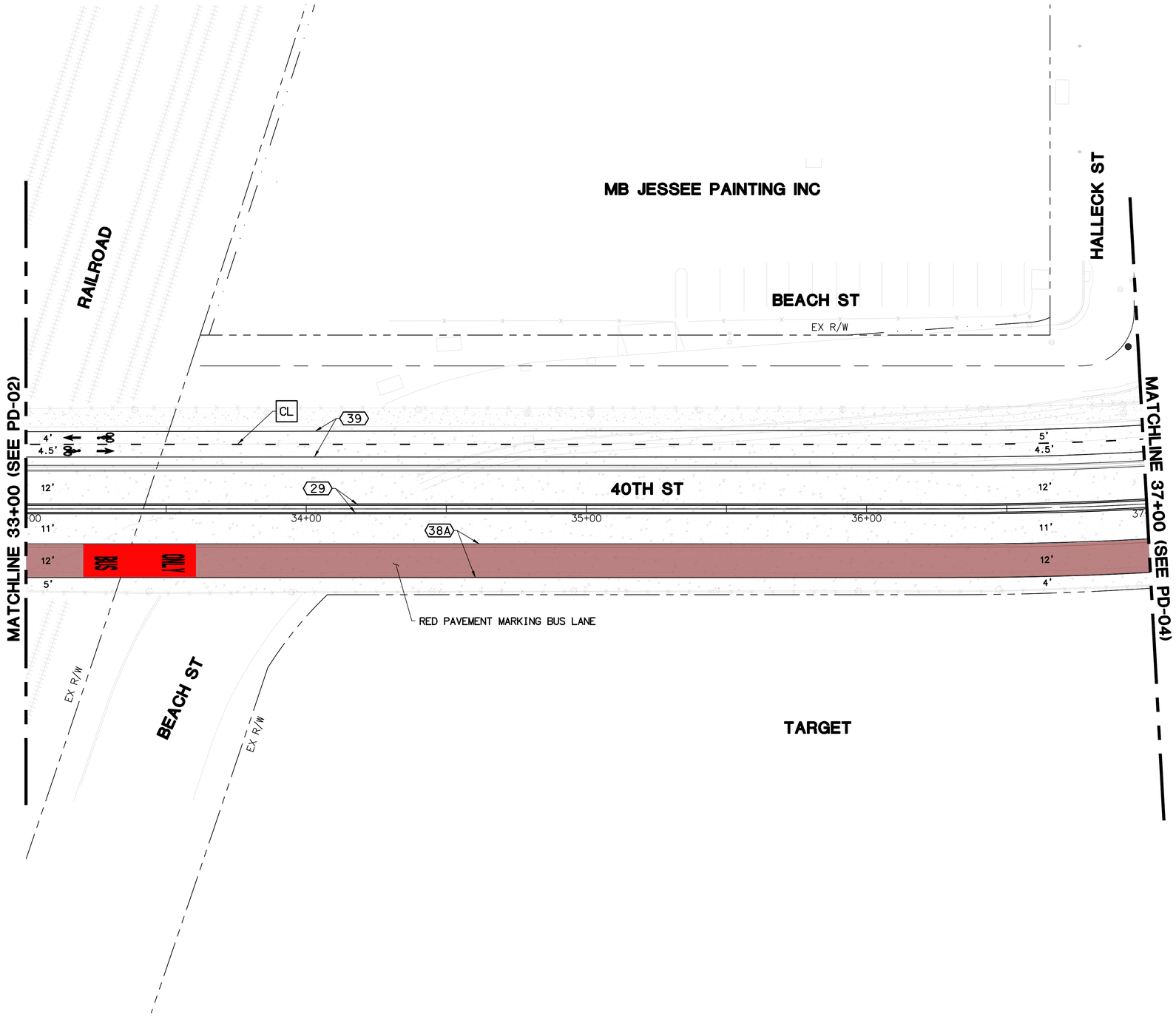

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MARK	REVISIONS	APPR.	DATE

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DEPARTMENT OF PUBLIC WORKS

APPROVED BY	BY	DATE

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CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION PLAN

SHELLMOUND BRIDGE FROM STA 33+00 TO STA37+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
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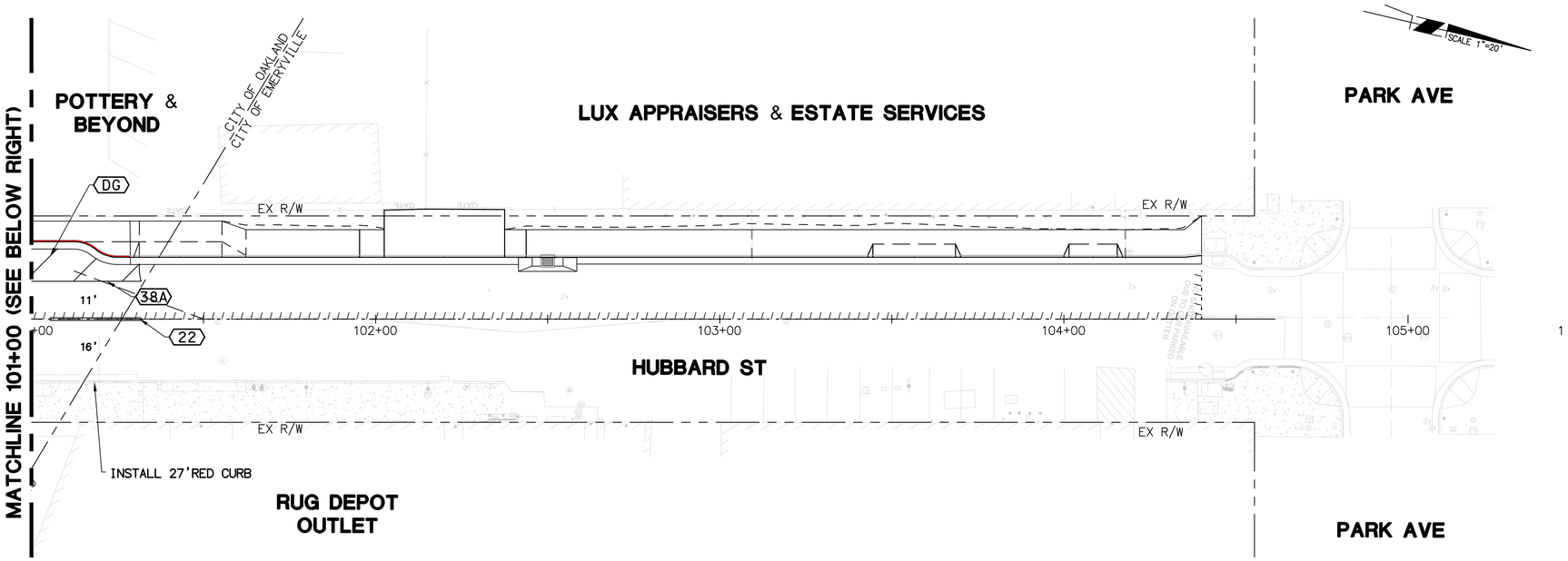

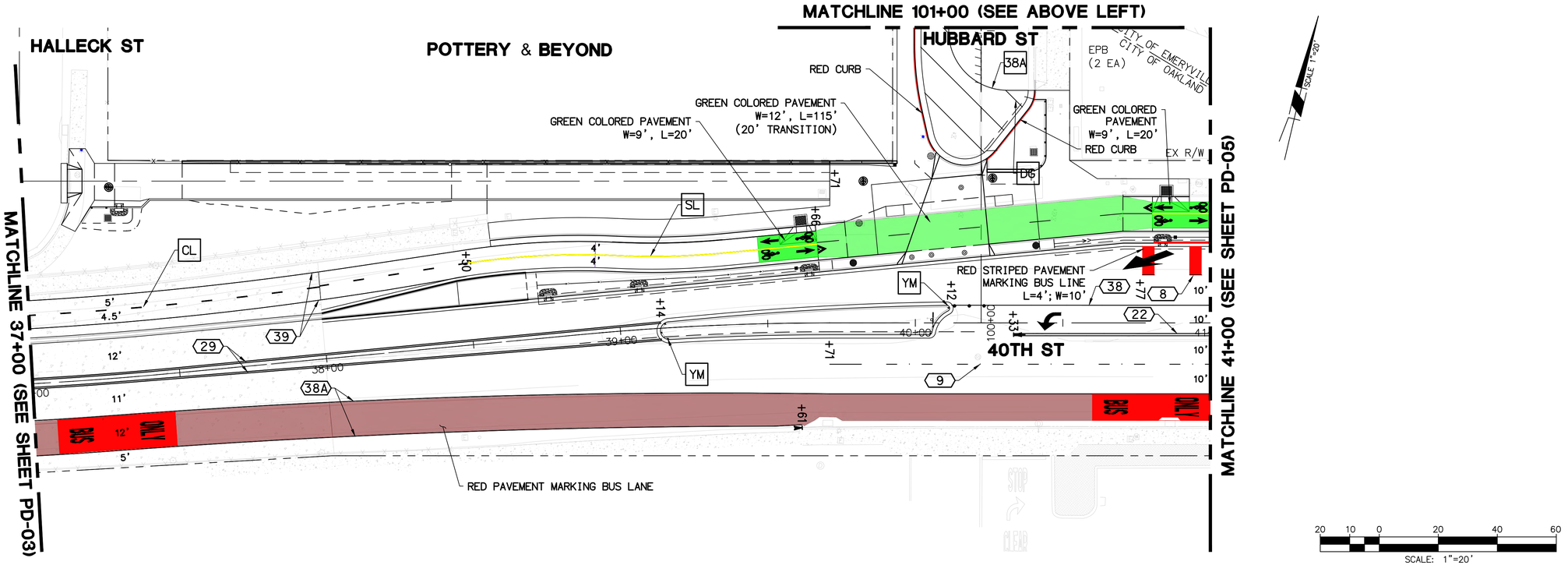

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R.C.E. No. 59539 EXPIRES: 12-31-25
DATE 10-08-24

REGISTERED PROFESSIONAL ENGINEER
SHAWN KOWALEWSKI
No. 59539
Exp. 12/31/25
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STATE OF CALIFORNIA

CALL BEFORE YOU DIG
Under Ground Service Alert North 811
Call: TOLL FREE
1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

MARK	REVISIONS	APPR.	DATE

DESIGNED BY MS DRAWN BY PD CHECKED BY SK

CITY OF EMERYVILLE, CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

APPROVED BY	BY	DATE

APPROVED BY
CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION PLAN

HALLECK STREET CONNECTION FROM STA 37+00 TO STA41+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
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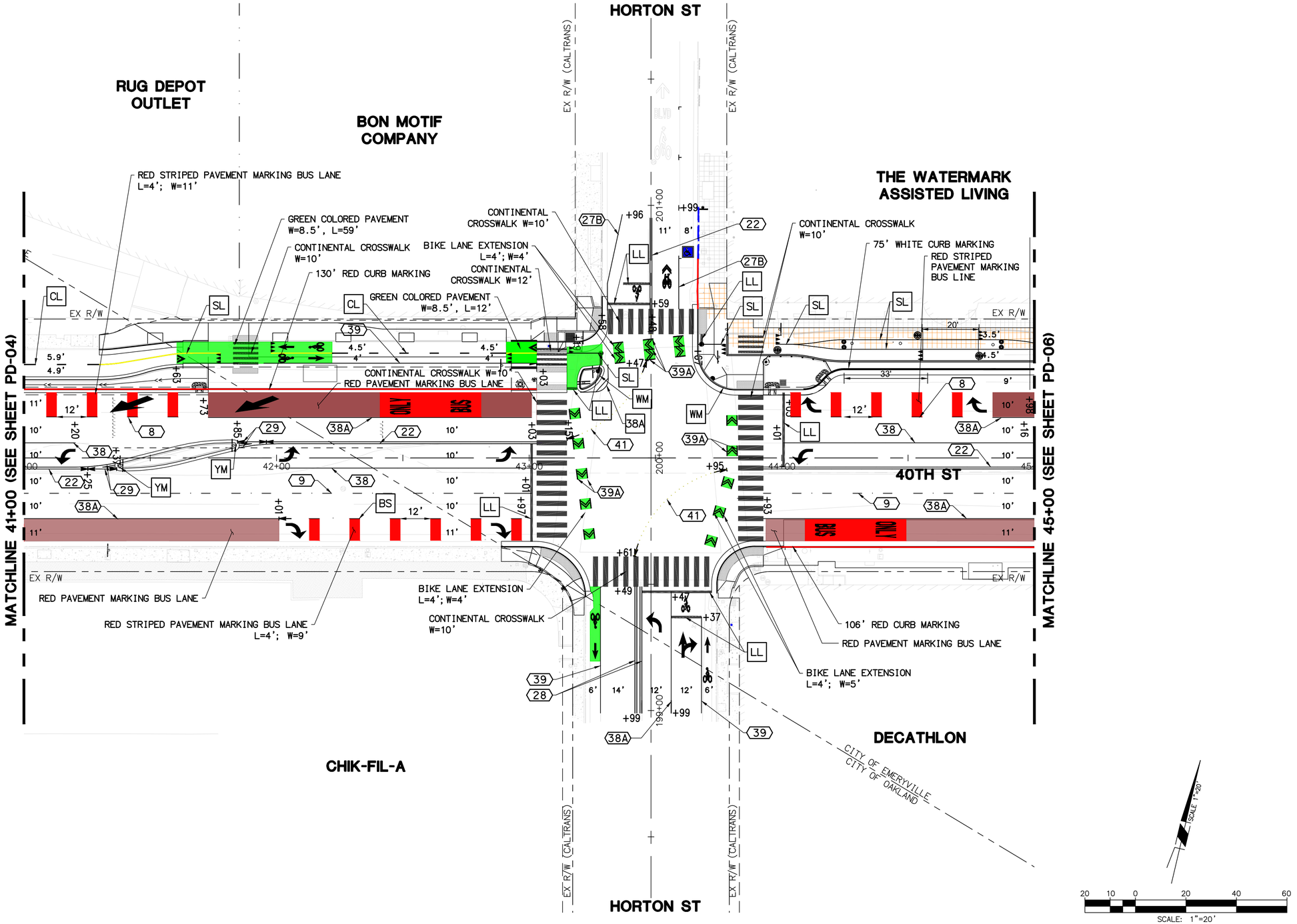

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SCALE: 1" = 20'

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R.C.E. No. 59539 EXPIRES: 12-31-25
DATE 10-08-24

REGISTERED PROFESSIONAL ENGINEER
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DATE

40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION
40TH STREET AT HORTON STREET
FROM STA 41+00 TO STA45+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
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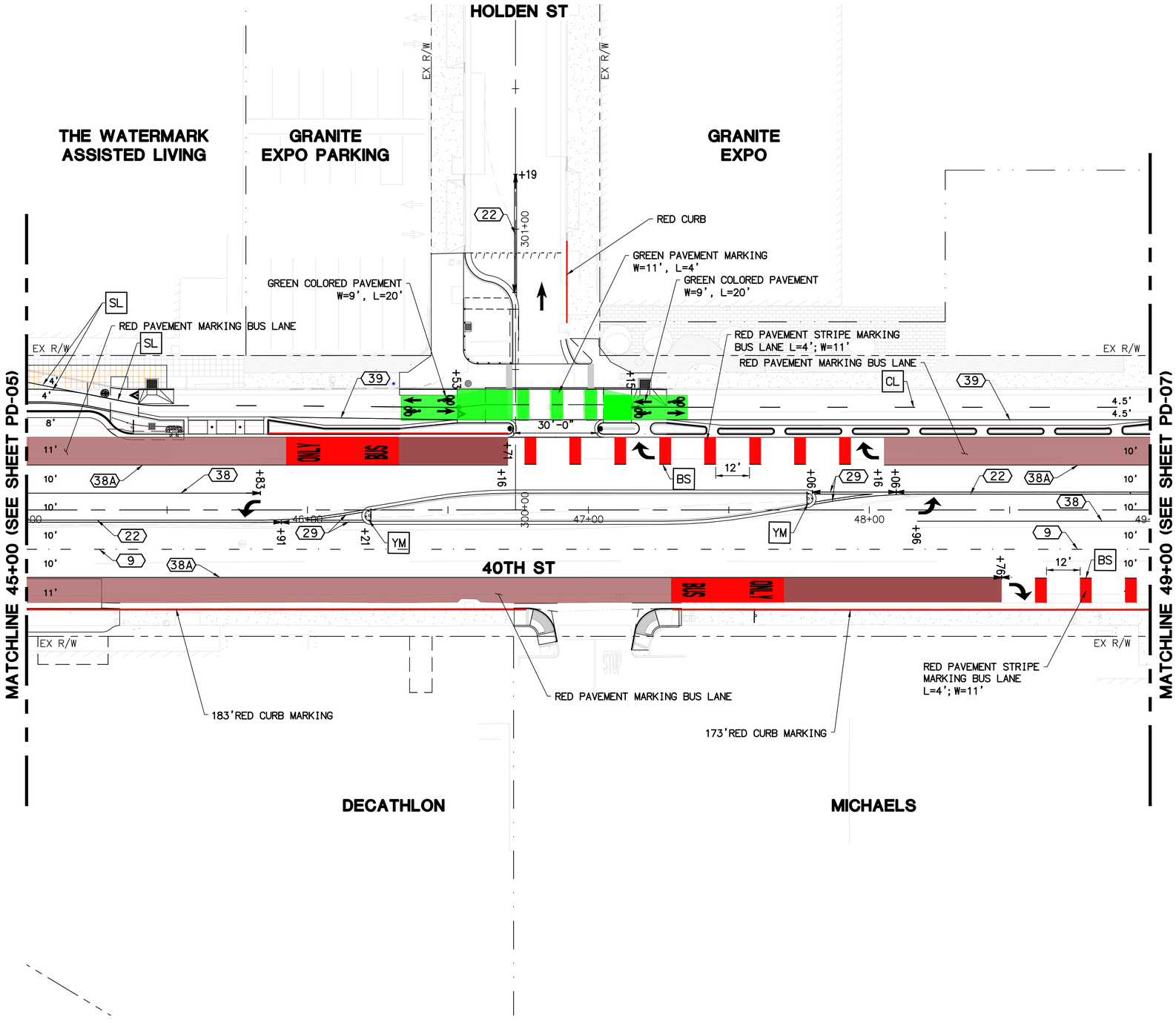
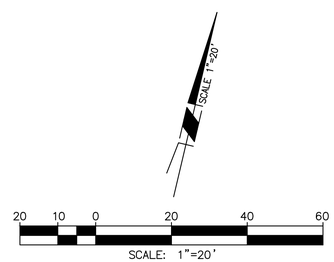
PD-05

SHEET 107 OF 273





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40TH STREET MULTIMODAL PROJECT

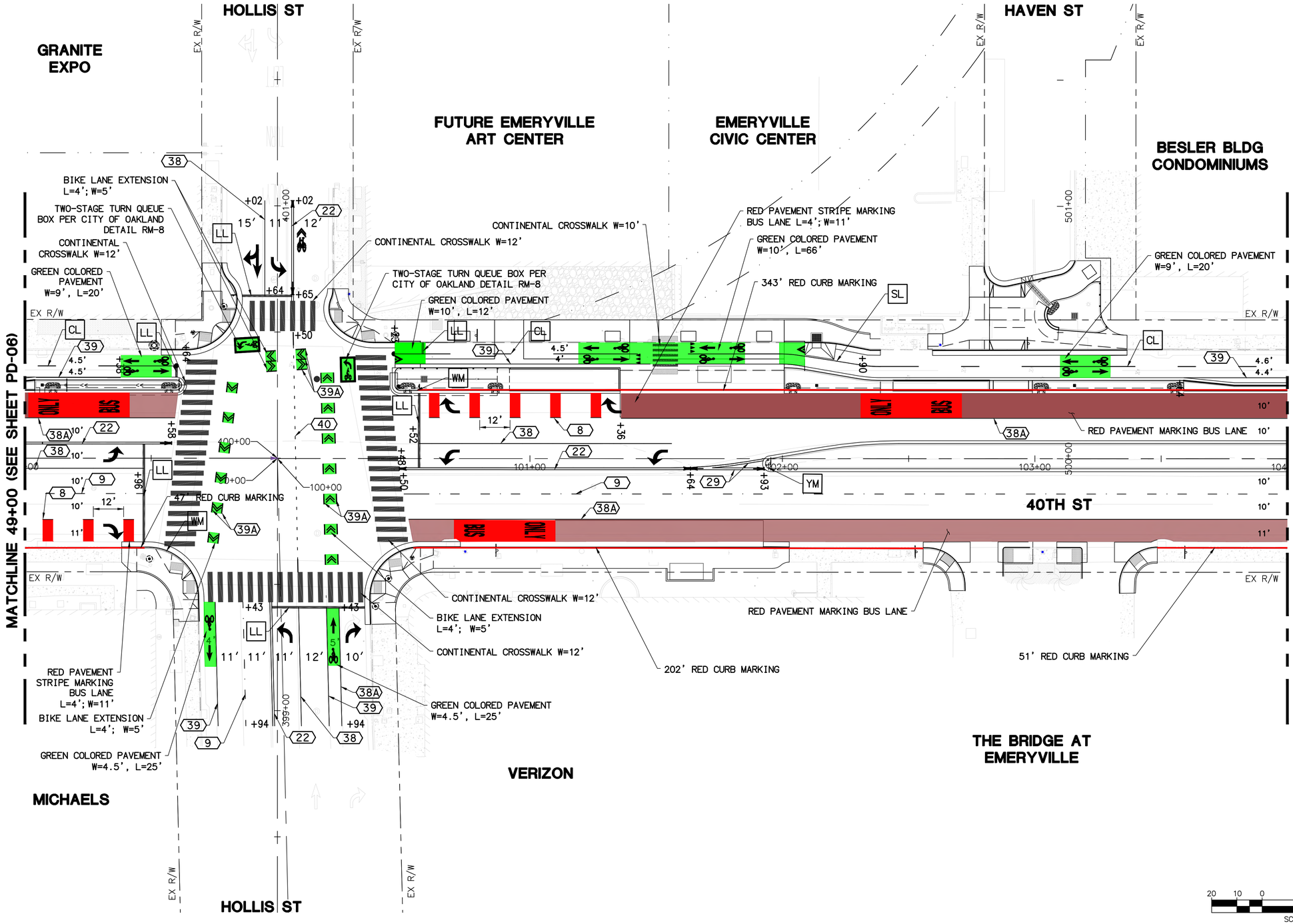
PAVEMENT DELINEATION PLAN 40TH STREET AT HOLDEN STREET FROM STA 45+00 TO STA49+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-06

SHEET 108 OF 273



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40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION PLAN 40TH STREET AT HOLLIS STREET/HAVEN STREET FROM STA 49+00 TO STA104+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXX
CONSTR. WORK ORDER. NO.: XXXXXX

PD-07

SHEET 109 OF 273

HARLAN ST

EX R/W

EX R/W

BESLER BLDG
CONDOMINIUMS

APPLE WEST HOME
MEDICAL SUPPLYS

DECORUM
FURNITURE
AND RUGS

601+00

+83

22

+57

600+00

205' RED CURB MARKING

EXISTING CONTINENTAL CROSSWALK W=12'

GREEN COLORED PAVEMENT
W=9', L=20'

BIKE LANE EXTENSION
L=4'; W=5'

RED PAVEMENT STRIPE MARKING BUS LANE
L=4'; W=11'

210' RED CURB MARKING

RED PAVEMENT MARKING BUS LANE

EX R/W

EX R/W

39

CL

LL

39A

4.5'
4.4'

4.5'
4.5'

10'

11'

ALLOW

BUS

ONLY

YM

29

38A

38

9

12'

BS

40TH ST

40TH ST

105+00

106+00

107+00

108+00

109

MATCHLINE 104+00 (SEE SHEET PD-07)

MATCHLINE 109+00 (SEE SHEET PD-09)

RED PAVEMENT MARKING BUS LANE

RED PAVEMENT STRIPE MARKING BUS LANE
L=4'; W=11'

190' RED CURB MARKING

EXISTING CONTINENTAL CROSSWALK W=12'

218' RED CURB MARKING

RED PAVEMENT MARKING BUS LANE

EX R/W

EX R/W

THE BRIDGE
AT
EMERYVILLE

THE BRIDGE
AT
EMERYVILLE

HARLAN ST

SCALE 1"=20'

20 10 0 20 40 60

SCALE: 1"=20'

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40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION PLAN

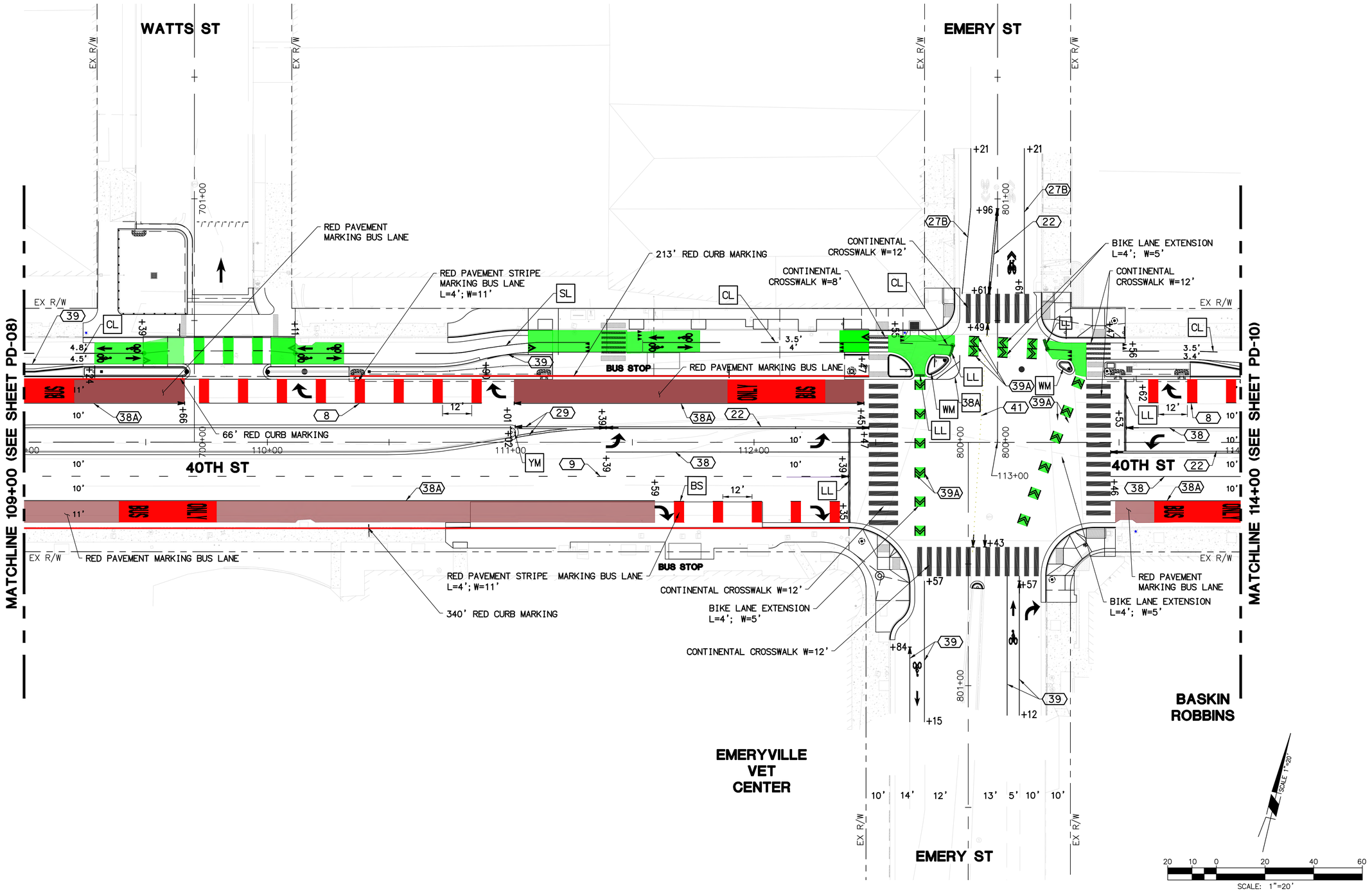
40TH STREET AT HARLAN
FROM STA 104+00 TO STA109+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-08

SHEET 110 OF 273



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40TH STREET MULTIMODAL PROJECT

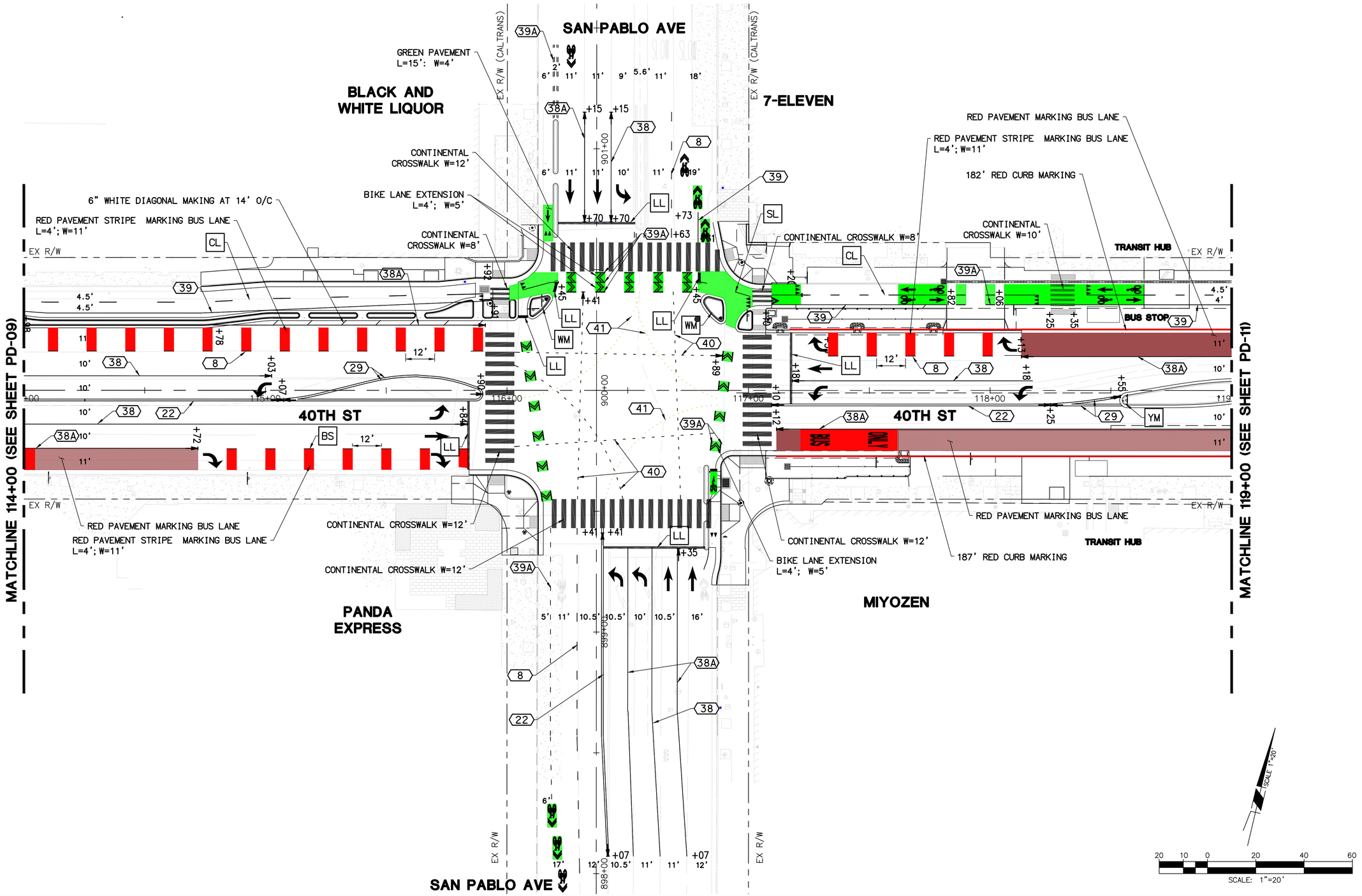
DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PAVEMENT DELINEATION PLAN
40TH STREET AT WATTS STREET/EMERY STREET
FROM STA 109+00 TO STA114+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

PD-09

SHEET 111 OF 273



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40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION PLAN 40TH STREET AT SAN PABLO AVENUE FROM STA 114+00 TO STA119+00

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-10

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40TH STREET MULTIMODAL PROJECT

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PAVEMENT DELINEATION PLAN
40TH STREET AT ADELINE STREET
FROM STA 119+00 TO STA202+00

HORIZ. SCALE: 1" = 20' VERT. SCALE: N/A

PD-11

SHEET 113 OF 273

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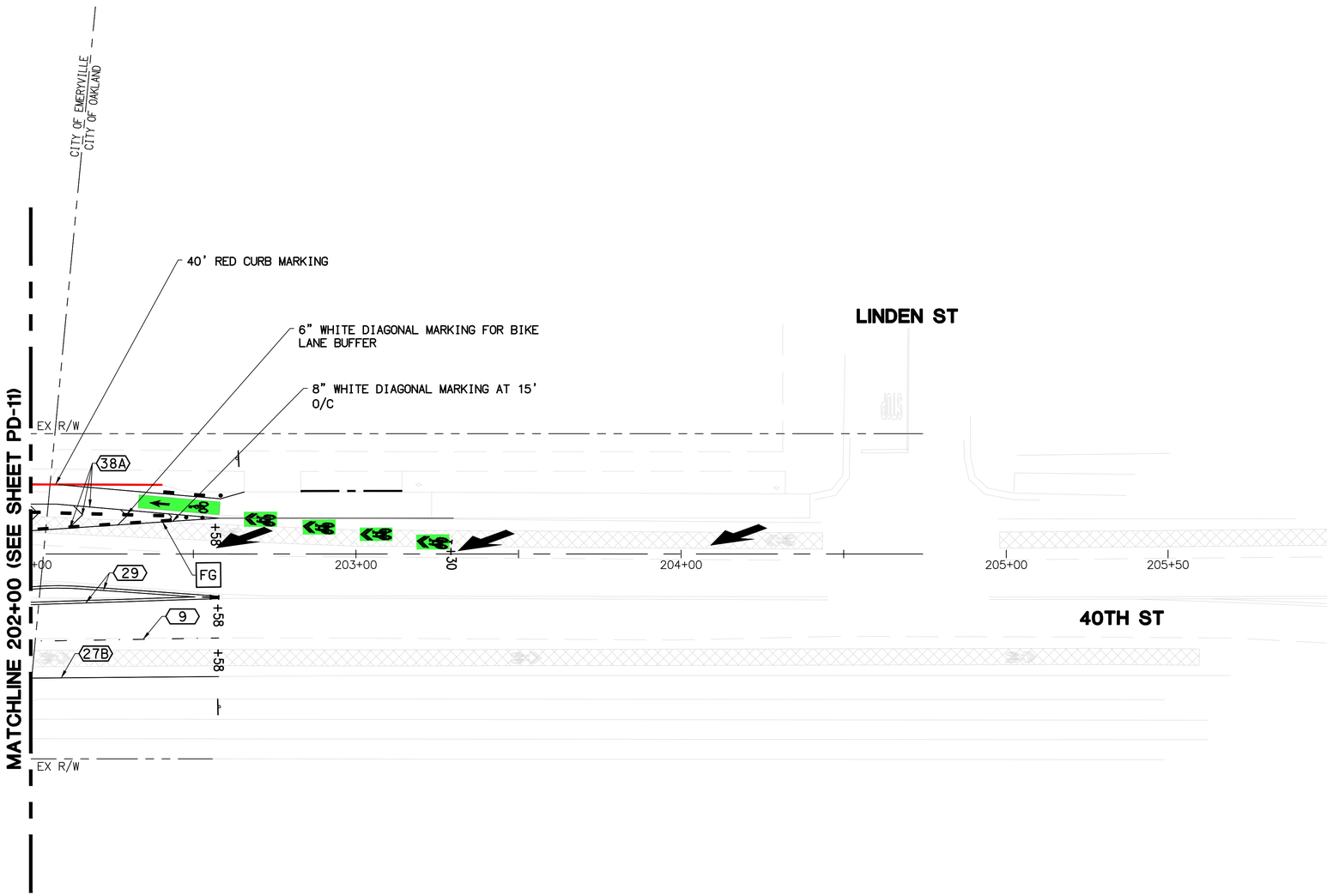

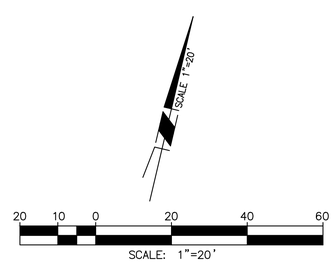

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40TH STREET MULTIMODAL PROJECT

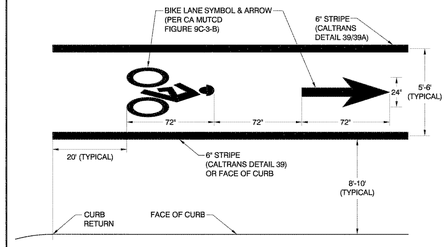
PAVEMENT DELINEATION PLAN
40TH STREET AT LINDEN STREET
FROM STA 202+00 TO STA205+50

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-12

SHEET 114 OF 273

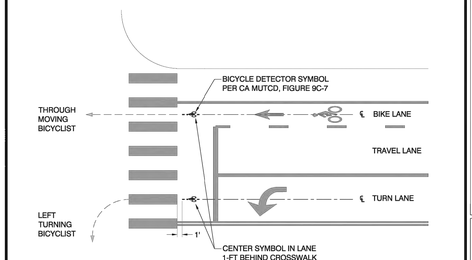


NOTES

1. Place a minimum of two bike lane symbol and arrow markings on each block face, centered in bike lane.
2. Place first marking on block 20 ft from curb return or crosswalk, unless otherwise noted.
3. Place last marking on block such that tip of arrow is 20 ft before curb return, unless otherwise noted.
4. Place additional mid-block markings, as noted on plans, such that spacing between symbols is no more than 200 ft, as measured from the base of one symbol to the next.
5. Adjust marking placement to leave at least 10 ft (parallel to the direction of travel) from advanced yield lines, limit lines, and other markings, unless otherwise noted.

NOT TO SCALE

CITY OF OAKLAND	BIKE LANE SYMBOL, ARROW, AND STRIPING	ROADWAY MARKING DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-1

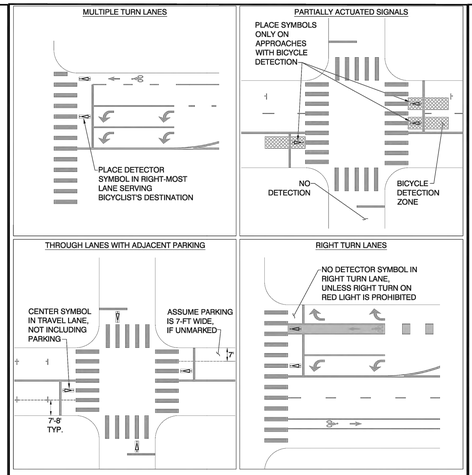


NOTES

1. The bicycle detector pavement marking (symbol) shall be used at all actuated traffic signal approaches that are capable of detecting bicycles.
2. A symbol shall be installed in the right-most lane serving the bicyclist's destination, including left turn lanes, through lanes, and bike lanes.
3. Center the symbol in the lane (aligned with lane assignment arrow).
4. The leading edge of the symbol shall be installed one foot behind the crosswalk (or limit line, if there is no crosswalk).
5. On Approaches with marked crosswalks and advanced limit lines, the symbol should be placed between the crosswalk and advanced limit line.

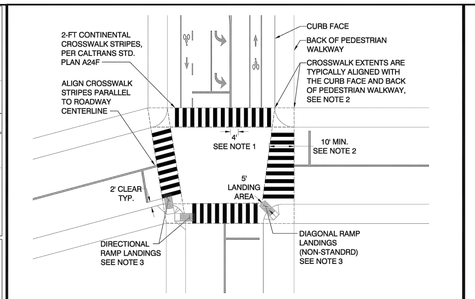
NOT TO SCALE

CITY OF OAKLAND	BICYCLE DETECTOR PAVEMENT MARKING	ROADWAY MARKING DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-3



LEGEND: BICYCLE DETECTOR SYMBOL (PER CA MUTCD, FIGURE 9C-7)

CITY OF OAKLAND	BICYCLE DETECTOR PAVEMENT MARKING	SUPPLEMENTAL GUIDANCE	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-3A

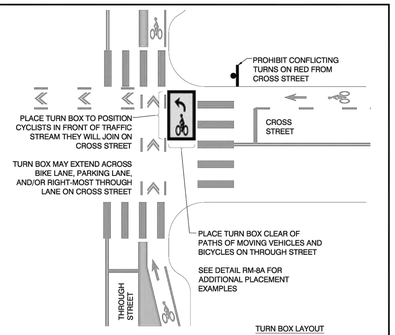


NOTES

1. Continental crosswalk stripe spacing is 4 ft, on-center, unless otherwise specified. Align first crosswalk stripe with centerline of roadway and continue pattern toward edge of roadway, maintaining 2 ft clear from face of curb (if present).
2. Crosswalks should encompass the pedestrian walkways they connect. Unless otherwise specified, align the front of the crosswalk with the curb face at the corresponding curb returns. Align the back of the crosswalk with the back of the pedestrian walkway but no less than 10 ft back from the front of the crosswalk.
3. Crosswalks must encompass the curb ramp landing areas they connect. Directional ramps are the preferred standard, but where a single diagonal ramp serves both crosswalks at a corner, the front of the crosswalks may need to be shifted toward the intersection to encompass the entire 5' landing area at the bottom of the curb ramp.
4. See Detail RM-4A for supplemental crosswalk layout guidance.
5. At controlled approaches, install advanced limit lines with continental crosswalks, per Marking Detail RM-5.

NOT TO SCALE

CITY OF OAKLAND	CONTINENTAL CROSSWALK	ROADWAY MARKING DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-4



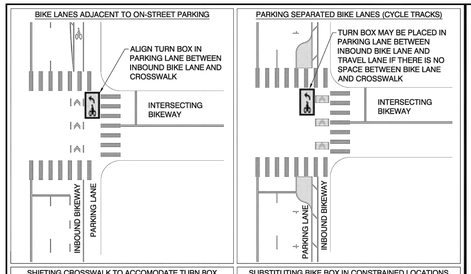
NOTES

1. Install two-stage turn queue boxes (turn boxes) at signalized intersections where separated (Class IV) bikeways intersect with another bikeway, to facilitate two-stage turns from the separated bikeway.
2. Turn boxes may also be used at the intersections of other bikeway types, where comfortable and convenient turns are not otherwise supported.
3. Prohibit turns on red from intersecting streets where turn boxes are installed in the path of turning vehicles.
4. Turn boxes shall be placed in a protected area, outside of the path of conflicting vehicle, bicycle, and pedestrian movements.
5. Turn boxes may also be used at unsignalized intersections to simplify cyclist turning movements, but engineering judgement must be used to ensure the safe placement of queue boxes outside the path of conflicting vehicle movements.
6. At signalized intersections with passive detection for bicycles, provide passive detection within the turn box

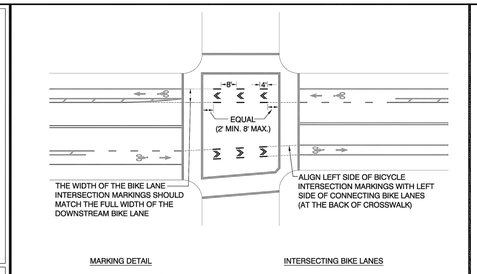
TURN BOX LAYOUT

NOT TO SCALE

CITY OF OAKLAND	TWO-STAGE TURN QUEUE BOX	ROADWAY MARKING DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-8



CITY OF OAKLAND	TWO-STAGE TURN QUEUE BOX	SUPPLEMENTAL GUIDANCE	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-8A

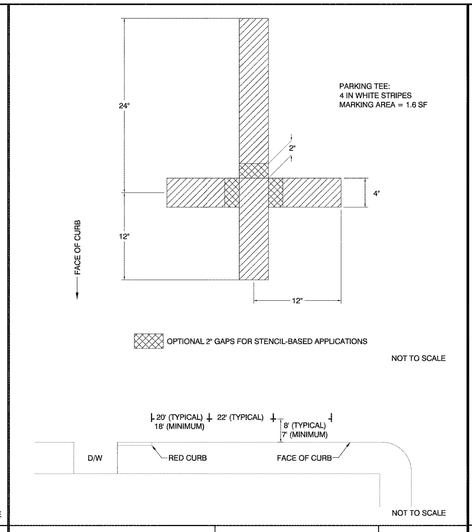


NOTES

1. Install bike lane intersection markings to connect approaching and receiving bike lanes across intersections, unless otherwise specified.
2. See Green Bike Lane Detail GB-4 for standard bike lane intersection markings through complex intersections.

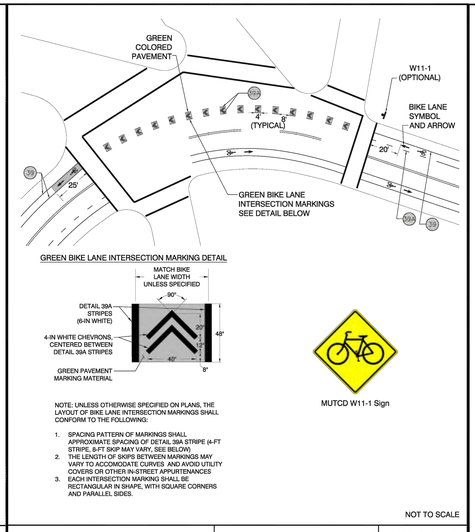
NOT TO SCALE

CITY OF OAKLAND	BIKE LANE EXTENSION THROUGH INTERSECTION	ROADWAY MARKING DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-9



NOT TO SCALE

CITY OF OAKLAND	PARKING STALL "TEE"	ROADWAY MARKING DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	RM-11

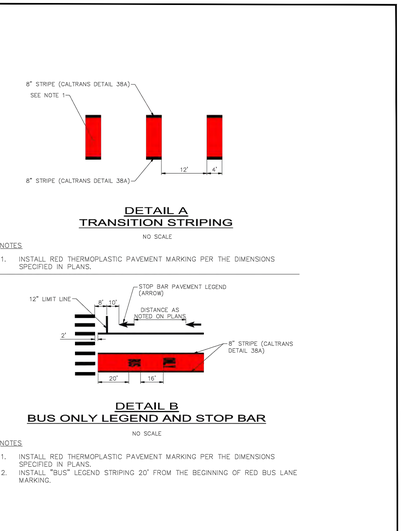


NOTE: UNLESS OTHERWISE SPECIFIED ON PLANS, THE LAYOUT OF BIKE LANE INTERSECTION MARKINGS SHALL CONFORM TO THE FOLLOWING:

1. SPACING PATTERN OF MARKINGS SHALL APPROXIMATE SPACING OF DETAIL 39A STRIPE (4-FT STRIPE, 8-FT SKIP MAY VARY, SEE BELOW)
2. THE LENGTH OF SKIPS BETWEEN MARKINGS MAY VARY TO ACCOMODATE CURVES AND AVOID UTILITY COVERS OR OTHER IN-STREET APPURTENANCES
3. EACH INTERSECTION MARKING SHALL BE RECTANGULAR IN SHAPE, WITH SQUARE CORNERS AND PARALLEL SIDES.

NOT TO SCALE

CITY OF OAKLAND	GREEN BIKE LANE (TYPE 4) COMPLEX INTERSECTION	GREEN BIKE LANE DETAILS	
DEPARTMENT OF TRANSPORTATION | SAFE STREETS DIVISION BICYCLE & PEDESTRIAN PROGRAM 250 FRANK H. OGAWA PLAZA, SUITE 6314 * OAKLAND CA, 94612 EMAIL: bikeped@oaklandca.gov		SCALE: NTS	DWG. NO.
		DATE: MAR 2021	GB-4



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R.C.E. No. 59539 EXPIRES: 12-31-25
DATE 10-08-24

REGISTERED PROFESSIONAL ENGINEER
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No. 59539
Exp. 12/31/25
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CITY OF EMERYVILLE, CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

APPROVED BY	BY	DATE

APPROVED BY
CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT

PAVEMENT DELINEATION DETAILS

HORIZ. SCALE: 1" = 20' VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXX
CONSTR. WORK ORDER. NO.: XXXXXX

PD-D-01

SHEET 115 OF 273

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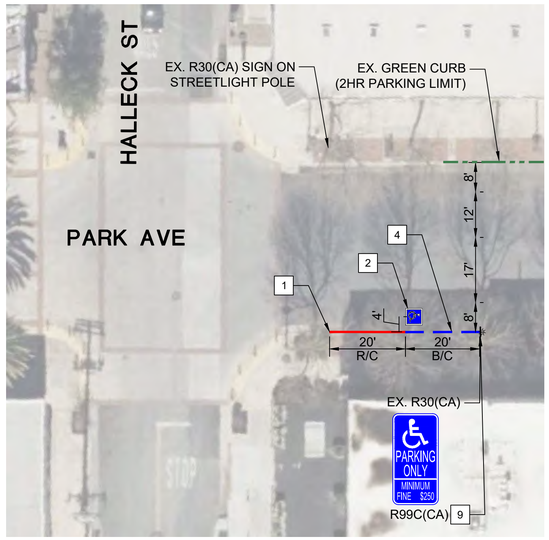
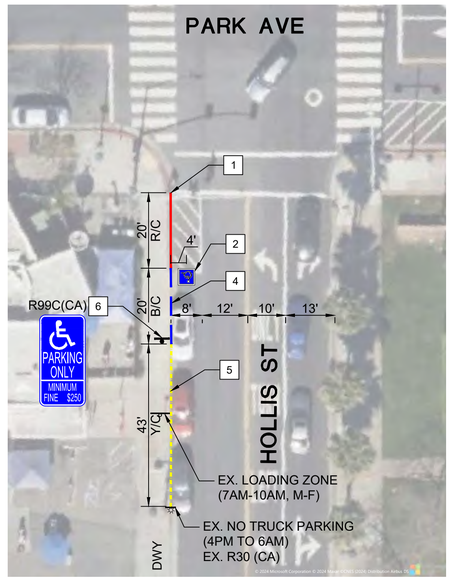
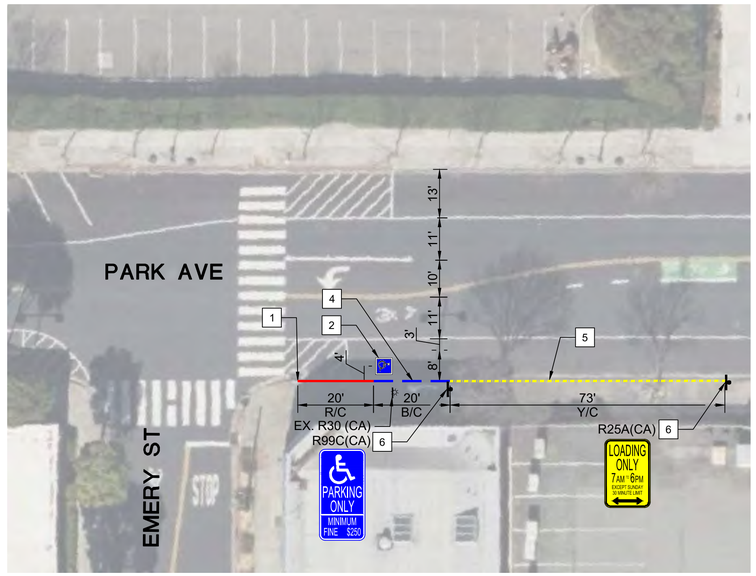


1 **PARK AVE AT HALLECK ST**
1" = 20'

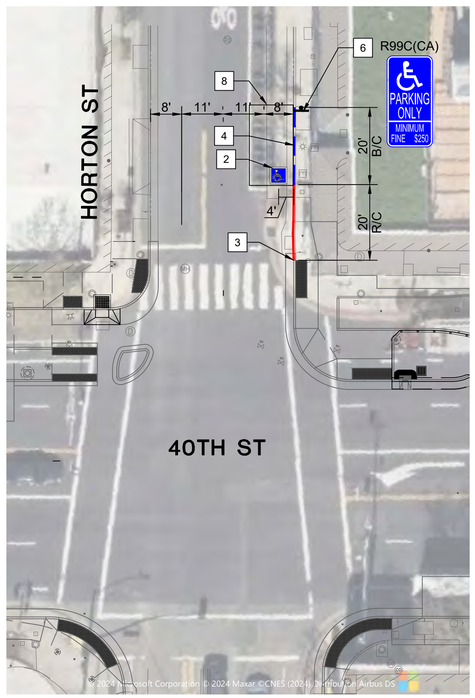


2 **PARK AVE AT HOLLIS ST**
1" = 20'

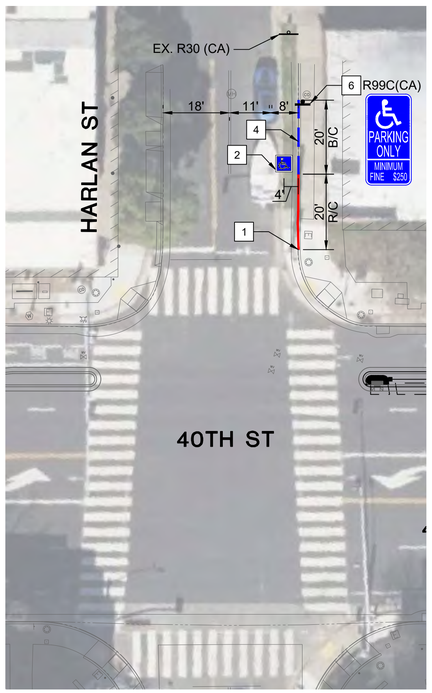
3 **PARK AVE AT HAVEN ST**
1" = 20'



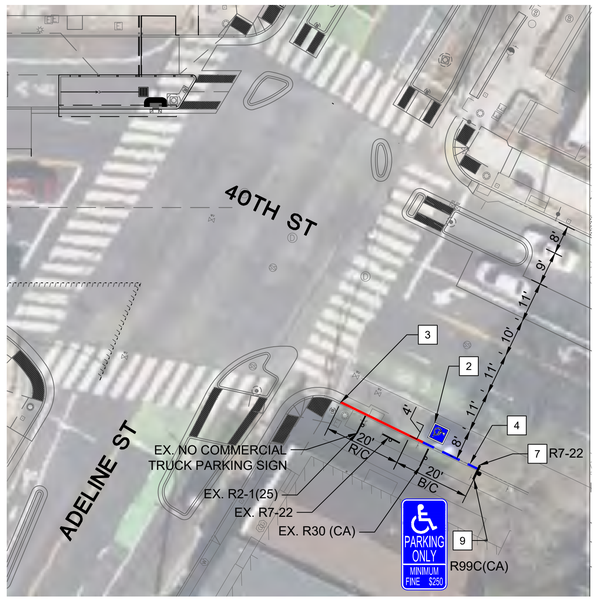
4 **PARK AVE AT EMERY ST**
1" = 20'



5 **40TH ST AT HORTON ST**
1" = 20'



6 **40TH ST AT HARLAN ST**
1" = 20'



7 **40TH ST AT ADELINE ST**
1" = 20'

8 **41ST ST AT ADELINE ST**
1" = 20'

SCALE: 1" = 20'

LEGEND

- RED CURB (R/C)
- BLUE CURB (B/C) - ACCESSIBLE PARKING
- YELLOW CURB (Y/C) - LOADING ZONE
- GREEN CURB - TIME-LIMITED PARKING

GENERAL NOTES

1. ALL EXISTING SIGNS TO REMAIN UNLESS OTHERWISE SHOWN ON PLANS

KEYNOTES

1	INSTALL RED CURB BEGINNING AT CURB RETURN
2	INSTALL INTERNATIONAL SYMBOL OF ACCESSIBILITY (ISA) MARKING PER CALTRANS STD. PLAN A24C
3	INSTALL RED CURB BEGINNING AT CROSSWALK
4	INSTALL BLUE CURB AS SHOWN
5	INSTALL YELLOW CURB AS SHOWN
6	INSTALL SIGN AS SHOWN ON NEW POST PER CALTRANS STD. PLANS RS1 AND RS5
7	REMOVE AND SALVAGE EXISTING SIGN
8	REMOVE AND RELOCATE BIKE SHARE STATION
9	INSTALL SIGN ON EXISTING POST OR STREETLIGHT

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APPROVED BY	BY	DATE

APPROVED BY
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DATE

40TH STREET MULTIMODAL PROJECT

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PAVEMENT DELINEATION DETAILS

PD-D-02

SHEET 116 OF 273

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

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PAVEMENT DELINEATION

SHEET No.	LOCATION	THERMOPLASTIC TRAFFIC STRIPING														PAVEMENT MARKER (RETROREFLECTIVE)		THERMOPLASTIC PAVEMENT MARKING																					
		6" YELLOW						6" WHITE						8" WHITE																									
		SOLID					DASH	SOLID			DASH																											
		CL (BIKE)	SL (BIKE)	DETAIL 22	DETAIL 28	DETAIL 29	DETAIL 41	DETAIL 27B	DETAIL 39	DETAIL 8	DETAIL 9	DETAIL 39A	DETAIL 40	DETAIL 38		TYPE D		PAINT BLUE CURB	RED PARKING	PAINT WHITE CURB	RED STRIPED BUS LANE	RED BACKGROUND BUS ONLY	RED BUS LANE	GREEN BIKE LANE	LIMIT LINE	BIKE LANE EXTENSION	SHARED ROADWAY BIKE SYMBOL	BIKE SYMBOL W/ PERSON	BIKE LANE TYPE I ARROW	TYPE I 10FT ARROW	TYPE IV (L,R) ARROW (BIKE)	TYPE IV (L,R) ARROW	TYPE VII (L,R) ARROW, MERGE	TYPE III (B) ARROW (BIKE)	TYPE VI ARROW	YIELD LINE	BUS ONLY	SPEED TABLE	CONTINENTAL CROSSWALK	DIAGONAL (6" WIDE)	CHEVRON
		LF														EA	EA	LF	LF	LF	SQFT				SQFT												
PD-01	SHLMD	246				326	54		690	163		48	239			1				58	471			392	38	24		42	21			31				5			562	158	
PD-02	SHLMD	800				1,477			1,377	291				119	1,354	125	6				387	902	7,937	558				35	14							5	84	24	30		
PD-03	40TH	399				798			797						801	69						460	4,738					14	7								42				
PD-04	40TH	223	150	119		213			417	24	129			195	691	32	4				77	804	4,217	1,675				28	14			15	27		42	3	84	24		54	
	HUBBARD															2																							
PD-05	40TH	131	269	273		21	98		218	274	308	116		200	444	29	17			64	558	719	3,183	1,108	147	48	12	42	14			150	54		42	13	84	24	1,130		
	HORTON				50											4																							
PD-06	40TH	207	81	345		119			240	153	68			162	612	43	10				429	718	5,537	800				28	14	14		75					84	36			
	HOLDEN															2																							
PD-07	40TH	285	57	248		30			323	153	394	128	90	486	717	27	30				297	700	5,963	1,735	132	51	12	70	35		8	150			42	5	126	24	1,514		
	HOLLIS															2	1																						
PD-08	40TH	406		278		109			377		586	36		230	640	36	24			3	432	904	5,724	442	76	18		28	14			120					84		1,296		
	HARLAN															2																							
PD-09	40TH	387		196		37	92		383	104	475	132		200	636	23	20			6	598	1,215	4,695	2,102	81	54	12	56	28	14		135				12	168	48	1,290		
	WATTS																																						
	EMERY															2																							
PD-10	40TH	390		357		199	196		373	544		212	415	459	859	50					895	345	3,094	1,578	144	60	69	35	18	84		180				14	42	12	1,562	10	
	SAN PABLO															2	1																						
PD-11	40TH	143		478		137	264	562	1,112	56	153	136		120	633	55	10				151	353	2,926	2,373	71	60	23	63	25	42		105			126	14	42	12	944		
	ADELINE															2																				5				18	
PD-12	40TH					108		57			58				174	11	2							176			46	7	4				81							29	116
PD-D-02	ADA																	160	160																				
	TOTAL	3,617	557	2,294	50	3,574	704	619	6,307				744		7,561	518	126	160	160	131	4,295	7,120	48,014	12,939	689	315	173	448	207	154	8	961	162	0	252	74	840	204	8,328	268	116

REMOVE PAVEMENT DEINEATION

SHEET NO	LOCATION	REMOVE YELLOW THERMOPLASTIC TRAFFIC STRIPE (HAZARDOUS)	REMOVE THERMOPLASTIC TRAFFIC STRIPE
		LF	LF
PD-1	SHELLMOUND	148	308
	65TH ST	53	172
PD-2	66TH ST	152	
PD-3	SHELLMOUND	143	243
	67TH ST	177	203
TOTAL		673	926

REMOVE PAVEMENT MARKING

SHEET NO	LOCATION	RR XING SYMBOL	TYPE IV ARROW	TYPE VII ARROW	LIMIT LINE	BIKE LANE SYMBOL	BIKE LANE ARROW	CONTINENTAL XING
		SQFT						
PD-1	SHELLMOUND		15	42	175	7	3.5	
	65TH ST	140			92			144
PD-2	66TH ST	70						
PD-3	SHELLMOUND							
	67TH ST	70				7	3.5	
TOTAL		280	15	42	267	14	7	144
GRAND TOTAL		769						

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DATE

40TH STREET MULTIMODAL PROJECT

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PAVEMENT DELINEATION QUANTITIES

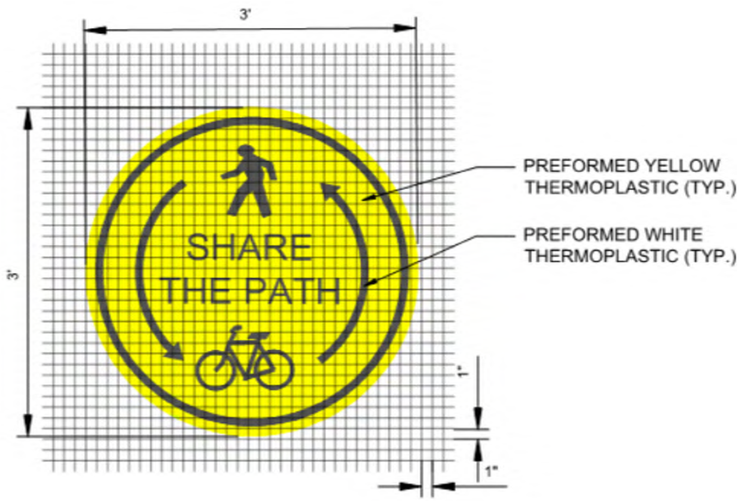
HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

PDQ-01

SHEET 117 OF 273

GENERAL NOTES

1. PAVEMENT DELINEATION WORK SHALL BE IN ACCORDANCE WITH THE 2023 CALTRANS STD PLAN, THE CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (CA-MUTCD) LATEST EDITION, AND THE CONTRACT SPECIAL PROVISIONS. PAVEMENT DELINEATION DETAIL DESIGNATION NUMBERS ARE PER CALTRANS STD PLANS A20A TO A20D. PAVEMENT MARKINGS ARROWS, SYMBOLS, WORDS AND CROSSWALKS ARE PER CALTRANS STD PLANS A24A TO A24F. BIKE PAVEMENT MARKINGS PER CITY OF OAKLAND "DESIGN DETAILS FOR TRANSPORTATION FACILITIES".
2. CONTRACTOR SHALL REMOVE BY WET SANDBLASTING ALL EXISTING AND PAVEMENT MARKINGS WHICH CONFLICT WITH NEW WORK AS SHOWN ON THE PLANS. SANDBLAST AREAS FOR PAVEMENT MARKING LEGEND AND ARROWS SHALL BE RECTANGULAR. ALL SANDBLASTED ARE FOG SEALED.
3. CONTRACTOR SHALL FINISH AND INSTALL ALL CONSTRUCTION MATERIALS FOR PAVEMENT DELINEATION AND SIGN WORK.
4. EXACT LOCATIONS OF ALL NEW SIGNS, PAVEMENT DELINEATION AND MARKINGS SHALL BE MARKED/ CAT-TRACED IN THE FIELD BY CONTRACTOR AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
5. LANE WIDTHS SHALL BE MEASURED BETWEEN THE CENTER LINES OF EACH ADJACENT SINGLE OR DOUBLE STRIPE OR TOP OF FACE OF CURB AS APPROPRIATE.
6. LANE WIDTHS OF CYCLE TRACK SHALL BE MEASURED BETWEEN THE CENTER LINES OF EACH ADJACENT STRIPE OR GUTTER EDGE AS APPROPRIATE.
7. ALL PAVEMENT DELINEATION AND MARKING SHALL BE THERMOPLASTIC.
8. CALTRANS PAVEMENT MARKINGS IN BIKE FACILITIES SHALL BE REDUCED TO HALF-SIZE.
9. FOR CONFLICT ZONES AND BIKE LANE EXTENSIONS, GREEN-COLORED PAVEMENT PATTERN SHALL MATCH THE PATTERN OF THE DOTTED LINES, THUS FILLING IN ONLY THE AREAS THAT ARE DIRECTLY BETWEEN A PAIR OF DASHED LINE SEGMENTS.
10. FOR AREAS WHERE GENERAL TRAFFIC IS PERMITTED TO ENTER INTO THE TRANSIT LANE OR OUT OF THE TRANSIT LANE, RED COLORED PAVEMENT PATTERN SHALL BE 4'-12'-4'.



LEGEND

(##)	STRIPING DETAILS PER STANDARD PLANS
LL	12" WHITE LIMIT LINE
CL	6" WIDE 3' LONG YELLOW DASHED CENTERLINE WITH 9' GAP
SL	6" YELLOW SOLID CENTERLINE
RP	REMOVE ALL EXISTING CONFLICTING TRAFFIC STRIPING, MARKING OR ARROW AS NOTED, INCLUDING RAISED PAVEMENT MARKERS
WM	INSTALL WHITE REFLECTIVE PAVEMENT MARKING ON TOP AND FACE OF CURB PER DETAIL A ON THE PART 1 PLANS.
	BIKE LANE SYMBOL WITH PERSON AND ARROW
	BIKE LANE
	TYPE (IV) L ARROW PER STD PLAN A24A
	TYPE (IV) R ARROW PER STD PLAN A24A
	TYPE (VI) ARROW PER STD PLAN A24A
	TYPE I ARROW PER STD PLAN A24A
	TYPE VII ARROW (L) PER STD PLAN A24A
	YIELD LINE PER STD A24G
	SHARE THE PATH
	SPEED TABLE/ SPEED HUMP WITH CROSSWALK PER CA MUTCD
BUS ONLY	BUS ONLY PER STD PLAN A24E, L=40'
	24" CONTINENTAL CROSSWALK BARS
	K72 DARK GREY
	"BUS ONLY" LANE TRANSITION STRIPING, L=4'

S-#	SIGN IDENTIFICATION NUMBER
	PROPOSED ROADSIDE SIGN (ONE POST)
	PROPOSED ROADSIDE SIGN (STREETLIGHT)
	EXISTING ROADSIDE SIGN (ONE POST)
PP	PROTECT IN PLACE
SS	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)
BAY ST	"BAY ST" PAVEMENT MARKING PER STANDARD PLAN A24D

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(510) 550-8959

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R.C.E. No. 63909 EXPIRES: 9-30-26
DATE 02-28-2025

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40TH STREET MULTIMODAL PROJECT - PART 2

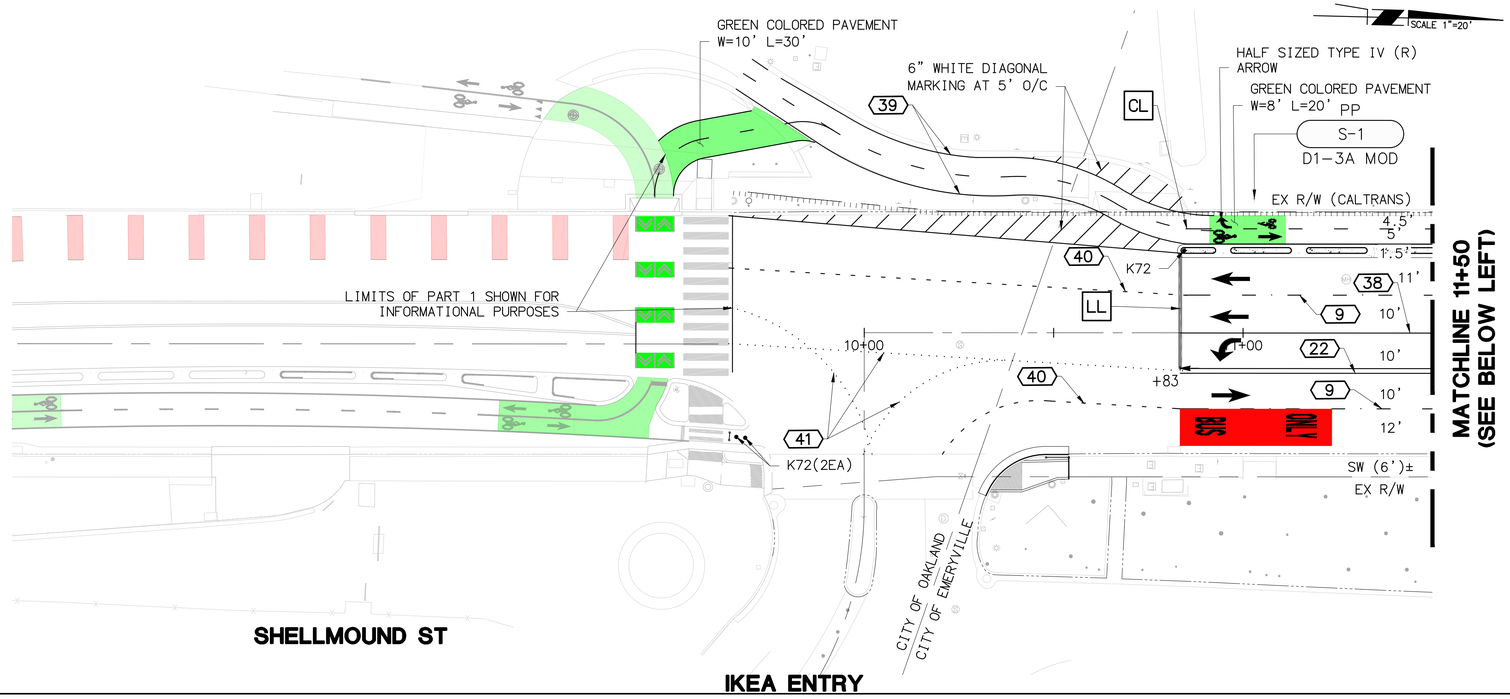
PAVEMENT DELINEATION NOTES AND DETAILS

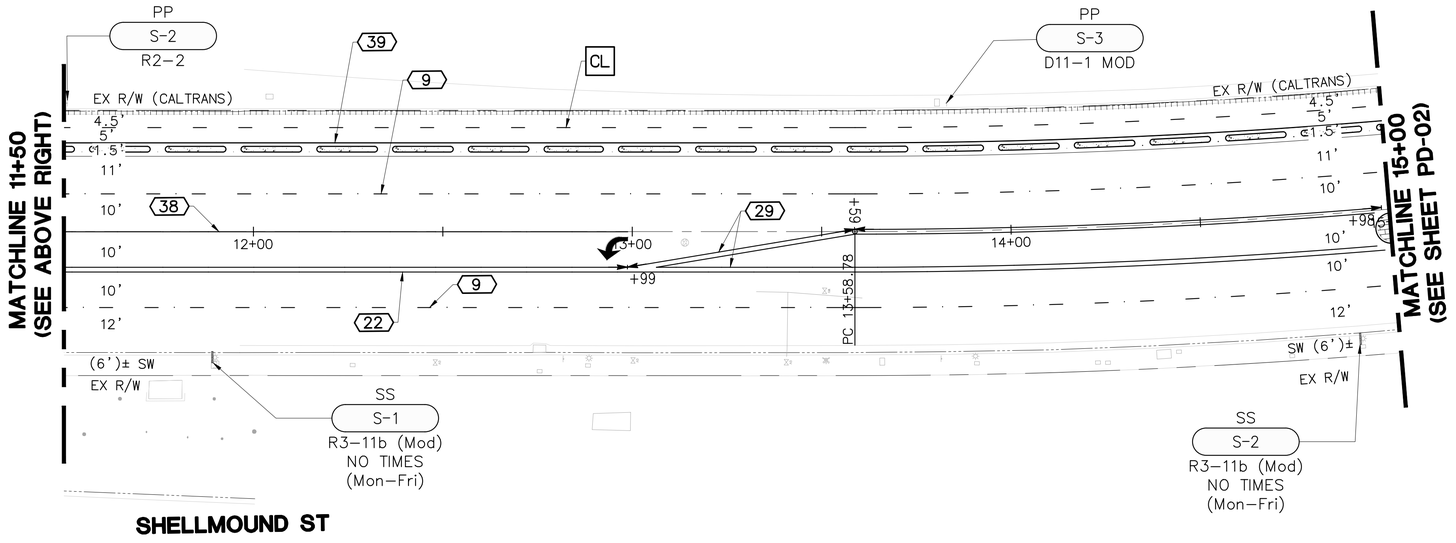
HORIZ. SCALE: NTS VERT. SCALE: NTS

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-01

SHEET 237 OF 273





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SCALE: 1"=20'

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40TH STREET MULTIMODAL PROJECT - PART 2

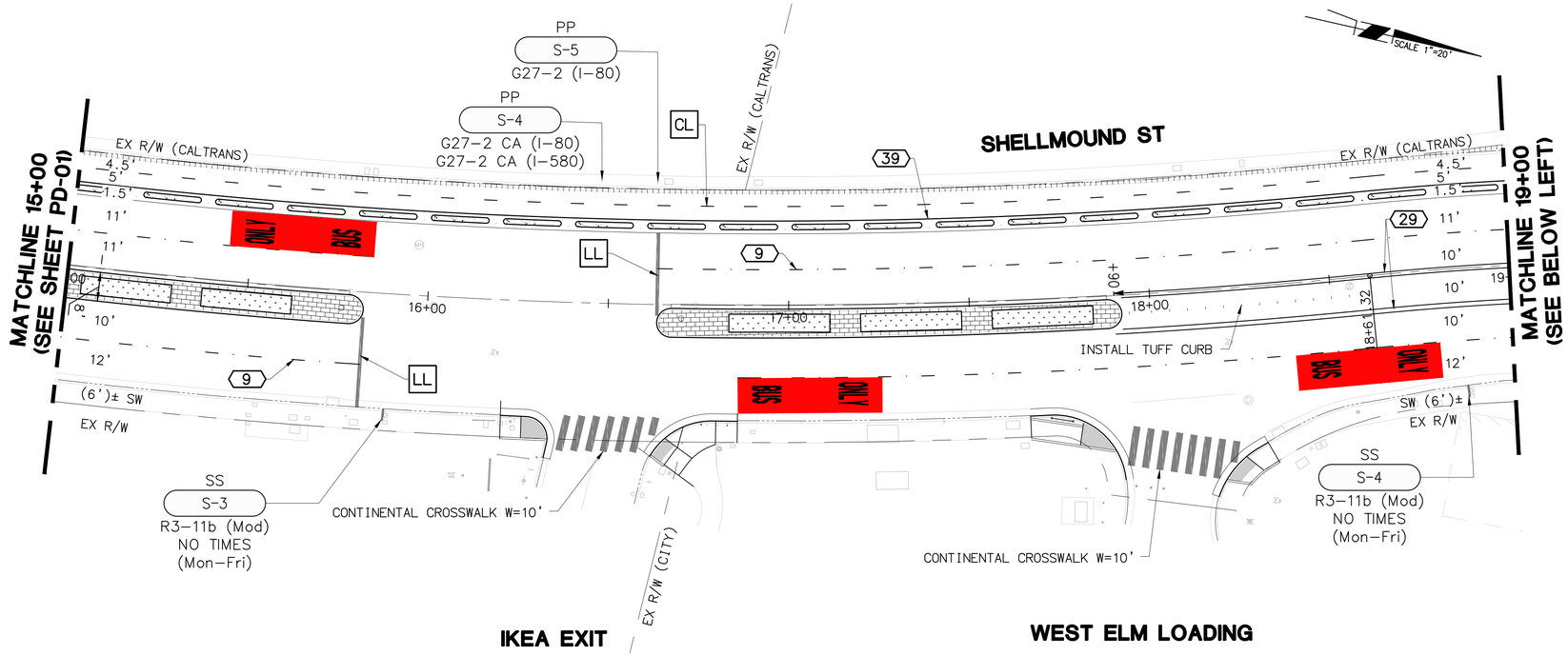
PAVEMENT DELINEATION PLAN
SHELLMOUND STREET
FROM BEG TO STA 15+00

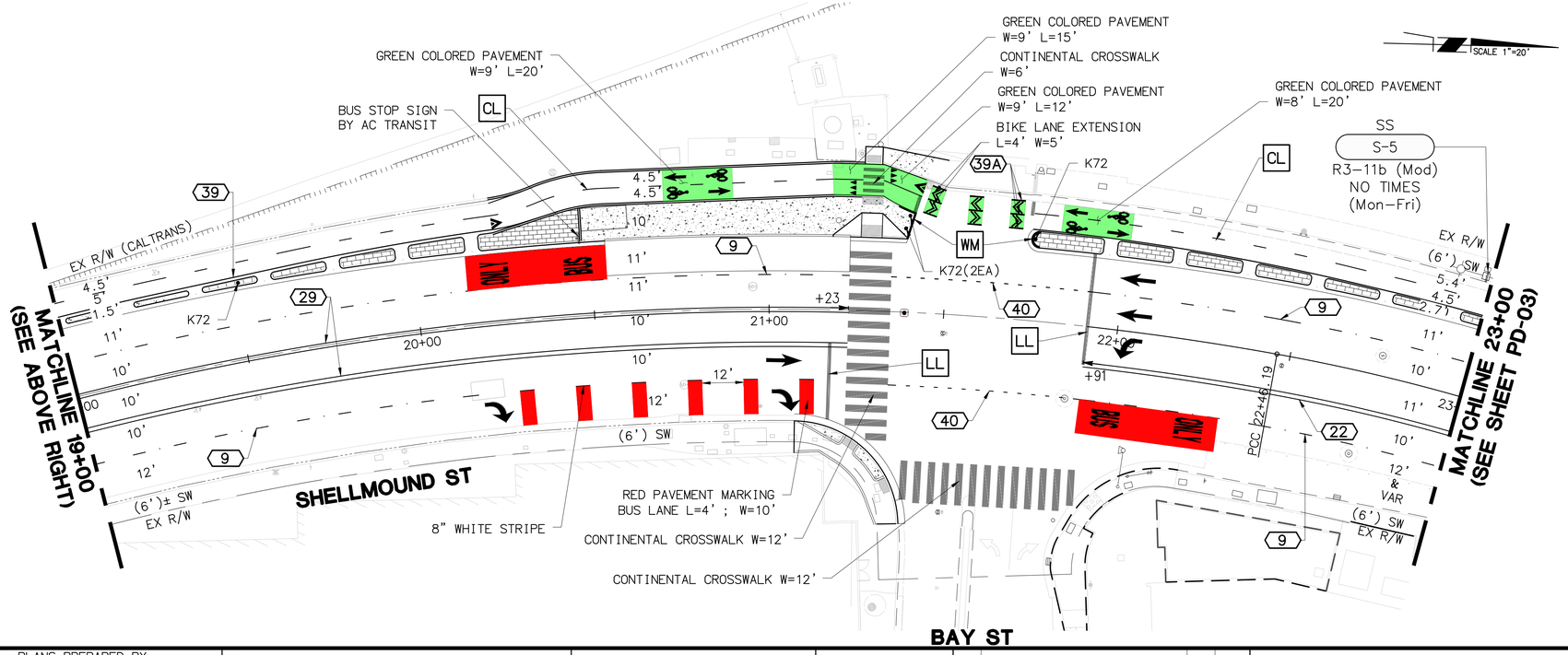
HORIZ. SCALE: 1" = 20' VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-02

SHEET 238 OF 273





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DATE

40TH STREET MULTIMODAL PROJECT - PART 2

PAVEMENT DELINEATION PLAN
SHELLMOUND STEET
FROM STA 15+00 TO STA 23+00

HORIZ. SCALE: 1" = 20' VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-03

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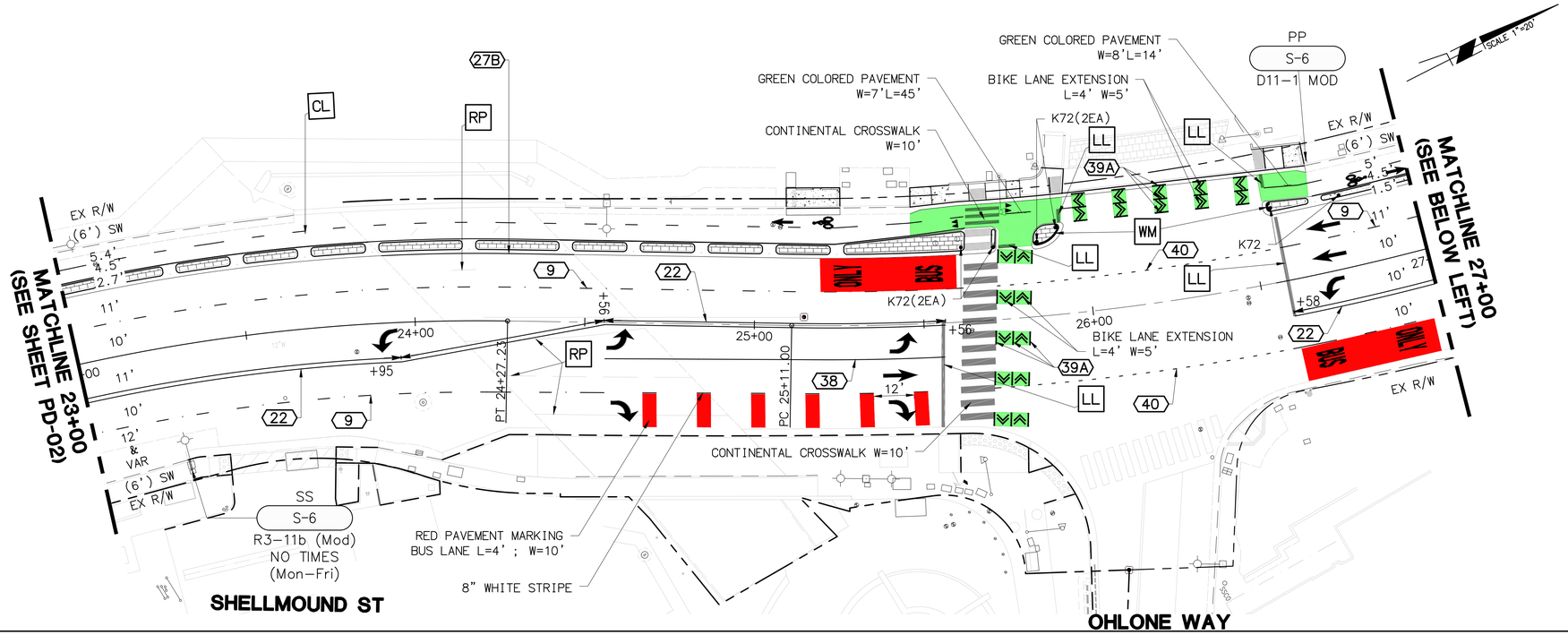

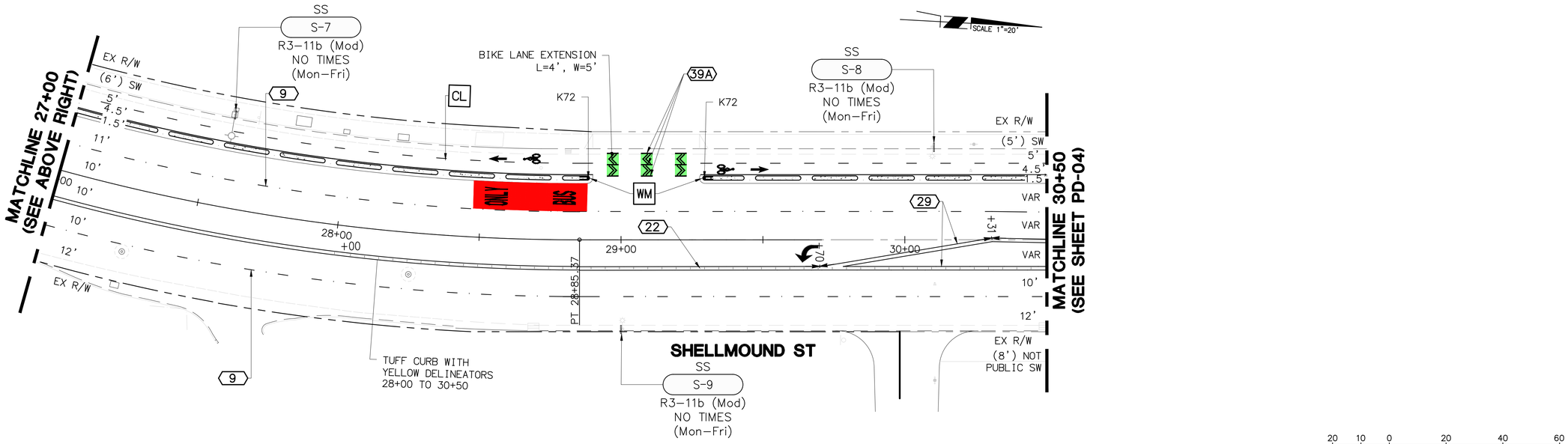

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2/28/2025 1:47 PM Miguel Vazquez

PLANS PREPARED BY
DIABLO ENGINEERING GROUP
1300 CLAY STREET, SUITE 600
OAKLAND, CA 94612
(510) 550-8959

ENGINEER IN RESPONSIBLE CHARGE
JENNIFER HARMON
R.C.E. No. 63909 EXPIRES: 9-30-26
DATE 02-28-2025

REGISTERED PROFESSIONAL ENGINEER
JENNIFER A. HARMON
No. C 63909
Exp. 9-30-26
CIVIL
STATE OF CALIFORNIA

CALL BEFORE YOU DIG
Under Ground Service Alert North 811
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

MARK	REVISIONS	APPR.	DATE

DESIGNED BY AT DRAWN BY AT CHECKED BY JH

CITY OF EMERYVILLE, CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

APPROVED BY	BY	DATE

APPROVED BY
CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT - PART 2

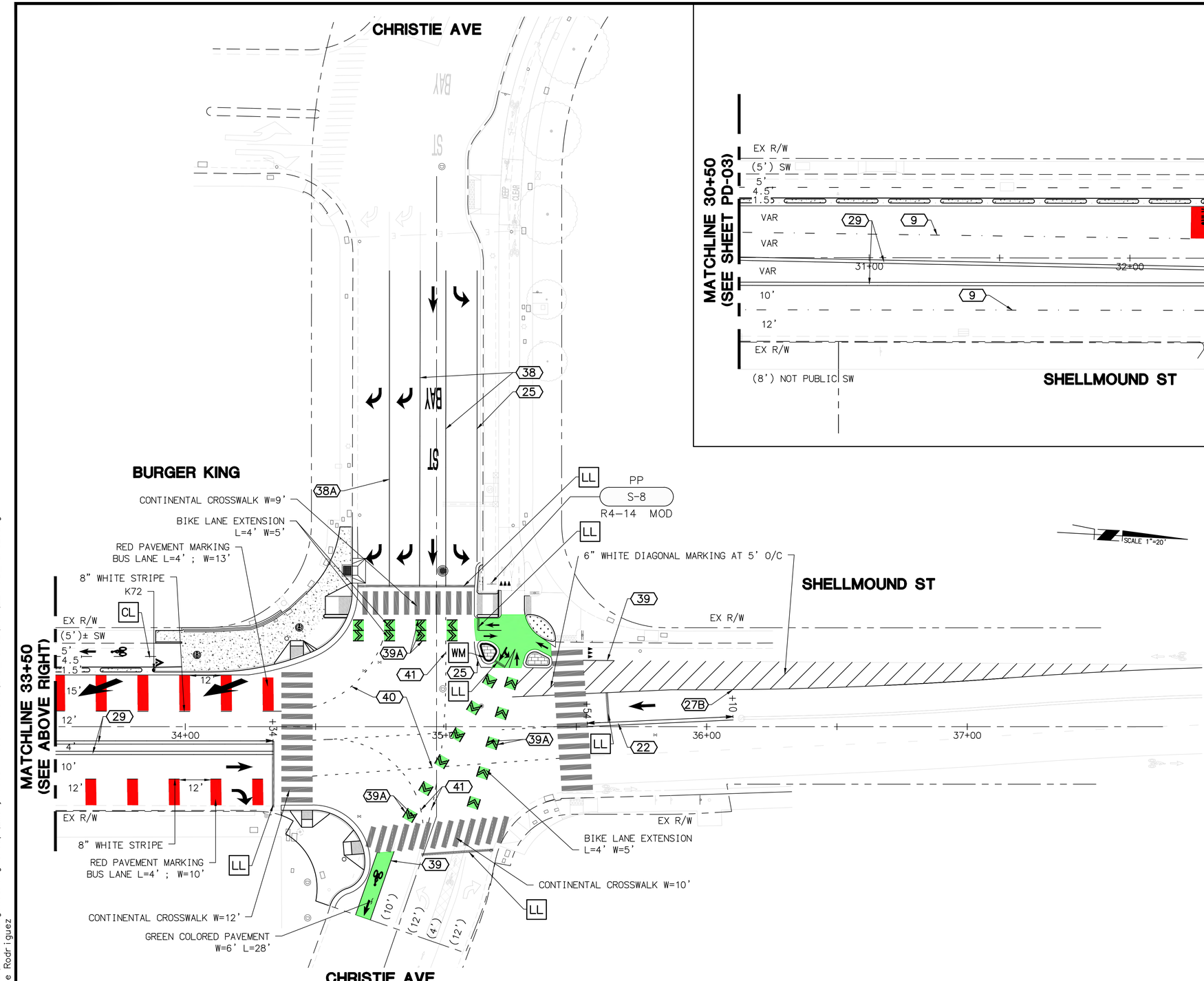
PAVEMENT DELINEATION PLAN
SHELLMOUND STREET
FROM STA 23+00 TO STA 30+50

HORIZ. SCALE: AS SHOWN | VERT. SCALE: N/A

DESIGN WORK ORDER, NO.: XXXXXXX
CONSTR. WORK ORDER, NO.: XXXXXXX

PD-04

SHEET 240 OF 273



100% SUBMITTAL, NOT FOR CONSTRUCTION

C:\Users\JoseRodriguez\Diablo Engineering Group\Emeryville - 40th Street\CAD_Part2\Div\221-PD_Part2.dwg
2/28/2025 4:58 PM Jose Rodriguez

PLANS PREPARED BY
DIABLO ENGINEERING GROUP
1300 CLAY STREET, SUITE 600
OAKLAND, CA 94612
(510) 550-8959

ENGINEER IN RESPONSIBLE CHARGE
JENNIFER HARMON
R.C.E. No. 63909 EXPIRES: 9-30-26
DATE 02-28-2025

REGISTERED PROFESSIONAL ENGINEER
JENNIFER A. HARMON
No. C 63909
Exp. 9-30-26
CIVIL
STATE OF CALIFORNIA

CALL BEFORE YOU DIG
Under Ground Service Alert North 811
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

MARK	REVISIONS	APPR.	DATE

DESIGNED BY AT DRAWN BY AT CHECKED BY JH

CITY OF EMERYVILLE, CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

APPROVED BY	BY	DATE

APPROVED BY
CITY ENGINEER
DATE

40TH STREET MULTIMODAL PROJECT - PART 2

PAVEMENT DELINEATION PLAN
SHELLMOUND ST TO CHRISTIE AVE
FROM STA 30+50 TO END

HORIZ. SCALE: 1" = 20' | VERT. SCALE: N/A

DESIGN WORK ORDER. NO.: XXXXXXX
CONSTR. WORK ORDER. NO.: XXXXXXX

PD-05

SHEET 241 OF 273

Attachment B:
Transportation Committee and City Council Agendas

PLEASE POST

City of Emeryville

INCORPORATED 1896

1333 Park Avenue. Emeryville, CA 94608-3517
t (510) 596-4300 | f (510) 596-4389

Chair John Bauters
Member Sukhdeep Kaur

Actions taken by Advisory Bodies are not official actions of the City Council, but must be considered and potentially ratified at a regular City Council meeting.

All writings that are public records and relate to an agenda item, which are distributed to a majority of the legislative body less than 72 hours prior to the meeting is noticed, will be made available via email by request to the Committee Secretary. In compliance with the Americans with Disabilities Act, a person requiring an accommodation, auxiliary aid, or service to participate in this meeting should contact the Committee Secretary as far in advance as possible, but no later than 72 hours prior to the scheduled event. The best effort to fulfill the request will be made. Assistive listening devices will be made available for anyone with hearing difficulty and must be returned to the Committee Secretary at the end of the meeting. All documents are available in alternative formats upon request. No animals shall be allowed at, or brought in to, a public meeting by any person except (i) as to members of the public or City staff utilizing the assistance of a service animal, which is defined as a guide dog, signal dog, or other animal individually trained to provide assistance to an individual with a disability; or (ii) as to police officers utilizing the assistance of a dog(s) in law enforcement duties.

TRANSPORTATION COMMITTEE

Special Meeting
Civic Center, Garden Level / Teleconference
1333 Park Avenue. Emeryville, CA 94608
June 20, 2023 – 3:00 PM

This meeting is being conducted in a hybrid (in-person/Zoom format) at the location indicated on the agenda. To join the meeting via Zoom, use the information provided below.

Zoom Meeting Information:
https://emeryville-org.zoom.us/j/87489115150?pwd=VUJxRG5MblNxamZnN3BlY1hzdE9oZz09
Audio Only: Call in to 669-900-6833, Meeting ID 874 8911 5150, Passcode 917042.

AGENDA

1. Call to Order
2. Roll Call
3. Public Comment
   3.1 *Submit an Online Speaker Card at www.emeryville.org/advisorybodies.*
4. Approval of May 8, 2023, Regular Meeting Action Minutes
5. Action Items
   5.1 Wayfinding (Oaks)
   5.2 Objective Standards (Bicycle Parking and Sidewalks) (Oaks)
   5.3 SB1 Project List RMRA (Road Maintenance and Rehabilitation Account) Funding (O'Connell)
6. Information Items
   6.1 Transportation and Other Grants (Alaoui)
   6.2 Capital Improvement Program Tracking Spreadsheet (Ahrens)
7. Future Agenda Items
   7.1 40th Street Multimodal Project Update (July 2023)
   7.2 Active Transportation Plan (July 2023)
   7.3 Civic Center Painting Project (July 2023)
   7.4 Tree Planting Program (Fall 2023)
8. Announcements / Member Comments
9. Adjournment

Public comment for agenda items can be submitted online via our online speaker card at www.emeryville.org/advisorybodies. Written comments can also be submitted by email to the Committee Secretary. If you would like to support, oppose, or otherwise comment on an upcoming agenda item, please send in your comments prior to the meeting.

FURTHER INFORMATION may be obtained by contact Josie Ahrens, Committee Secretary, at 510-596-4319 or josie.ahrens@emeryville.org. The next regular meeting is scheduled for July 10, 2023, at 3:00 PM.

DATED: JUNE 13, 2023

Post On: JUNE 16, 2023
Post Until: JUNE 21, 2023

Lorrayne Leong, Deputy City Clerk

Action Minutes for
City of Emeryville
Transportation Committee, Regular Meeting of the Advisory Committee
May 8, 2023 – 3:00PM to 5:00PM

Members:
John J. Bauters (Bauters), Chair and Mayor
Sukhdeep Kaur (Kaur), Councilmember

Staff Present:
Josie Ahrens (Ahrens)
Mohamed Alaoui (Alaoui)
Paul Buddenhagen (Buddenhagen)
Nik Ignacio (Ignacio)
Nancy Humphrey (Humphrey)
Valorie Maxwell (Maxwell)
Ryan O'Connell (O'Connell)
Michael Roberts (Roberts)
Randall West (West)

Members of the Public:
Celeste Burrows
Betsy Cooley
Phil Erickson (Community Design + Architecture)
Jennifer Harmon (Diablo Engineering Group)
Rob Rees (Fehr & Peers)

1. **Call to order:** This meeting was called to order at 3:01 PM.

2. **Roll Call:** See above.

3. **Public Comment:** None.

4. **Approval of Action Minutes**

   4.1 Approval of April 10, 2023 Special Meeting Action Minutes.

   A motion was made to approve the April 10, 2023 action minutes. No public comment.

   Motion: Kaur / Second: Bauters / Vote: Unanimous approval.

5. Action Items:

5.1 40th Street Multimodal Project Update (O'Connell)

O'Connell presented updates on the project's progress in the planning phase, which included sharing an overall timeline as well as grants received for the project. Consultants on the project were also present, which included Phil Erickson from Community Design + Architecture, Jennifer Harmon from Diablo Engineering Group, and Rob Rees from Fehr & Peers. The scope of work of the project includes transit-only lanes with new boarding islands, two-way cycle track, and pedestrian improvements at eleven intersections.

The project team shared the initial results from the traffic feasibility study and shared initial plans for community outreach. The goal is to have 100% plans complete in spring 2024 and construction to begin in summer 2024 and completed by fall 2025. The project was originally approved by City Council in March 2020, but the consultants are doing a traffic study again for full or patrial closures on unsignalized intersections, and traffic counts have gone down in January 2023 in comparison to pre-covid levels.

O'Connell presented three alternatives: Alternative 1 is current base project, Alternative 2 is side street closures with Horton diverter, and Alternative 3 is side street closures with no Horton diverter. He outlined the benefits for closures: green infrastructure opportunities, trees, benches, bike parking, and mini park spaces, while still maintaining emergency vehicle access and smaller delivery truck access.

The consultants presented traffic impact data from transportation impact software and studies. Staff recommend Alternative 3. The Horton diverter is currently tied to a condition of approval for the Sherwin Williams site and would need to be modified through the process of modifying conditions of approval.

Public Comment: Cooley asked a question about how the project will impact the EmergyGo Round. Staff responded that the EmeryGo Round was analyzed in 2019 and service was improved with transit-only lanes and potential TSP (transit signal priority) for transit service. But more analysis should be done on the impact on Hollis Street for service.

Kaur and Bauters asked a few clarifying questions about design elements and expressed support for the project.

A motion was made to recommend to the Council a design alternative that includes, at a minimum, the closure of the four unsignalized side streets.

Motion: Bauters / Second: Kaur / Vote: Unanimous approval.

City of Emeryville
CALIFORNIA

M E M O R A N D U M

DATE: July 18, 2023

TO: Paul Buddenhagen, City Manager

FROM: Mohamed Alaoui, Public Works Director

SUBJECT: **40th Street Multimodal Project:**

Resolution Of The City Council Of The City Of Emeryville Approving Concept Closing Unsignalized Intersections On The North Side Of 40th Street (Watts, Haven, Holden, and Hubbard) As Part Of The 40th Street Multimodal Project; And/Or

Resolution Of The City Council Of The City Of Emeryville Approving Addition Of New Scope Of Work (Exhibit A-1) Related To Additional Design Work For Unsignalized Intersections On The North Side Of 40th Street As Part Of The 40th Street Multimodal Project Into The Professional Services Contract With Diablo Engineering Group; And/Or

Resolution Of The City Council Of The City Of Emeryville Approving Addition Of New Scope Of Work (Exhibit A-2) Related To Design Of The 40th Street Multimodal Project Phase 2: Bay Trail Gap Closure (CIP No. SUT-05) Into The Professional Services Contract With Diablo Engineering Group; And

Resolution Of The City Council Of The City Of Emeryville Authorizing The City Manager To Execute A First Amendment To The Professional Services Contract With Diablo Engineering Group For Additional Services As Described In Exhibit(s) _____, Increase The Total Compensation By $_____, For A Total Amount Not To Exceed $_____

RECOMMENDATION

Staff recommends that the City Council adopt the above-entitled resolutions.

BACKGROUND

The 40th Street Multimodal Project (“Project”) is a significant initiative undertaken by the City of Emeryville to improve transportation conditions for bus riders, pedestrians, and cyclists. The project focuses on the redesign of 40th Street, as well as sections of San Pablo Avenue and Shellmound Street, with the aim of enhancing connectivity, safety, and efficiency for various modes of transportation.

This Project holds significant importance as 40th Street has been designated as a major Transit Street and Regional Retail Access Route, serving as a vital multimodal

connector within Emeryville. It plays a critical role in providing access to employment opportunities, essential services, and regional transit hubs/destinations, including the MacArthur BART Station, San Pablo Avenue, and the Bay Trail.

The suite of improvements proposed in the Project include the implementation of dedicated bus-only lanes in both directions along 40th Street, aimed at reducing travel time for buses and optimizing transit efficiency. Furthermore, a two-way Class 4 separated bikeway will be established, running from Adeline Street to the Bay Bridge Trail. This dedicated bikeway aims to enhance safety for cyclists while also promoting active transportation and improving accessibility. Lastly, to ensure pedestrian safety, the Project incorporates improvements at eleven intersections along the route. These enhancements encompass various measures such as traffic calming measures, enhanced crosswalks, and the installation of bus boarding islands and shelters.

On March 3, 2020, the City Council approved the conceptual design of the Project and found it to be exempt from the California Environmental Quality Act. As part of the resolution, City Council added items for consideration in the final engineering design phase which included a feasibility analysis of closing unsignalized cross streets on the northside of 40th Street.

The City of Emeryville has made significant progress in advancing the Project since City Council's concept approval in March 2020. In 2021, the City received $3,174,000 for the Design Phase from Alameda CTC for transit improvements and from the statewide Active Transportation Program for pedestrian and bicycle improvements. In 2022, the City received $3,800,000 from the statewide Affordable Housing and Sustainable Communities Program for construction of a transportation project to support infill and compact developments that reduce greenhouse gas emissions. Lastly in May 2023, the City received notice that they will be awarded $8,376,000 from Alameda CTC's Comprehensive Investment Program 2024 which covers the remaining construction funding gap for the Project.

In August 2022, the Public Works Department issued a Request for Proposals for "Professional Design Services for the 40th Street Transit-Only Lanes And Multimodal Enhancements Project." Two consultant teams submitted proposals, demonstrating a detailed understanding of the project, strong team composition, and technical expertise from past projects. After careful evaluation, City staff identified Diablo Engineering Group ("Diablo Engineering") as the most suitable consultant, considering their approach, experience, and understanding of the City's requirements.

Following the evaluation process, City staff engaged in negotiations with Diablo Engineering, adhering to the Local Assistance Procedures Manual (LAPM) guidelines. Minor scope changes were incorporated into the original proposal, and these adjustments were outlined in the task breakdown summary as shown in Attachment A – Original Professional Services Contract. The Contract was approved at City Council on November 15, 2022 (Resolution No. 22-154) and the Contract was executed on January 13, 2023.

DISCUSSION

Progress to Date

Diablo Engineering, and their project team, has been diligently working on the 35% design plans for the Project and recently completed a traffic feasibility analysis that was presented to the Transportation Committee on May 9, 2023. They will continue to progress with their design work throughout 2023 and they expect to be 100% complete with the design phase in Spring/Summer 2024.

First Resolution – Approval Of Concept Closing Unsignalized Intersections On The North Side Of 40th Street (Watts, Haven, Holden, and Hubbard)

In March 2020, City Council instructed Staff to conduct a traffic feasibility study for full and partial closures of the unsignalized streets that connect to 40th Street from the north (Watts, Haven, Holden, and Hubbard). In early 2023, Fehr & Peers (a subconsultant to the Diablo Engineering team) completed a traffic feasibility analysis as one of the first items of work for the design phase of the Project. The results of the analysis were shared with the Emeryville Transportation Committee on May 9, 2023.

In the traffic feasibility analysis, the team studied various circulation alternatives along the corridor with and without closures of unsignalized intersections. All the signalized intersections in the Project area were found to operate with some congestion with average delays except for one intersection. The San Pablo Avenue intersection with 40th Street would continue to operate with significant congestion and delays, without a significant change from the project. The analysis went on to show that the extent of vehicle queuing on 40th Street would experience no significant change regardless of whether the unsignalized intersections on the north side of 40th street are fully closed or open.

At the Transportation Committee meeting, Staff received positive feedback on the overall project, circulation/traffic pattern changes, and the concept of green infrastructure and parklet opportunities if the unsignalized streets were closed off to vehicular traffic. The Committee made a motion to forward the concept of closing unsignalized intersections on the north side of 40th Street (Watts, Haven, Holden, and Hubbard) to City Council. This is the first resolution attached to this staff report.

Second Resolution – Addition Of New Scope Of Work Related To Additional Design Work For Unsignalized Intersections On The North Side Of 40th Street (Exhibit A-1)

Given the progress made thus far and the need for additional work related to the unsignalized intersections, Staff recommends extending the design contract with Diablo Engineering to include the following:

- Exhibit A-1 (Additional design work for unsignalized intersections) – Total cost of $120,232.00

- These tasks will involve the preparation of a final traffic analysis, environmental studies, and civil designs for the additional design work needed for the unsignalized intersections on the north side of 40th Street within the original "Phase 1" Project limits (Adeline Street to IKEA Entrance).
- The "Phase 1" Project including Exhibit A-1 is fully funded through various grant programs for Design and Construction Phases.

***Third Resolution* – Addition Of New Scope Of Work Related To Design Of The 40th Street Multimodal Project Phase 2: Bay Trail Gap Closure (Exhibit A-2)**

On July 21, 1999, the Emeryville Public Financing Authority issued revenue bonds in the amount of $14,420,000 to acquire three outstanding series of bonds that had been issued by the City of Emeryville including West Emeryville Assessment District Limited Obligation Refunding Bonds, Bay-Shellmound Street Extension Assessment District Limited Obligation Refunding Bonds, and the Assessment District 1993-1 (East Bay Bridge Center) Limited Obligation Refunding Bonds. The 1999 Emeryville Public Financing Authority Revenue Bonds were paid in full in September 2021. However, a fund balance of $1.07 million remained.

On February 7, 2023, City Council authorized the establishment of a capital improvement fund to be used for public improvements or the maintenance of public improvements within the area for which the Bay Street-Shellmound bonds were issued, and City Council authorized the transfer of the $1.07 million in remaining funds to this capital improvement fund (Fund 441).

On June 6, 2023, City Council approved the Capital Improvement Program for Fiscal Years 2023-2024 through 2027-2028 ("CIP"). Included within the CIP is Project No. SUT-05, 40th Street Multimodal Project Phase 2: Bay Trail Gap Closure, which was assigned the 1.07 million in Fund 441.

The "Phase 2" Project is aligned with local planning efforts through our Active Transportation Plan and Sustainable Transportation section from the CIP. Additionally, it is consistent with goals and policies at the regional level with the Countywide Transportation Plan (from Alameda CTC), Plan Bay Area 2050 (from MTC), and Bay Trail Gap Closure Implementation Plan (from MTC).

As shown in Attachment C, the original "Phase 1" Project limits connect the equity priority communities to the east of San Pablo Avenue with the Bay Trail entrance across the railroad tracks. The proposed "Phase 2" Project extends the multimodal corridor to Emeryville's Central core area where residents can connect to job centers, shopping areas, and more recreational opportunities.

Additionally, this extended portion of the "Phase 2" Project connects to other active transportation facilities including our South Bayfront Bridge. The bridge connects across the railroad tracks to the large Sherwin Williams Site and a newly built 3.5-acre park. At the southerly end of the 40th Street Phase 2 Project, there is a connection to the

regional Bay Trail landing point. At the North end at the Shellmound/Christie Avenue intersection, the Project closes the last remaining gap of the regional Bay Trail in Emeryville.

Combining the delivery of the “Phase 1” and “Phase 2” Projects represents an efficient use of Staff resources. It also ensures that the two phases are designed in an integrated fashion with ease. If “Phase 2” were delivered as a separate project, there would be a multi-year delay before the design would be completed and greater difficulty in ensuring the integration of the two designs. Furthermore, by designing “Phase 2” now, it puts us in a better position to seek grant funds for the associated Phase 2 construction phase.

Staff recommends extending the design contract with Diablo Engineering to include the following:

- Exhibit A-2 (Phase 2 Design) – Total cost of $656,440.00
    - These tasks will encompass the preparation of a final traffic analysis, environmental study, and civil designs for the "Phase 2” Project. This extension will expand the “Phase 1” Project limits by 0.5 miles northward as described in CIP No. SUT-05.
    - Staff recommends funding Exhibit C with funds from Fund 441 in CIP No. SUT-05.

Fourth Resolution – 1st Amendment Professional Services Contract for Diablo Engineering

The approved resolutions will determine the total amount of the 1st Amendment Professional Services Contract with Diablo Engineering. This may include:

- Exhibit A-1: Total cost of $120,232.00
- Exhibit A-2: Total cost of $656,440.00
- Or Exhibit A-1 + A-2: Total cost of $776,672.00

By executing a 1st Amendment to the Professional Services Contract with Diablo Engineering, incorporating the additional scopes of work (Exhibit A-1 and A-2), the City will ensure comprehensive support during the design and bidding phases, as well as the successful implementation of the Project's various elements.

Community Outreach Efforts

In an effort to ensure transparent and inclusive communication, City staff has actively engaged with the public regarding the Project. Recognizing the importance of gathering feedback and addressing concerns, the following outreach efforts have been undertaken:

- Project Mailers
    - Staff distributed six hundred and twelve (612) project postcards to residents and businesses within a ¼ mile radius of the 40th Street and Park Avenue corridors.
    - Additionally, four hundred and fifty-four (454) individual addresses directly on the 40th Street and unsignalized street corridors were sent project mailers which had more information/graphics than the postcard, and eleven (11) mailers were delivered in person to assure delivery when "return to sender" was received.
    - The mailers provided an informative resource with essential details about the project and its potential impacts on the local community. Included in the information was a dedicated project phone line and email to collect input and feedback from residents and businesses in the area. A link to the project web page for further information was also provided. Residents and businesses in closer proximity received the project mailer with more details about the proposed closures of unsignalized intersections so they would be aware of access changes that more directly affect them.
- In-Person Outreach Meetings and Phone Calls
    - Throughout the month of June and into early July, Staff and their consultants have conducted seven (7) in-person outreach meetings where presentations and materials were shared. The team has engaged in phone calls with nine (9) representatives of residents and/or businesses situated in the Project area. These interactions have provided an opportunity for stakeholders to voice their opinions, seek clarifications, and share their concerns directly with the project team. Staff members have actively listened to the feedback received, taking note of valuable insights, and will be considering their input in the ongoing project development.
- Email Correspondence:
    - In addition to the targeted outreach mentioned above, the Project team has been responsive to six (6) inquiries received from residents and businesses who responded to the project mailer via email. Through a dedicated project email address, staff has provided information, addressed queries, and ensured that the concerns of the community are acknowledged and considered.

Resulting Community Input

During the outreach to date, City staff and their consultants have followed up the mailings in the areas near to the proposed intersection closures with phone calls,

dropping off flyers, and making drop-in contacts with business and property owners, and management and leasing companies. Some stakeholders have not provided responses.

The following is a summary of input from the community as of the date the report was drafted.

Negative Input

1. Community members not directly located at the proposed unsignalized closure streets have expressed concerns regarding the potential increasing traffic on Park Avenue and signalized side streets. Some also expressed concerns about congestion that will result from the previously approved based scope of the 40th Street Project.
2. Some oppose the project due to concerns about potential impact on property values and development potential.
3. There is no convenient way to return to Hubbard Street if a customer misses the signalized right turn at Horton Street, and several businesses expressed concerns about the closures complicating customer access to their businesses.
4. Several business owners expressed serious concerns about accessing their loading docks; especially for larger trucks on Hubbard and Holden Street. Large trucks already have limited access at loading docks due to street width.
5. Necessary adjustments to curb markings to ensure truck access after the street closures may impact street parking for business customers and employees.
6. Retail access from pass-by trips on the frontage of 40th Street will be significantly reduced.

Staff Comment on Negative Input

1. *Vehicular traffic on the overall network will experience acceptable levels of congestion, see earlier discussion of traffic analysis.*
2. *There are numerous recent and proposed developments in Emeryville that have vehicular access similar to that which will result from the 40th Street Project.*
3. *This can be addressed with wayfinding signs and collaboration with businesses for them to provide information on their websites, and reviewing wayfinding results from Waze and similar apps.*
4. *The Project Team has analyzed truck turning movements with the closures in place. Results show that access appears to be feasible, albeit less flexible, and requiring additional red curb and removing existing truck restrictions on Park Avenue. Discussions with business and property owners are continuing.*
5. *While less convenient and further away, on-street parking is available in the surrounding street network.*
6. *This can be addressed with wayfinding signs and collaboration with businesses for them to provide information on their websites, and reviewing wayfinding results from Waze and similar apps.*

Positive Input

Public green spaces at the end of the streets have been well-received by several businesses and residents, as an open space amenity, opportunity for public art, and improved community environment.

1. The closure of Haven St. is gaining support from residents, who have suggested utilizing the closed space for weekend and evening activities. The reduced vehicle activity at after-hours provides opportunities for several types of open space activation.
2. Some business owners see the potential value of the bicycle, pedestrian, and green space improvements as a benefit to their business and property values.
3. Several businesses have employees who already bike to work and walk to services in the area. They see that the bicycle infrastructure will enhance their commute and improve safety and comfort for them when walking or biking in the Park Avenue District.
4. Certain businesses have suggested placing art in the parklet areas.

Staff Comment on Positive Input

1. *The City currently issues block party permits throughout the year, and this will make it easier to hold events in a safe defined space.*
2. *In general, studies have shown that bicycles and pedestrians visit business more frequently than single occupancy auto visits. Actual statistics for a particular business may vary.*
3. *The project improvements will encourage other employees to bike or take transit to work.*
4. *Staff is open to working with the Public Art Committee on art opportunities Project wide.*

Additional Nuanced Input

1. Some businesses have voiced support for the safety benefits and parklet activation opportunities of the closure sites, but are concerned that Park Avenue cannot support the diverted truck traffic.
2. Several community members and businesses have shown support for the multimodal improvements on 40th Street and are accepting of the reduction in parking. However, their concerns primarily revolve on how the street closures would affect loading and customer access issues.
3. A business owner provided positive feedback of the closure to most vehicles while expressing a desire to retain the option of using emergency exits for semi-truck deliveries on an occasional basis.
4. Residents next to closure sites are in support of the activation of the space for green infrastructure and parklet ideas, but they are worried about the maintenance and security of the area.

Staff Comment on Nuanced Input

1. *In order to ensure truck access to affected businesses, it will be necessary to remove turn restrictions for trucks on Park Avenue. Minor modifications to curbs on Park Avenue will also be needed and additional parking may be removed on the closure streets to accommodate trucks turning into and out of loading areas.*
2. *Discussions and design refinements are on-going. The City is investigating all solutions to ensure loading activity remains feasible.*
3. *Emergency vehicle access is for the exclusive use of emergency vehicles. However, use of emergency access "aprons" similar to driveway/sidewalk areas of the street right of way to facilitate truck turning movements is acceptable.*
4. *The City will need to assign funds for regular maintenance of the new facilities that are built. The Project team will consult with Emeryville PD on site layout and lighting levels.*

The City remains committed to fostering open lines of communication and encourages ongoing public engagement throughout the remaining phases of the Project. This is demonstrated by the extent of public outreach to date. By actively involving the community in the design process, staff aims to ensure that the Project will reflect the needs and priorities of the residents and businesses it serves.

Upcoming Project Schedule and Milestones

- Spring - Summer 2023: Preliminary Design
  - Feasibility/Traffic Study
  - Committee Reviews and City Council Approvals
  - Community Outreach and Engagement
- Summer 2023: Stakeholder and Committee Reviews of 35% Design
- Spring 2024: Council Approval to Advertise Bids (and other items as necessary)
- ATP state funding project approval
- Summer 2024: 100% Plans Complete
- Fall 2024: Construction Begins
- Late 2025: Construction Completion

FISCAL IMPACT

<u>40th Street Multimodal Project (CIP No. T-13)</u>
The original Professional Services Contract with Diablo Engineering Group (Attachment A) is written to not exceed $2,198,806.84. Items of work as described in Exhibit B are eligible expenses under the current grant funding programs that are funding the design phase of the 40th Street Multimodal Project (CIP No. T-13). There is adequate funding in the Project to fund this additional work ($120,232).

<u>40th Street Multimodal Project Phase 2: Bay Trail Gap Closure (CIP No. SUT-05)</u>

On June 6, 2023, City Council approved the CIP which includes funding for CIP No. SUT-05, *40th Street Multimodal Project Phase 2: Bay Trail Gap Closure*. There is adequate funding in the Project to fund this additional work ($656,440).

Funding Table

40th Street Multimodal Project (CIP No. T-13)	Fund 254 (Alameda CTC)	$2,000,000	Resolution 21-125
40th Street Multimodal Project (CIP No. T-13)	Fund 254 (ATP Cycle 5)	$1,374,000	Resolution 22-117
40th Street Multimodal Project Phase 2: Bay Trail Gap Closure (CIP No. SUT-05)	Fund 441	$1,072,000	Resolution 23-69

STAFF COMMUNICATION WITH THE PUBLIC

Staff has sent (612) postcards and (454) project mailers to residents and businesses along the 40th Street and Park Avenue Corridors. Throughout the month of June and into early July, staff and their consultants have conducted (7) in-person outreach meetings and (9) phone calls with residents and businesses in the Project area. Additionally, there have been (6) emails with other residents and businesses who reached out to the Project team by way of the mailer or City Website.

CONFLICT OF INTEREST

None.

CONCLUSION

Staff recommends the City Council adopt the attached resolutions. By executing a 1st Amendment to the Professional Services Contract with Diablo Engineering, incorporating the additional scopes of work (Exhibit A-1 and A-2), the City will ensure comprehensive support during the design and bidding phases, as well as the successful implementation of the Project's various elements.

If one or more of the resolutions is not approved or modified, Staff recommends the Council allow staff to amend the other resolutions as necessary.

PREPARED BY: Ryan O'Connell, Senior Civil Engineer, Public Works Department

APPROVED AND FORWARDED TO THE CITY COUNCIL OF THE CITY OF EMERYVILLE:

Paul Buddenhagen, City Manager

ATTACHMENTS

- Attachment A – Original Professional Services Contract (Diablo)
    1. Exhibit A – Original Proposal from Diablo Engineering Group
- Attachment B – Draft 1st Amendment Professional Services Contract (Diablo)
    1. Exhibit A-1 – Additional Design Work For Unsignalized Intersections on 40th Street (Task 8)
    2. Exhibit A-2 – Phase 2: Bay Trail Gap Closure (Task 9)
- Attachment C – Map of 40th Street Multimodal Projects: Phase 1 and Phase 2
- Draft Resolutions
    1. First Resolution – Concept of Closing Unsignalized Intersections On The North Side Of 40th Street (Watts, Haven, Holden, and Hubbard)
    2. Second Resolution – Addition Of New Scope Of Work Related To Additional Design Work For Unsignalized Intersections On The North Side Of 40th Street (Exhibit B)
    3. Third Resolution – Addition Of New Scope Of Work Related To Design Of The 40th Street Multimodal Project Phase 2: Bay Trail Gap Closure (Exhibit C)
    4. Fourth Resolution – 1st Amendment Professional Services Contract for Diablo Engineering

RESOLUTION NO. 23-105

Resolution Of The City Council Of The City Of Emeryville Approving The Concept Of Closing The Unsignalized Intersections Of Hubbard Street And Haven Street On The North Side Of 40th Street, And The Design Concept Of Partial Southbound Closures At The Unsignalized Intersections Of Holden Street And Watts Street On The North Side Of 40th Street As Part Of The 40th Street Multimodal Project

WHEREAS, on March 3, 2020, the City Council approved the conceptual design of the 40th Street Multimodal Project and found it to be exempt from the California Environmental Quality Act; and

WHEREAS, as part of the resolution, City Council instructed Staff to conduct a traffic feasibility study for full and partial closures of the unsignalized streets that connect to 40th Street from the north (Watts, Haven, Holden, and Hubbard); and

WHEREAS, in August 2022, the Public Works Department issued a Request for Proposals for "Professional Design Services for the 40th Street Transit-Only Lanes And Multimodal Enhancements Project" and after careful evaluation, City staff identified Diablo Engineering Group (“Diablo Engineering”) as the most suitable consultant, considering their approach, experience, and understanding of the City's requirements; and

WHEREAS, in early 2023, Fehr & Peers (a subconsultant to the Diablo Engineering team) completed a traffic feasibility analysis as one of the first items of work for the design phase of the Project and the results of the analysis were shared with the Emeryville Transportation Committee on May 9, 2023; and

WHEREAS, in the traffic feasibility analysis, the team studied the impact of closing unsignalized intersections in the project area various circulation alternatives along the corridor with and without closures of unsignalized intersections and all of the signalized intersections in the Project area were found to experience no significant change in congestion as a result of the additional closure of the unsignalized intersections as compared to the base project; and

WHEREAS, the traffic feasibility analysis went on to show that the extent of vehicle queuing on 40th Street would be similar whether the unsignalized intersections are fully closed or not as compared to the base project; and

WHEREAS, at the May 9, 2023, Transportation Committee meeting, Staff received positive feedback on the overall project, circulation/traffic pattern changes, and the concept of green infrastructure and parklet opportunities if the unsignalized streets were closed off to vehicular traffic; and

WHEREAS, the Transportation Committee recommended forwarding the concept of closures at unsignalized intersections on the north side of 40th Street (Watts, Haven, Holden, and Hubbard) to City Council; and

WHEREAS, on July 18, 2023, the City Council reviewed the concept of closures at unsignalized intersections on the north side of 40th Street, considered the public testimony, the staff report dated July 18, 2023, and the record as a whole; and

WHEREAS, on July 18, 2023, the City Council approved a motion directing staff to move forward with further conceptual review of the Transportation Committee's recommendation to study full closures at Hubbard Street and Haven Street and partial southbound closures at Watts Street and Holden Street; now, therefore, be it

RESOLVED, by the City Council of the City of Emeryville that the City Council approves the design concept of closing the unsignalized intersections of Hubbard Street and Haven Street on the north side of 40th Street, and the design concept of partial southbound closures at the unsignalized intersections of Holden Street and Watts Street on the north side of 40th Street as part of the 40th Street Multimodal Project.

ADOPTED, by the City Council of the City of Emeryville at a regular meeting held Tuesday, July 18, 2023, by the following vote:

AYES:	4	Mayor Bauters, Vice Mayor Welch and Council Members Kaur and Mourra
NOES:	1	Council Member Priforce
ABSTAIN:	0	
ABSENT:	0	

DocuSigned by:
John Bauters
C7383B49E2C9458...
MAYOR

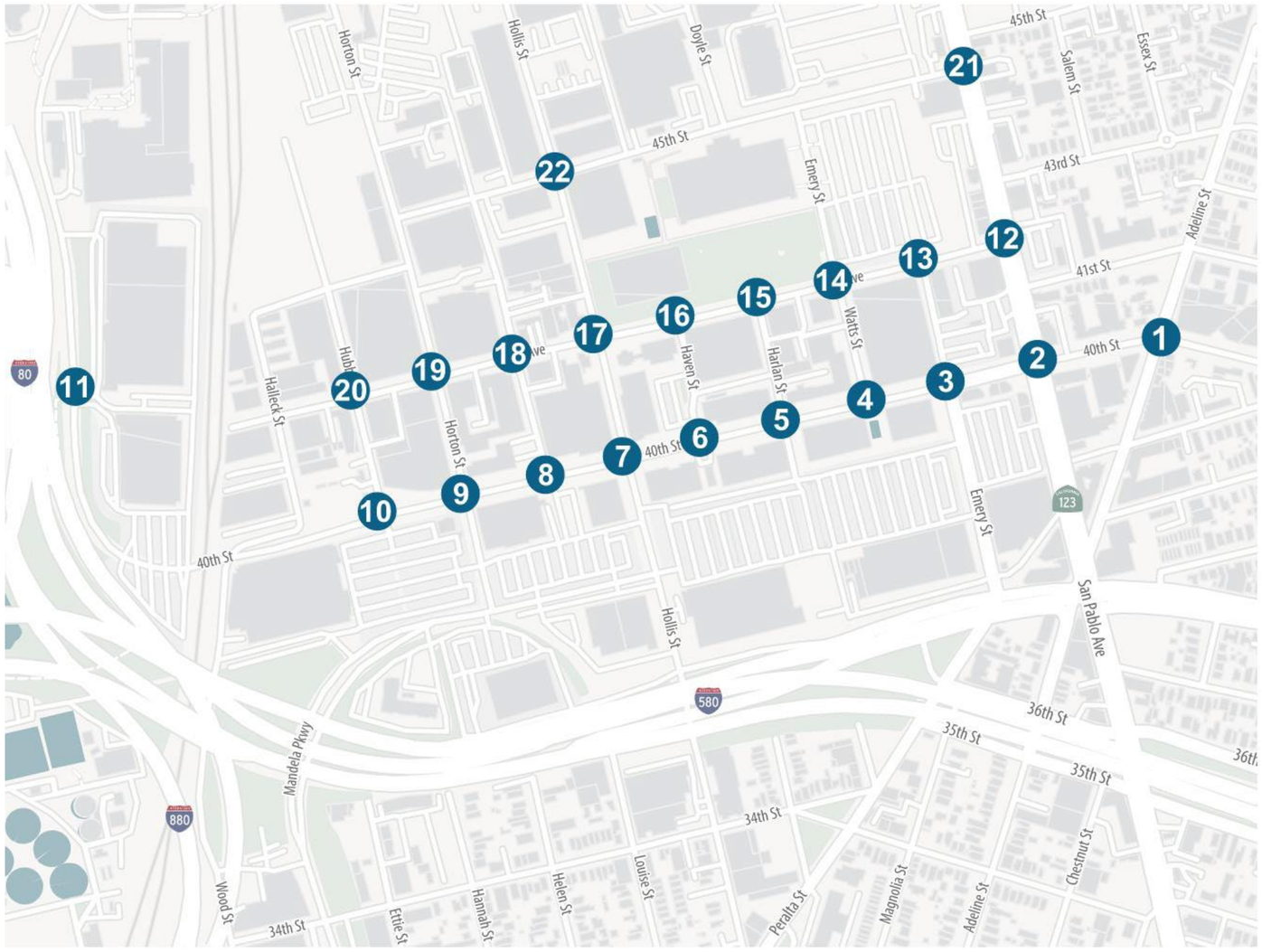
ATTEST:

DocuSigned by:
April Richardson
9AF9F67CE0284D8...
CITY CLERK

APPROVED AS TO FORM:

DocuSigned by:
John Kennedy
2C934D92DB55467...
CITY ATTORNEY

Attachment C:
Alternatives 1 and 2
Peak Hour Intersection Traffic Volumes
(Part 1)



XX	PM Peak Hour Traffic Volume		Signalized		Stop-Controlled
#	Study Intersection		Transit Priority Lanes		

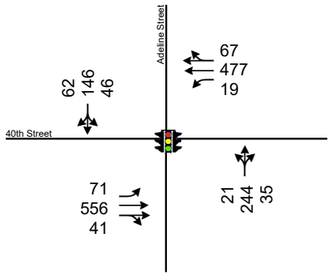
Note: Traffic volumes reflect data collected in 2024 plus traffic from near term developments including the Sherwin Williams and BMR projects.

FEHR PEERS

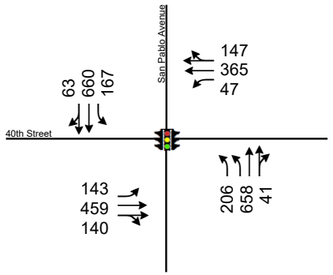
Weekday PM Peak Hour Traffic Volumes and Lane Configurations - 40th Street Transit Hub

ATTACHMENT C

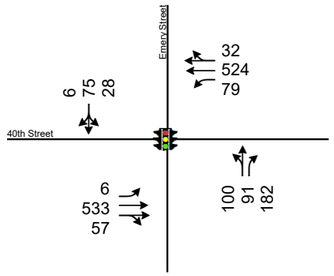
1. Adeline Street/40th Street



2. San Pablo Avenue/40th Street



3. Emery Street/40th Street



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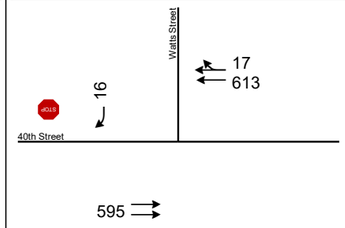

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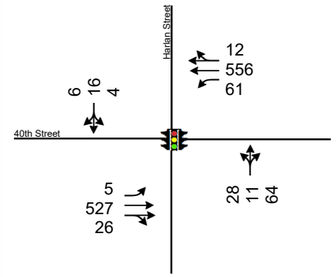

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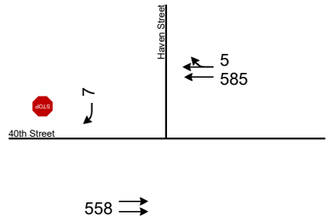
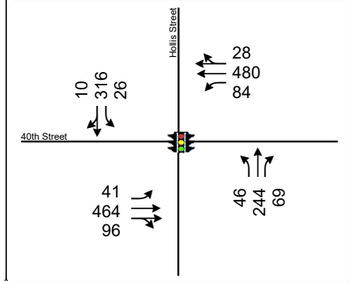


7. Hollis Street/40th Street



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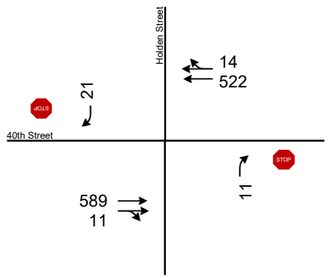
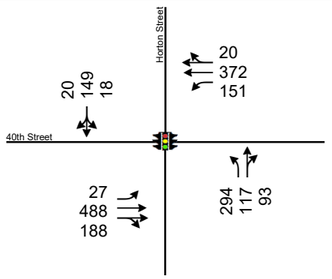
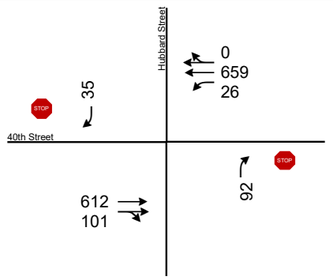


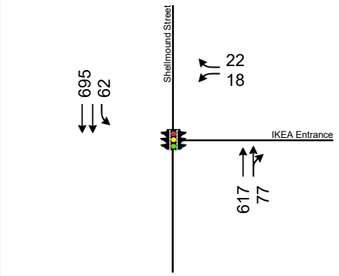
9. Horton Street/40th Street



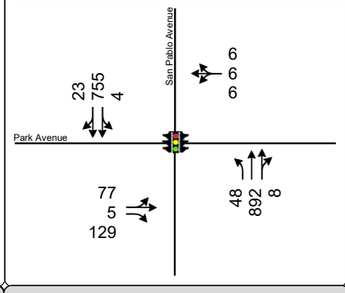
10. Hubbard Street/40th Street



11. Shellmound Street/IKEA Entrance



12. San Pablo Avenue/Park Avenue



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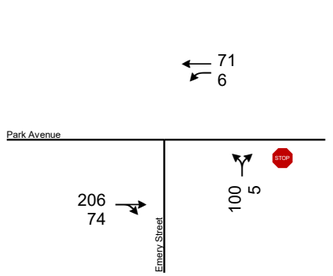

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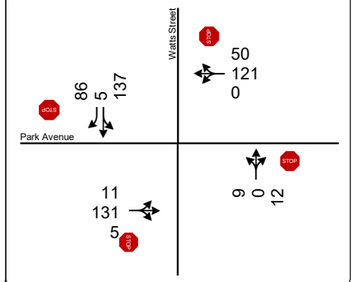
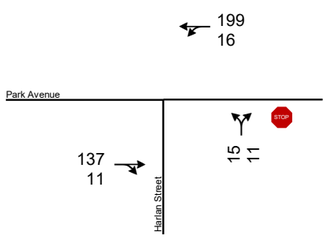


15. Harlan Street/Park Avenue



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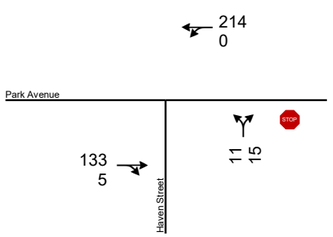
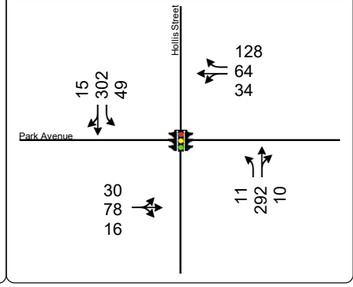


17. Hollis Street/Park Avenue



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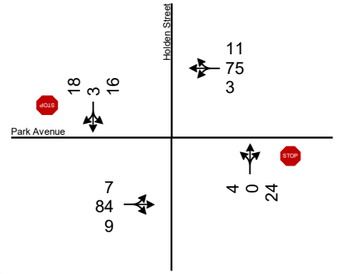
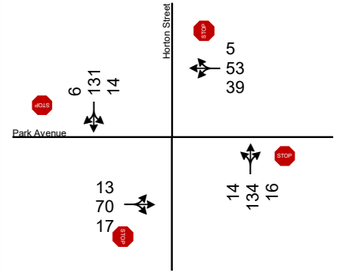


19. Horton Street/Park Avenue



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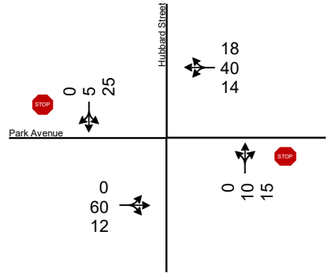
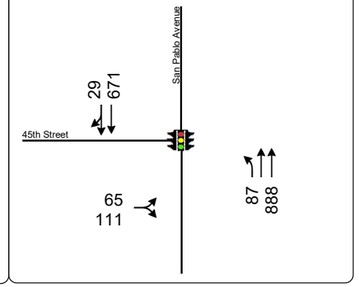


21. San Pablo Avenue/45th Street



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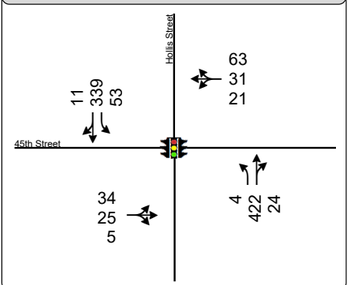


XX PM Peak Hour Traffic Volume

Signalized

Stop-Controlled

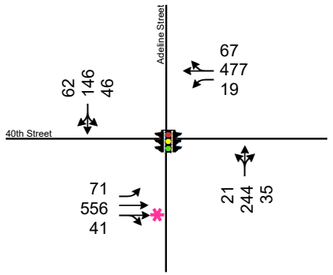
Note: Traffic volumes reflect data collected in 2024 plus traffic from near term developments including the Sherwin Williams and BMR projects.

FEHR PEERS

Weekday PM Peak Hour Traffic Volumes and Lane Configurations - 40th Street Transit Hub - Alternative 1

ATTACHMENT C-1

1. Adeline Street/40th Street



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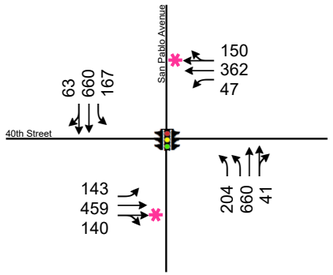

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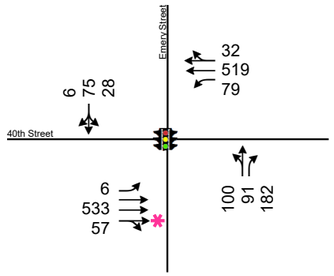

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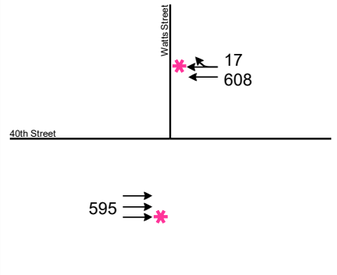

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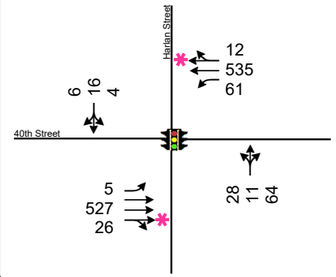

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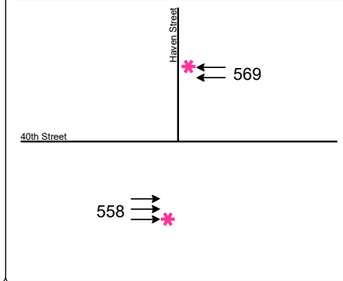

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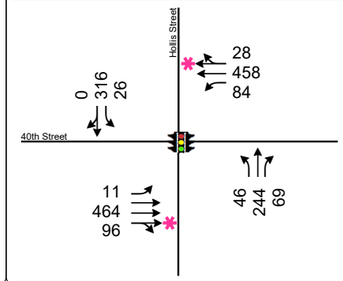

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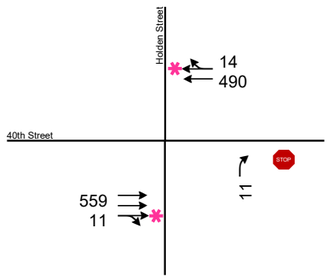

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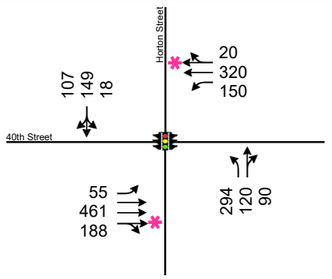

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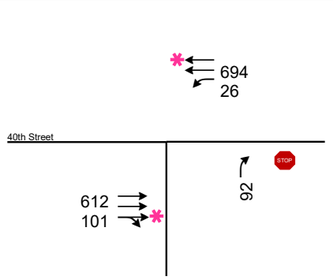

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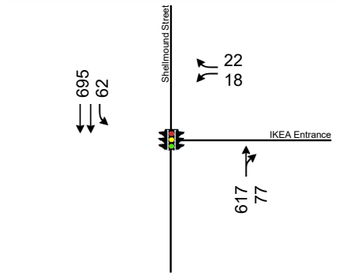
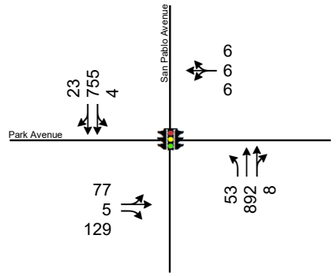


12. San Pablo Avenue/Park Avenue



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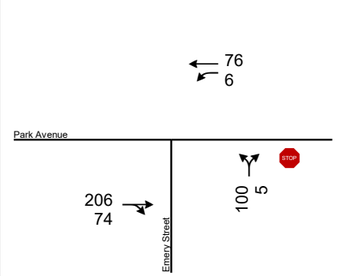

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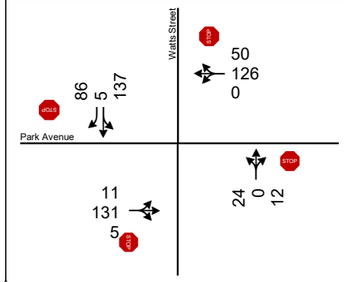

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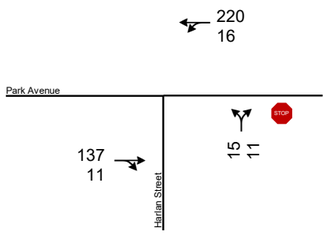

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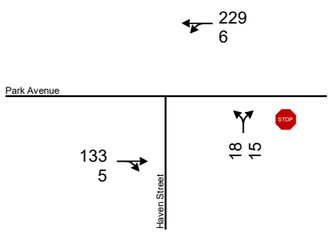

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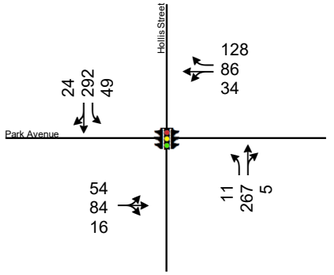

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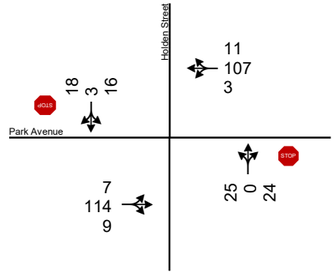

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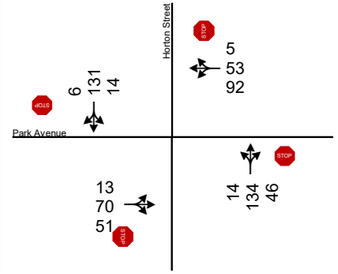

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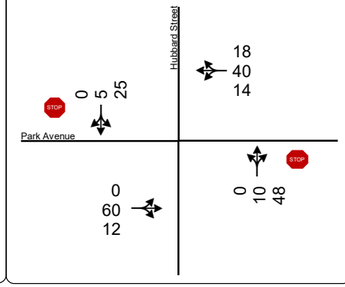

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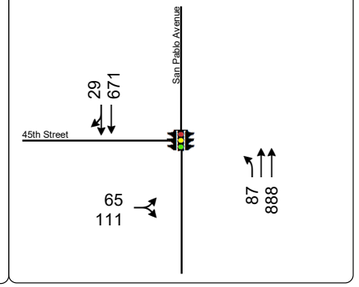
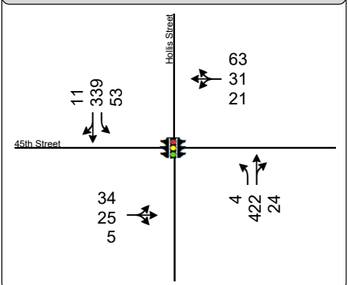


22. Hollis Street/45th Street



XX PM Peak Hour Traffic Volume

Signalized

STOP Stop-Controlled

* Transit Priority Lanes

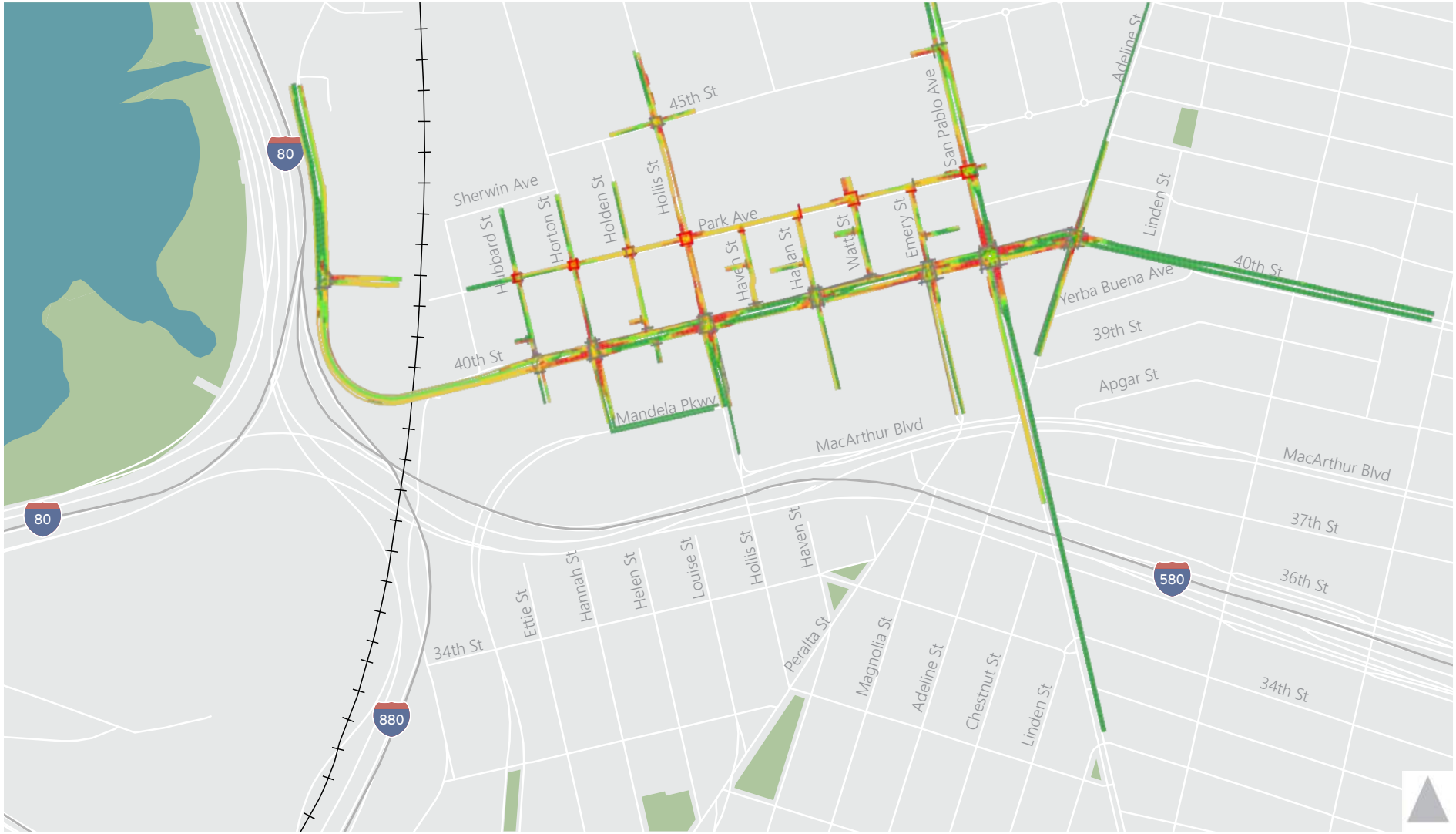
Note: Traffic volumes reflect data collected in 2024 plus traffic from near term developments including the Sherwin Williams and BMR projects.

FEHR PEERS

Weekday PM Peak Hour Traffic Volumes and Lane Configurations - 40th Street Transit Hub - Alternative 2

ATTACHMENT C-2

Attachment D:
Alternatives 1 and 2 Corridor Speed Plots (Part 1)



- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 1 – Average Motor Vehicle and Bus Speeds
4:45 PM - 5:00 PM

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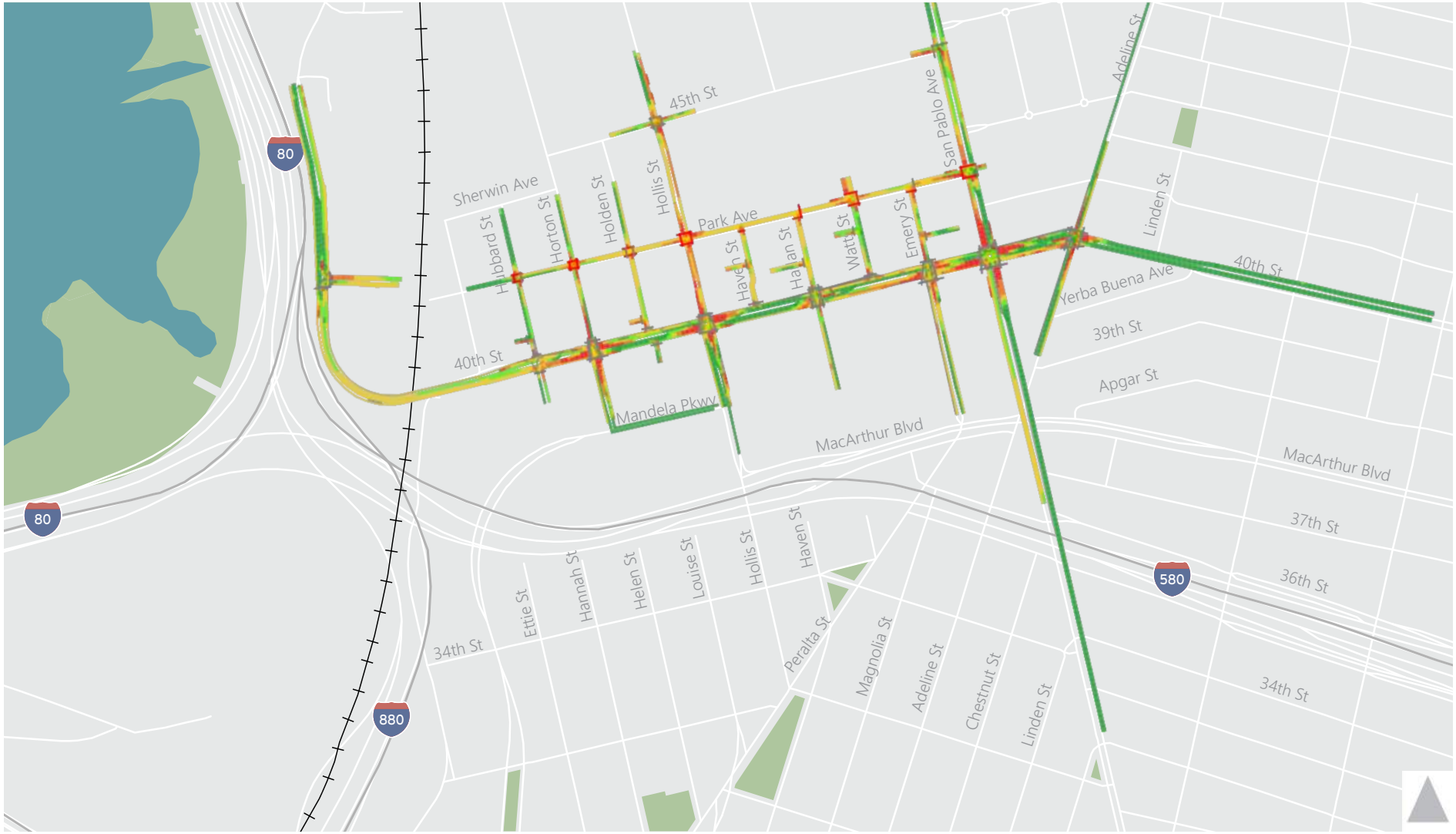
ATTACHMENT D



- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 1 – Average Motor Vehicle and Bus Speeds
5 PM - 5:15 PM

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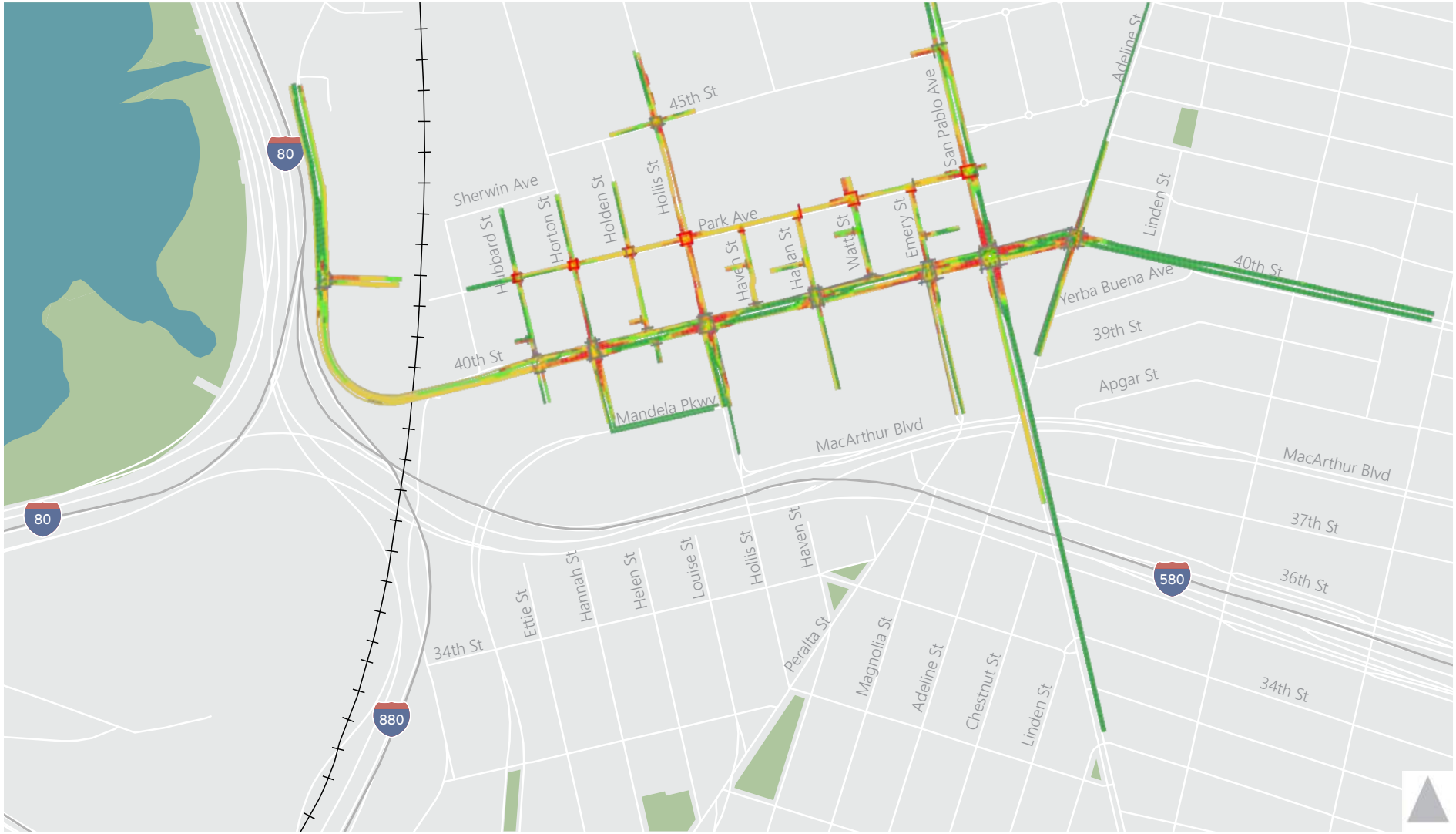
ATTACHMENT D



- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 1 – Average Motor Vehicle and Bus Speeds
5:15 PM - 5:30 PM

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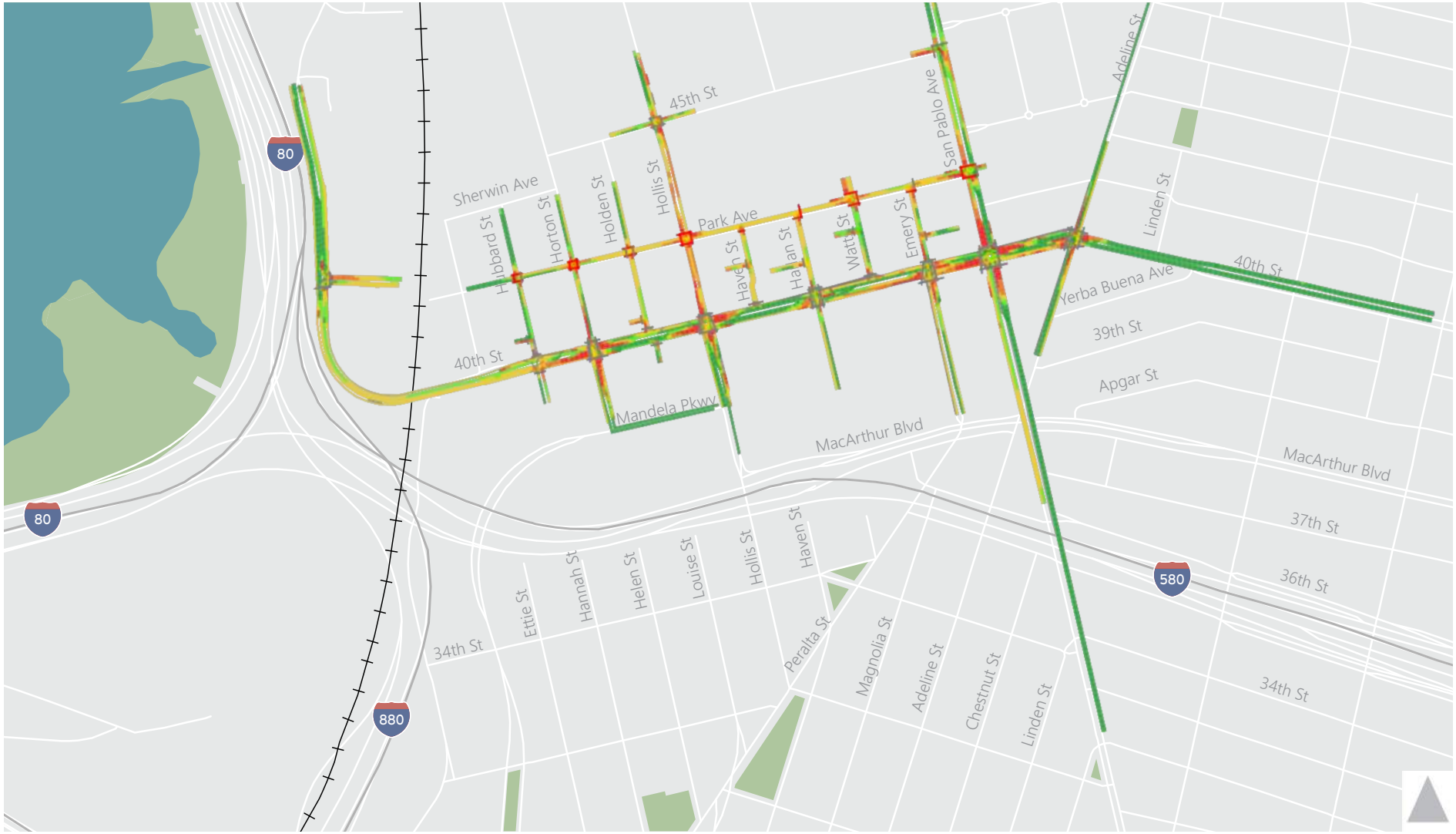
ATTACHMENT D



- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 1 – Average Motor Vehicle and Bus Speeds
5:30 PM - 5:45 PM

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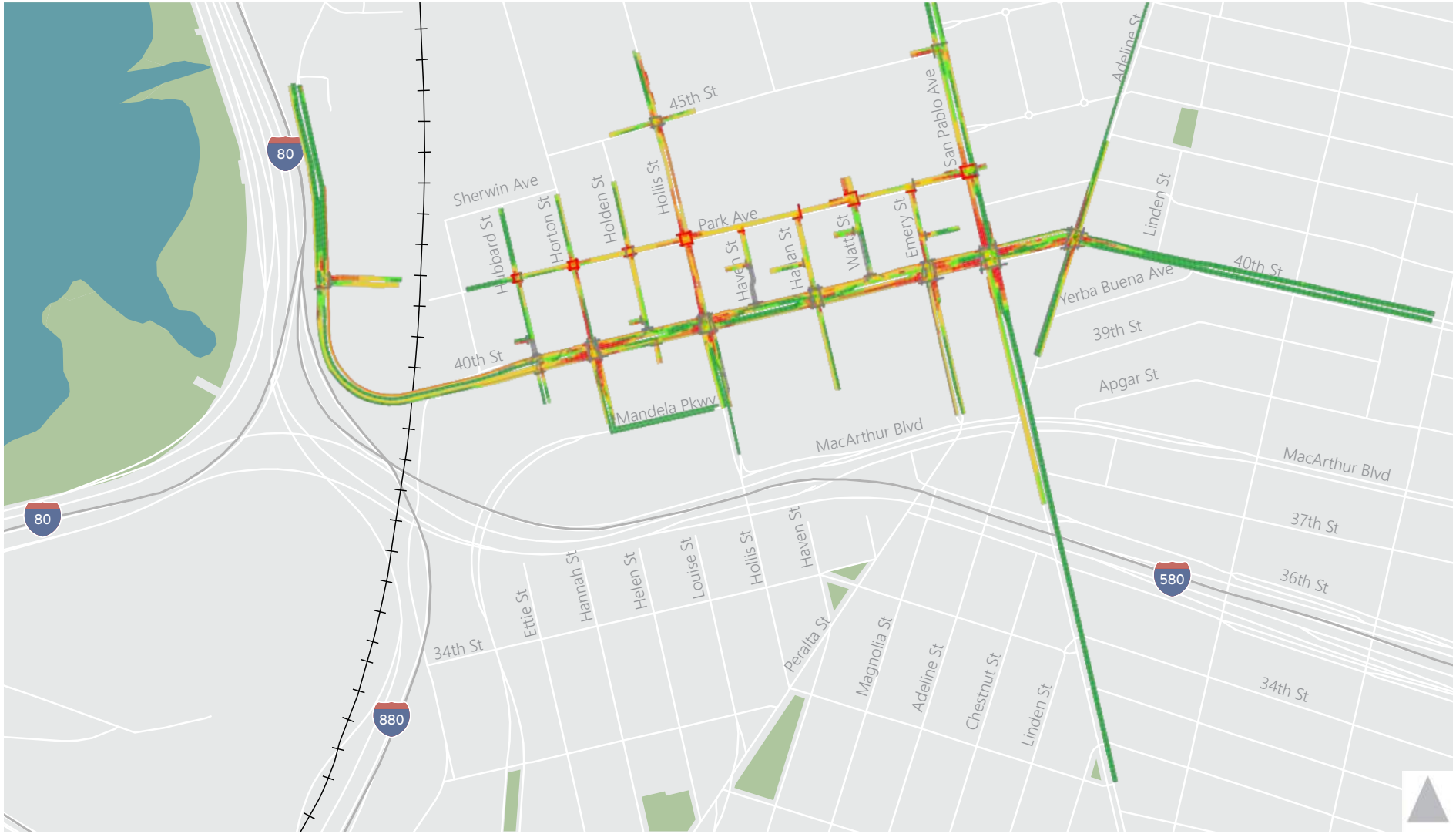

- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 2 – Average Motor Vehicle and Bus Speeds
4:45 PM - 5:00 PM

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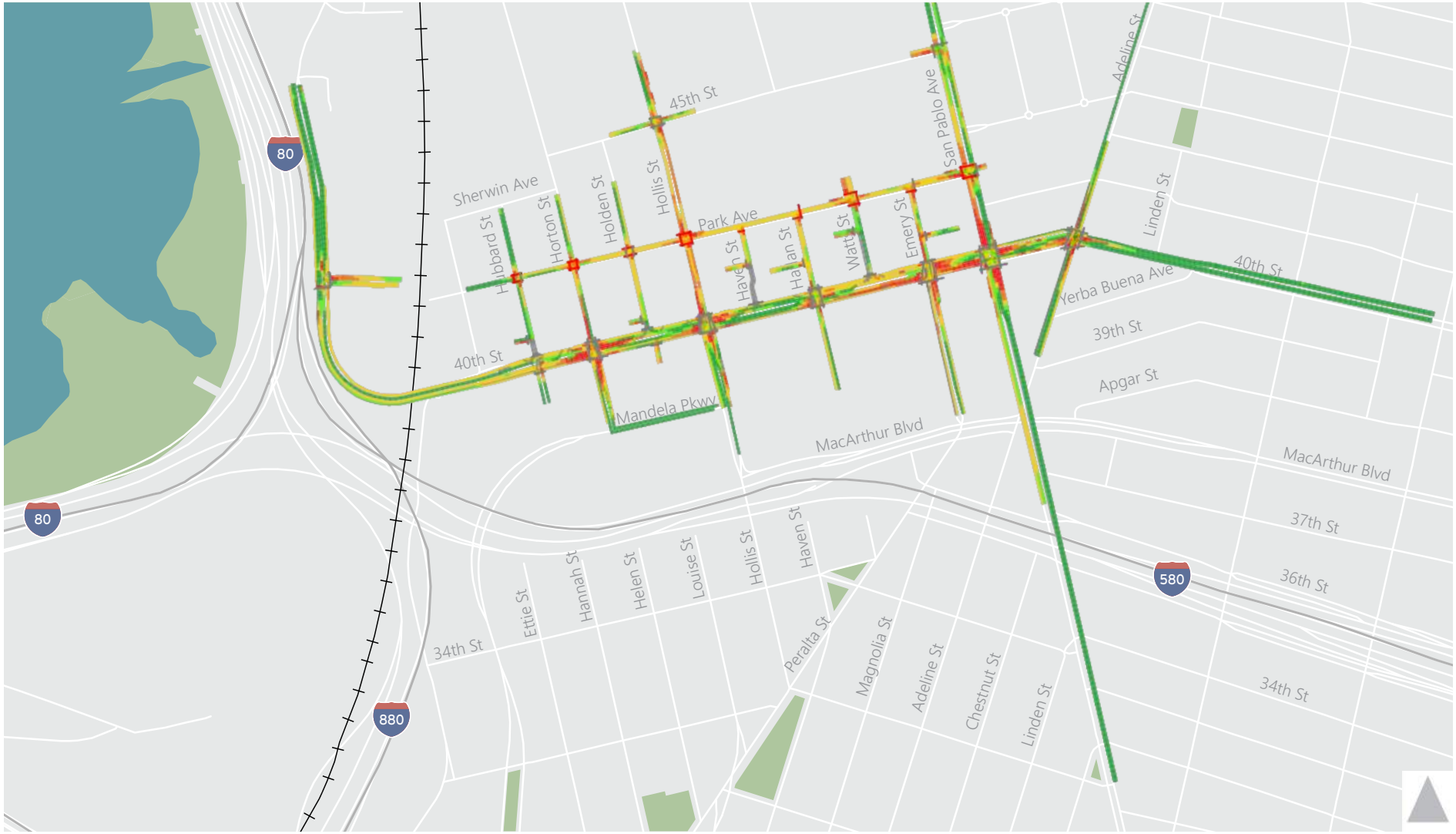
ATTACHMENT D



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- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 2 – Average Motor Vehicle and Bus Speeds
5 PM - 5:15 PM

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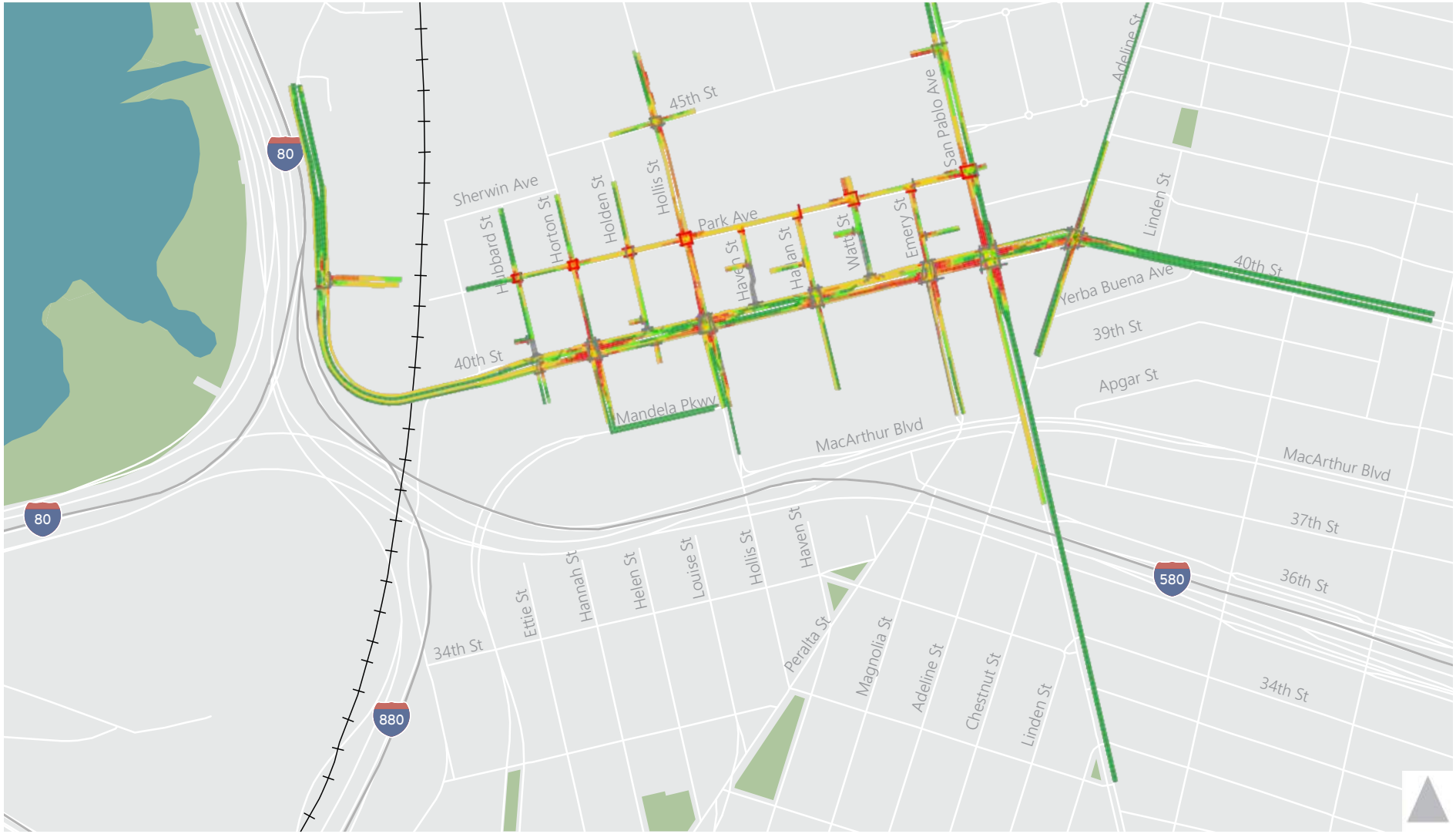
ATTACHMENT D



- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 2 – Average Motor Vehicle and Bus Speeds
5:15 PM - 5:30 PM

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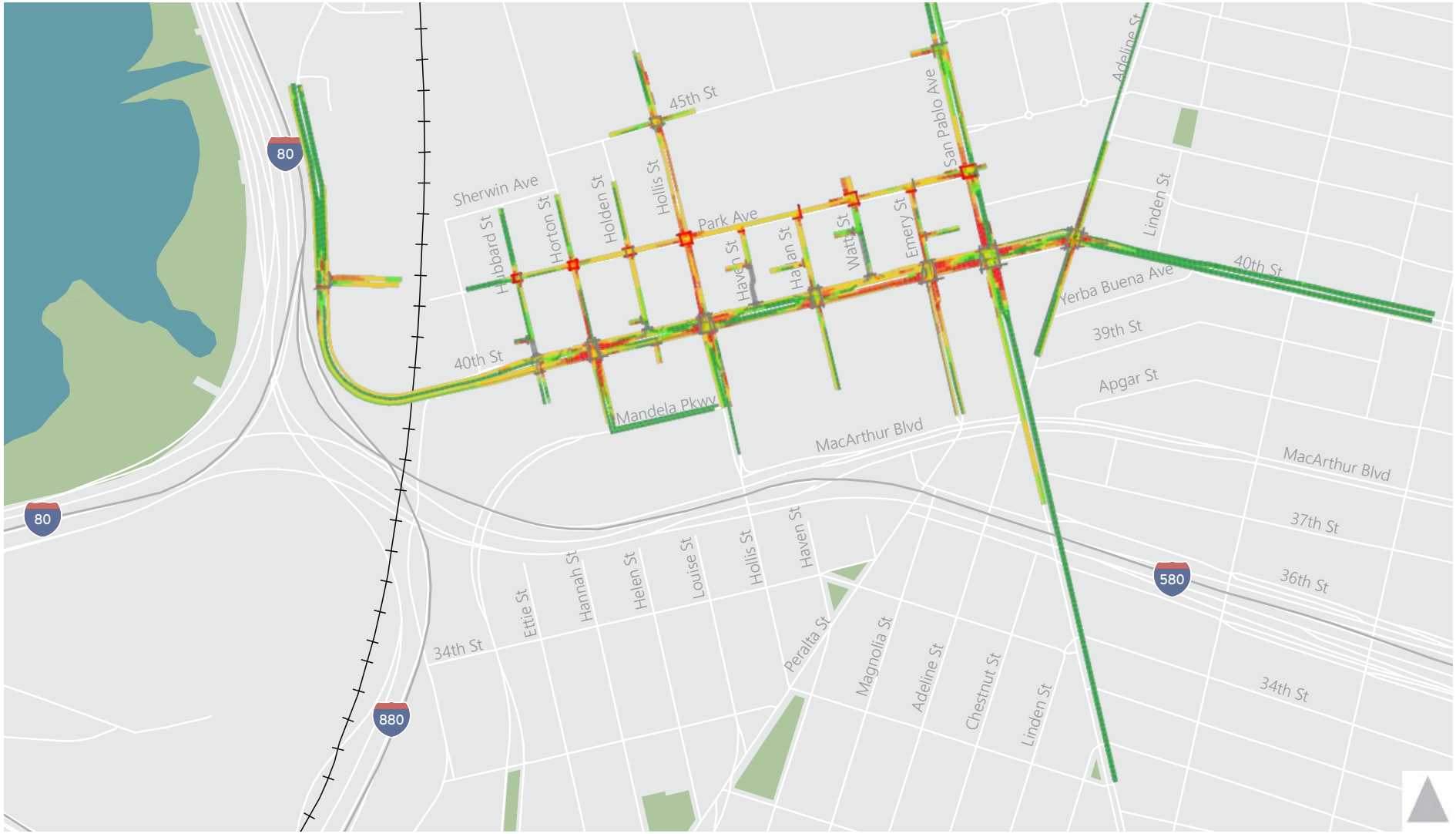
ATTACHMENT D



- 0 mph - 5 mph
- 5 mph - 10 mph
- 10 mph - 15 mph
- 15 mph - 20 mph
- > 20 mph

- **Alternative 1 (No Project)** – 2023 traffic volumes plus approved Major Development Projects yet to be built including Sherwin Williams and BMR buildout with 2023 geometrics and traffic signal operations.
- **Alternative 2 (Modified Project)** – Same traffic volumes as Alternative 1 with the modified project geometry approved by Council in July 2023 and optimized traffic signal timings.

Alternative 2 – Average Motor Vehicle and Bus Speeds
5:30 PM - 5:45 PM

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ATTACHMENT D

Attachment E:
Intersection LOS and Delay Calculation Worksheets (Part 1)

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 1 (2025 Forecast)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 1 **Adeline St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	21	22	104.3%	38.0	18.4	D
	Through	244	247	101.4%	41.3	3.5	D
	Right Turn	35	31	87.1%	30.5	6.5	C
	Subtotal	300	300	99.9%	39.8	3.9	D
SB	Left Turn	46	47	101.1%	58.6	17.5	E
	Through	146	150	103.0%	49.4	8.4	D
	Right Turn	62	57	91.9%	40.1	6.8	D
	Subtotal	254	254	100.0%	48.9	7.7	D
EB	Left Turn	71	66	92.3%	77.4	3.7	E
	Through	556	550	98.9%	4.1	1.1	A
	Right Turn	41	42	102.4%	8.5	4.0	A
	Subtotal	668	657	98.4%	11.8	1.7	B
WB	Left Turn	19	20	106.3%	62.7	20.3	E
	Through	477	473	99.1%	15.3	2.4	B
	Right Turn	67	67	100.1%	17.9	5.0	B
	Subtotal	563	560	99.5%	17.6	3.0	B
Total		1,785	1,771	99.2%	24.3	1.9	C

Intersection 2 **San Pablo Ave/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	206	206	100.0%	54.4	7.1	D
	Through	658	657	99.8%	29.7	2.5	C
	Right Turn	41	41	100.5%	26.5	7.8	C
	Subtotal	905	904	99.9%	35.5	3.0	D
SB	Left Turn	167	159	95.1%	81.9	19.8	F
	Through	660	654	99.1%	42.4	6.2	D
	Right Turn	63	62	97.8%	51.4	7.5	D
	Subtotal	890	874	98.2%	50.1	7.8	D
EB	Left Turn	143	138	96.2%	43.8	5.7	D
	Through	459	456	99.3%	44.1	4.2	D
	Right Turn	140	141	100.6%	46.0	4.9	D
	Subtotal	742	734	98.9%	44.6	3.4	D
WB	Left Turn	47	44	94.3%	77.7	24.9	E
	Through	365	364	99.6%	70.6	4.2	E
	Right Turn	147	142	96.8%	20.0	4.7	B
	Subtotal	559	550	98.4%	58.8	5.3	E
Total		3,096	3,063	98.9%	46.3	2.5	D

Intersection 3 **Emery St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	100	104	104.3%	51.0	6.7	D
	Through	91	86	94.9%	51.4	7.1	D
	Right Turn	182	182	100.0%	11.3	4.0	B
	Subtotal	373	373	99.9%	32.6	4.0	C
SB	Left Turn	28	27	95.4%	67.1	10.0	E
	Through	75	70	93.1%	54.1	8.1	D
	Right Turn	6	6	96.7%	17.7	12.4	B
	Subtotal	109	102	93.9%	56.0	6.6	E
EB	Left Turn	6	6	91.7%	53.3	47.7	D
	Through	533	528	99.1%	24.0	7.1	C
	Right Turn	57	50	87.9%	24.3	14.2	C
	Subtotal	596	584	98.0%	24.7	7.0	C
WB	Left Turn	79	83	104.6%	78.6	8.9	E
	Through	524	518	98.9%	7.0	2.8	A
	Right Turn	32	30	94.7%	4.7	2.6	A
	Subtotal	635	631	99.4%	16.9	3.1	B
Total		1,713	1,690	98.6%	25.9	3.4	C

Intersection 4 **Watts Ave/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through						
	Right Turn	16	17	105.0%	14.9	2.6	B
	Subtotal	16	17	105.0%	14.9	2.6	B
EB	Left Turn						
	Through	595	587	98.6%	15.5	7.6	C
	Right Turn						
	Subtotal	595	587	98.6%	15.5	7.6	C
WB	Left Turn						
	Through	613	608	99.1%	1.0	0.4	A
	Right Turn	17	20	118.8%	3.2	1.6	A
	Subtotal	630	628	99.7%	1.1	0.4	A
Total		1,241	1,231	99.2%	8.0	3.7	A

Intersection 5 **Harlan St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	28	28	100.7%	6.6	6.0	A
	Through	11	11	98.2%	41.4	21.8	D
	Right Turn	64	62	96.1%	9.2	3.9	A
	Subtotal	103	101	97.6%	13.0	5.9	B
SB	Left Turn	4	3	85.0%	14.1	25.2	B
	Through	16	14	86.3%	59.5	18.9	E
	Right Turn	6	4	65.0%	17.3	28.2	B
	Subtotal	26	21	81.2%	52.1	21.6	D
EB	Left Turn	5	5	102.0%	68.4	26.0	E
	Through	527	524	99.4%	7.7	2.6	A
	Right Turn	26	27	103.8%	2.9	1.7	A
	Subtotal	558	556	99.6%	8.3	2.4	A
WB	Left Turn	61	61	99.5%	66.0	5.1	E
	Through	556	553	99.5%	1.9	0.5	A
	Right Turn	12	12	100.8%	1.6	1.6	A
	Subtotal	629	626	99.5%	8.8	1.1	A
Total		1,316	1,304	99.1%	9.6	1.5	A

Intersection 6 **Haven St/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through						
	Right Turn	7	7	101.4%	9.2	1.2	A
	Subtotal	7	7	101.4%	9.2	1.2	A
EB	Left Turn						
	Through	558	556	99.6%	0.6	0.2	A
	Right Turn						
	Subtotal	558	556	99.6%	0.6	0.2	A
WB	Left Turn						
	Through	585	581	99.3%	0.4	0.2	A
	Right Turn	5	4	86.0%	0.7	0.4	A
	Subtotal	590	585	99.2%	0.4	0.2	A
Total		1,155	1,148	99.4%	0.6	0.1	A

Intersection 7 **Hollis St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	46	46	98.9%	55.2	7.1	E
	Through	244	245	100.5%	32.1	5.4	C
	Right Turn	69	66	95.4%	7.9	3.5	A
	Subtotal	359	357	99.3%	30.4	4.7	C
SB	Left Turn	26	27	103.8%	77.9	16.9	E
	Through	316	318	100.7%	47.6	8.9	D
	Right Turn	10	9	91.0%	34.6	21.2	C
	Subtotal	352	354	100.7%	49.7	9.5	D
EB	Left Turn	41	34	83.2%	64.4	14.2	E
	Through	464	463	99.8%	39.2	4.3	D
	Right Turn	96	92	95.8%	37.3	8.3	D
	Subtotal	601	589	98.0%	40.5	4.2	D
WB	Left Turn	84	80	95.4%	53.0	13.1	D
	Through	480	479	99.8%	26.1	4.0	C
	Right Turn	28	28	100.7%	18.7	4.3	B
	Subtotal	592	587	99.2%	29.5	4.1	C
Total		1,904	1,888	99.1%	36.8	3.2	D

Intersection 8 **Holden St/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn	11	8	73.6%	12.7	9.9	B
	Subtotal	11	8	73.6%	12.7	9.9	B
SB	Left Turn						
	Through						
	Right Turn	21	20	95.2%	20.1	4.5	C
	Subtotal	21	20	95.2%	20.1	4.5	C
EB	Left Turn						
	Through	589	583	99.0%	1.6	0.8	A
	Right Turn	11	10	91.8%	0.4	0.1	A
	Subtotal	600	593	98.9%	1.6	0.8	A
WB	Left Turn						
	Through	522	521	99.8%	2.7	0.5	A
	Right Turn	14	13	91.4%	3.1	1.8	A
	Subtotal	536	534	99.6%	2.7	0.5	A
Total		1,168	1,155	98.9%	2.5	0.6	A

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 1 (2025 Forecast)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 9 **Horton St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	294	292	99.2%	51.2	5.7	D
	Through	117	115	97.9%	45.4	4.8	D
	Right Turn	93	91	97.5%	29.3	2.4	C
	Subtotal	504	497	98.6%	45.6	4.4	D
SB	Left Turn	18	19	102.8%	35.5	16.3	D
	Through	149	149	100.2%	49.2	6.0	D
	Right Turn	20	17	84.0%	45.2	17.0	D
	Subtotal	187	185	98.7%	48.1	5.4	D
EB	Left Turn	27	25	93.7%	70.6	16.4	E
	Through	488	484	99.1%	37.4	5.3	D
	Right Turn	188	184	97.8%	37.5	5.0	D
	Subtotal	703	693	98.6%	38.7	4.8	D
WB	Left Turn	151	147	97.1%	83.5	5.6	F
	Through	372	376	101.0%	10.6	1.7	B
	Right Turn	20	19	96.5%	14.3	8.4	B
	Subtotal	543	542	99.7%	31.5	2.3	C
Total		1,937	1,916	98.9%	39.2	2.3	D

Intersection 10 **Hubbard St/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn	92	88	96.1%	14.3	8.3	B
	Subtotal	92	88	96.1%	14.3	8.3	B
SB	Left Turn						
	Through						
	Right Turn	35	34	95.7%	12.6	0.8	B
	Subtotal	35	34	95.7%	12.6	0.8	B
EB	Left Turn						
	Through	612	604	98.8%	8.5	3.3	A
	Right Turn	101	100	99.2%	9.1	4.9	A
	Subtotal	713	705	98.8%	8.5	3.4	A
WB	Left Turn	26	26	98.5%	8.6	2.2	A
	Through	659	658	99.8%	5.2	0.9	A
	Right Turn						
	Subtotal	685	683	99.7%	5.3	0.9	A
Total		1,525	1,510	99.0%	7.6	2.3	A

Intersection 11 **Shellmound St/IKEA Exit** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	617	611	99.0%	33.9	6.1	C
	Right Turn	77	78	101.7%	32.7	7.7	C
	Subtotal	694	689	99.3%	33.8	5.8	C
SB	Left Turn	62	61	97.9%	32.4	5.2	C
	Through	695	688	99.0%	2.3	0.5	A
	Right Turn						
	Subtotal	757	749	98.9%	4.8	0.8	A
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	18	15	83.9%	45.6	13.3	D
	Through						
	Right Turn	22	21	96.4%	6.8	0.8	A
	Subtotal	40	36	90.8%	22.9	5.6	C
Total		1,491	1,475	98.9%	19.0	2.9	B

Intersection 12 **San Pablo Ave/Park Ave** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	48	42	88.3%	9.8	6.1	A
	Through	892	888	99.6%	3.8	0.4	A
	Right Turn	8	8	100.0%	1.2	1.2	A
	Subtotal	948	939	99.0%	4.1	0.5	A
SB	Left Turn	4	4	92.5%	4.0	6.7	A
	Through	755	746	98.8%	15.2	4.1	B
	Right Turn	23	25	110.0%	17.0	7.5	B
	Subtotal	782	775	99.1%	15.2	4.1	B
EB	Left Turn	77	80	104.2%	45.3	6.5	D
	Through	5	6	110.0%	44.6	41.1	D
	Right Turn	129	120	92.9%	9.2	7.0	A
	Subtotal	211	206	97.4%	25.4	6.0	C
WB	Left Turn	6	5	88.3%	25.7	24.3	C
	Through	6	6	96.7%	34.7	24.4	C
	Right Turn	6	5	80.0%	14.0	26.8	B
	Subtotal	18	16	88.3%	30.1	15.4	C
Total		1,959	1,935	98.8%	11.4	1.7	B

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 1 (2025 Forecast)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 13 **Emery St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	100	96	95.6%	18.6	4.6	C
	Through						
	Right Turn	5	6	110.0%	14.4	13.2	B
	Subtotal	105	101	96.3%	18.4	4.5	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	206	201	97.4%	0.8	0.3	A
	Right Turn	74	70	93.9%	0.8	0.5	A
	Subtotal	280	270	96.5%	0.8	0.2	A
WB	Left Turn	6	6	96.7%	6.0	6.8	A
	Through	71	68	95.1%	1.5	0.4	A
	Right Turn						
	Subtotal	77	73	95.2%	1.9	0.7	A
Total		462	445	96.2%	5.2	1.6	A

Intersection 14 **Watts Ave/Park Ave** **All-way Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	9	10	113.3%	11.3	5.0	B
	Through						
	Right Turn	12	8	62.5%	11.6	4.6	B
	Subtotal	21	18	84.3%	11.1	4.2	B
SB	Left Turn	137	138	100.7%	7.3	0.3	A
	Through	5	4	84.0%	5.8	4.4	A
	Right Turn	86	82	95.7%	6.2	0.3	A
	Subtotal	228	225	98.5%	6.9	0.2	A
EB	Left Turn	11	11	97.3%	6.4	4.9	A
	Through	131	124	94.9%	6.4	1.1	A
	Right Turn	5	4	76.0%	3.5	4.7	A
	Subtotal	147	139	94.4%	6.4	1.2	A
WB	Left Turn						
	Through	121	112	92.4%	8.2	1.9	A
	Right Turn	50	51	102.4%	8.0	1.9	A
	Subtotal	171	163	95.3%	8.2	1.8	A
Total		567	544	95.9%	7.3	0.8	A

Intersection 15 **Harlan St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	15	17	112.7%	14.5	2.8	B
	Through						
	Right Turn	11	11	98.2%	5.4	2.6	A
	Subtotal	26	28	106.5%	11.2	2.8	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	137	129	94.0%	0.4	0.3	A
	Right Turn	11	11	95.5%	0.0	0.1	A
	Subtotal	148	139	94.1%	0.4	0.3	A
WB	Left Turn	16	14	85.6%	3.6	1.5	A
	Through	199	191	95.9%	0.9	0.2	A
	Right Turn						
	Subtotal	215	205	95.2%	1.1	0.2	A
Total		389	372	95.5%	1.6	0.2	A

Intersection 16 **Haven St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	11	10	89.1%	15.4	3.3	C
	Through						
	Right Turn	15	15	102.0%	12.9	1.5	B
	Subtotal	26	25	96.5%	14.1	1.3	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	133	124	93.5%	0.2	0.2	A
	Right Turn	5	4	88.0%	0.1	0.4	A
	Subtotal	138	129	93.3%	0.2	0.2	A
WB	Left Turn						
	Through	214	208	97.1%	0.2	0.3	A
	Right Turn						
	Subtotal	214	208	97.1%	0.2	0.3	A
Total		378	362	95.7%	1.1	0.3	A

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 1 (2025 Forecast)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 17 **Hollis St/Park Ave** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	11	8	71.8%	12.5	9.9	B
	Through	292	291	99.7%	14.1	3.4	B
	Right Turn	10	8	81.0%	5.0	6.3	A
	Subtotal	313	307	98.1%	13.9	3.3	B
SB	Left Turn	49	48	97.1%	21.1	6.8	C
	Through	302	305	100.9%	15.2	7.7	B
	Right Turn	15	12	77.3%	12.3	5.3	B
	Subtotal	366	364	99.4%	15.9	7.1	B
EB	Left Turn	30	29	96.3%	15.4	7.7	B
	Through	78	73	93.2%	12.2	3.7	B
	Right Turn	16	15	92.5%	10.2	8.4	B
	Subtotal	124	116	93.9%	12.9	3.4	B
WB	Left Turn	34	35	103.8%	21.3	11.5	C
	Through	64	58	89.8%	13.8	5.9	B
	Right Turn	128	125	97.5%	10.8	1.6	B
	Subtotal	226	218	96.3%	13.1	3.1	B
Total		1,029	1,005	97.7%	14.3	2.8	B

Intersection 18 **Holden St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	4	3	85.0%	6.5	5.9	A
	Through						
	Right Turn	24	25	102.5%	11.4	3.2	B
	Subtotal	28	28	100.0%	11.0	1.3	B
SB	Left Turn	16	15	92.5%	6.8	1.4	A
	Through	3	3	83.3%	4.8	4.6	A
	Right Turn	18	19	105.0%	6.4	1.9	A
	Subtotal	37	36	97.8%	6.5	0.6	A
EB	Left Turn	7	7	98.6%	0.2	0.3	A
	Through	84	77	91.3%	0.8	0.2	A
	Right Turn	9	9	96.7%	0.0	0.0	A
	Subtotal	100	92	92.3%	0.7	0.2	A
WB	Left Turn	3	2	60.0%	0.0	0.0	A
	Through	75	67	89.3%	0.1	0.1	A
	Right Turn	11	8	75.5%	0.0	0.0	A
	Subtotal	89	77	86.6%	0.1	0.1	A
Total		254	234	92.0%	2.5	0.3	A

Intersection 19 **Horton St/Park Ave** **All-way Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	14	13	90.7%	7.8	2.1	A
	Through	134	131	97.4%	15.3	2.4	C
	Right Turn	16	16	97.5%	11.5	4.8	B
	Subtotal	164	159	96.8%	14.4	2.2	B
SB	Left Turn	14	12	87.9%	8.0	2.7	A
	Through	131	132	100.7%	8.8	0.8	A
	Right Turn	6	3	56.7%	4.4	4.9	A
	Subtotal	151	148	97.7%	8.7	0.8	A
EB	Left Turn	13	11	86.2%	6.5	1.3	A
	Through	70	65	92.1%	7.7	0.5	A
	Right Turn	17	15	90.0%	6.5	2.9	A
	Subtotal	100	91	91.0%	7.4	0.3	A
WB	Left Turn	39	37	95.9%	5.1	0.7	A
	Through	53	48	91.1%	5.3	1.2	A
	Right Turn	5	4	80.0%	5.3	8.1	A
	Subtotal	97	90	92.5%	5.5	1.7	A
Total		512	487	95.1%	9.8	1.0	A

Intersection 20 **Hubbard St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	10	10	100.0%	13.0	2.2	B
	Right Turn	15	9	57.3%	11.5	1.1	B
	Subtotal	25	19	74.4%	12.3	1.4	B
SB	Left Turn	25	23	91.6%	7.6	0.9	A
	Through	5	5	102.0%	5.0	3.5	A
	Right Turn						
	Subtotal	30	28	93.3%	7.5	0.8	A
EB	Left Turn						
	Through	60	59	99.0%	0.4	0.4	A
	Right Turn	12	13	105.8%	0.5	1.0	A
	Subtotal	72	72	100.1%	0.5	0.5	A
WB	Left Turn	14	13	90.0%	0.5	0.8	A
	Through	40	39	96.3%	0.2	0.2	A
	Right Turn	18	13	73.3%	0.1	0.4	A
	Subtotal	72	64	89.3%	0.2	0.2	A
Total		199	183	92.0%	2.8	0.4	A

Intersection 21 **San Pablo Ave/45th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	87	82	94.6%	18.2	3.7	B
	Through	888	889	100.1%	9.0	1.5	A
	Right Turn						
	Subtotal	975	972	99.6%	9.8	1.6	A
SB	Left Turn						
	Through	671	665	99.2%	4.0	1.1	A
	Right Turn	29	30	102.4%	2.9	2.0	A
	Subtotal	700	695	99.3%	4.0	1.0	A
EB	Left Turn	65	63	96.6%	46.6	9.3	D
	Through						
	Right Turn	111	109	97.9%	21.9	5.0	C
	Subtotal	176	172	97.4%	31.4	5.7	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,851	1,838	99.3%	9.8	1.5	A

Intersection 22 **Hollis St/45th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	4	4	90.0%	13.7	14.7	B
	Through	422	423	100.3%	10.5	2.6	B
	Right Turn	24	19	80.0%	10.1	5.1	B
	Subtotal	450	446	99.1%	10.5	2.6	B
SB	Left Turn	53	50	94.7%	17.7	4.8	B
	Through	339	340	100.3%	7.7	3.3	A
	Right Turn	11	10	86.4%	5.1	4.3	A
	Subtotal	403	400	99.2%	8.8	3.0	A
EB	Left Turn	34	35	102.4%	20.5	3.1	C
	Through	25	25	100.0%	16.4	7.2	B
	Right Turn	5	4	82.0%	2.9	3.0	A
	Subtotal	64	64	99.8%	19.1	3.2	B
WB	Left Turn	21	19	90.0%	21.2	6.8	C
	Through	31	30	96.5%	18.1	6.1	B
	Right Turn	63	63	100.0%	7.5	2.3	A
	Subtotal	115	112	97.2%	12.2	2.5	B
Total		1,032	1,022	99.0%	10.6	1.9	B

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 1 **Adeline St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	21	20	92.9%	46.1	25.3	D
	Through	244	249	102.2%	44.3	7.6	D
	Right Turn	35	32	90.6%	30.5	5.6	C
	Subtotal	300	301	100.2%	43.1	7.1	D
SB	Left Turn	46	46	100.0%	72.2	21.1	E
	Through	146	147	100.5%	76.1	35.3	E
	Right Turn	62	59	95.6%	76.1	45.1	E
	Subtotal	254	252	99.2%	75.1	33.6	E
EB	Left Turn	71	68	95.8%	61.8	9.5	E
	Through	556	538	96.7%	11.4	1.7	B
	Right Turn	41	40	98.3%	17.0	5.2	B
	Subtotal	668	646	96.7%	16.5	2.6	B
WB	Left Turn	19	19	100.0%	56.1	20.1	E
	Through	477	472	99.0%	24.3	8.5	C
	Right Turn	67	67	99.9%	17.9	7.8	B
	Subtotal	563	558	99.1%	24.7	7.7	C
Total		1,785	1,757	98.4%	33.1	7.9	C

Intersection 2 **San Pablo Ave/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	204	203	99.6%	52.9	5.1	D
	Through	660	658	99.7%	34.0	2.6	C
	Right Turn	41	40	97.8%	27.8	9.3	C
	Subtotal	905	902	99.6%	37.9	2.0	D
SB	Left Turn	167	164	98.2%	79.8	15.1	E
	Through	660	657	99.5%	53.5	7.4	D
	Right Turn	63	62	98.3%	60.1	9.2	E
	Subtotal	890	883	99.2%	58.9	8.6	E
EB	Left Turn	143	134	93.4%	62.3	5.2	E
	Through	459	444	96.6%	42.4	6.6	D
	Right Turn	140	132	94.1%	31.6	8.0	C
	Subtotal	742	709	95.5%	44.1	5.2	D
WB	Left Turn	47	45	95.5%	35.1	5.8	D
	Through	362	360	99.3%	39.1	12.0	D
	Right Turn	150	148	98.5%	43.2	9.1	D
	Subtotal	559	552	98.8%	39.7	8.8	D
Total		3,096	3,045	98.4%	45.8	3.9	D

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 3 **Emery St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	100	102	101.6%	57.4	12.8	E
	Through	91	86	94.3%	52.1	12.3	D
	Right Turn	182	179	98.5%	62.2	37.8	E
	Subtotal	373	367	98.3%	59.1	24.4	E
SB	Left Turn	28	23	81.8%	204.1	186.2	F
	Through	75	64	84.7%	147.0	120.2	F
	Right Turn	6	5	88.3%	121.8	151.7	F
	Subtotal	109	92	84.1%	159.7	129.6	F
EB	Left Turn	6	5	86.7%	55.2	39.7	E
	Through	533	509	95.4%	68.0	26.3	E
	Right Turn	57	52	91.8%	22.1	12.6	C
	Subtotal	596	566	95.0%	63.5	24.2	E
WB	Left Turn	79	83	105.3%	58.0	5.2	E
	Through	519	510	98.3%	21.1	6.9	C
	Right Turn	32	29	91.9%	42.7	17.2	D
	Subtotal	630	623	98.8%	27.4	5.2	C
Total		1,708	1,647	96.4%	53.2	19.4	D

Intersection 4 **Watts Ave/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	595	573	96.3%	53.6	30.9	F
	Right Turn						
	Subtotal	595	573	96.3%	53.6	30.9	F
WB	Left Turn						
	Through	608	599	98.5%	6.6	1.7	A
	Right Turn	17	18	106.5%	3.3	2.2	A
	Subtotal	625	617	98.7%	6.5	1.7	A
Total		1,220	1,190	97.5%	29.2	15.7	D

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 5 **Harlan St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	28	26	92.1%	6.9	8.6	A
	Through	11	11	96.4%	34.5	22.0	C
	Right Turn	64	64	99.2%	11.6	5.4	B
	Subtotal	103	100	97.0%	13.7	5.8	B
SB	Left Turn	4	4	87.5%	37.8	32.5	D
	Through	16	15	93.8%	51.7	22.9	D
	Right Turn	6	6	95.0%	27.0	31.9	C
	Subtotal	26	24	93.1%	46.2	20.6	D
EB	Left Turn	5	5	94.0%	41.7	21.5	D
	Through	527	511	97.0%	13.4	9.8	B
	Right Turn	26	26	99.6%	24.1	17.6	C
	Subtotal	558	542	97.1%	14.4	10.0	B
WB	Left Turn	61	61	99.7%	60.1	16.0	E
	Through	535	528	98.7%	8.1	1.7	A
	Right Turn	12	12	103.3%	4.5	1.5	A
	Subtotal	608	601	98.8%	13.6	2.5	B
Total		1,295	1,267	97.8%	14.8	4.8	B

Intersection 6 **Haven St/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	558	542	97.1%	0.3	0.1	A
	Right Turn						
	Subtotal	558	542	97.1%	0.3	0.1	A
WB	Left Turn						
	Through	569	560	98.3%	4.2	2.0	A
	Right Turn						
	Subtotal	569	560	98.3%	4.2	2.0	A
Total		1,127	1,101	97.7%	2.2	1.0	A

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 7 **Hollis St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	46	46	99.6%	58.2	8.9	E
	Through	244	245	100.4%	36.1	4.2	D
	Right Turn	69	66	95.5%	6.9	4.0	A
	Subtotal	359	357	99.4%	34.0	4.0	C
SB	Left Turn	26	26	99.6%	89.8	22.6	F
	Through	316	314	99.5%	50.9	8.0	D
	Right Turn						
	Subtotal	342	340	99.5%	53.9	8.2	D
EB	Left Turn	11	8	74.5%	46.3	21.8	D
	Through	464	451	97.1%	12.0	2.8	B
	Right Turn	96	96	99.9%	3.7	1.0	A
	Subtotal	571	555	97.1%	11.2	2.5	B
WB	Left Turn	84	80	95.6%	70.0	12.6	E
	Through	458	452	98.8%	19.7	5.7	B
	Right Turn	28	26	93.2%	15.1	7.1	B
	Subtotal	570	559	98.0%	26.3	6.0	C
Total		1,842	1,810	98.3%	27.8	3.2	C

Intersection 8 **Holden St/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn	11	8	74.5%	9.3	1.9	A
	Subtotal	11	8	74.5%	9.3	1.9	A
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	559	548	98.1%	1.3	0.3	A
	Right Turn	11	11	100.0%	0.8	0.9	A
	Subtotal	570	559	98.1%	1.3	0.3	A
WB	Left Turn						
	Through	490	484	98.7%	7.0	5.0	A
	Right Turn	14	14	100.0%	1.6	3.0	A
	Subtotal	504	498	98.8%	6.8	4.8	A
Total		1,085	1,065	98.2%	3.9	2.1	A

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 9 **Horton St/40th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	294	296	100.7%	49.9	6.6	D
	Through	120	118	98.0%	46.4	7.1	D
	Right Turn	90	85	94.8%	25.6	7.3	C
	Subtotal	504	499	99.0%	44.7	4.9	D
SB	Left Turn	18	19	106.7%	62.2	19.5	E
	Through	149	146	98.1%	51.1	5.7	D
	Right Turn	107	95	89.0%	41.6	11.1	D
	Subtotal	274	261	95.1%	48.0	7.0	D
EB	Left Turn	55	47	86.0%	61.0	17.1	E
	Through	461	456	99.0%	39.4	4.3	D
	Right Turn	188	188	99.8%	9.2	3.1	A
	Subtotal	704	691	98.2%	33.3	3.3	C
WB	Left Turn	150	147	98.3%	53.1	12.0	D
	Through	320	317	99.1%	41.4	4.9	D
	Right Turn	20	19	96.0%	4.0	3.1	A
	Subtotal	490	484	98.7%	43.8	4.6	D
Total		1,972	1,935	98.1%	40.8	3.2	D

Intersection 10 **Hubbard St/40th St** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn	92	88	95.5%	8.0	3.1	A
	Subtotal	92	88	95.5%	8.0	3.1	A
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	612	605	98.8%	6.3	1.6	A
	Right Turn	101	98	97.3%	7.1	2.5	A
	Subtotal	713	703	98.6%	6.4	1.7	A
WB	Left Turn	26	24	90.4%	10.4	4.3	B
	Through	694	686	98.8%	2.1	0.7	A
	Right Turn						
	Subtotal	720	709	98.5%	2.3	0.7	A
Total		1,525	1,500	98.4%	4.6	0.9	A

Intersection 11 **Shellmound St/IKEA Exit** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	617	611	99.0%	7.4	3.5	A
	Right Turn	77	76	99.1%	5.6	2.8	A
	Subtotal	694	687	99.0%	7.2	3.4	A
SB	Left Turn	62	59	95.8%	53.5	8.1	D
	Through	695	689	99.1%	4.8	0.9	A
	Right Turn						
	Subtotal	757	748	98.8%	8.2	1.6	A
EB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
WB	Left Turn	18	17	93.9%	57.3	10.3	E
	Through						
	Right Turn	22	19	87.7%	6.3	0.9	A
	Subtotal	40	36	90.5%	32.2	8.9	C
Total		1,491	1,472	98.7%	8.4	2.0	A

Intersection 12 **San Pablo Ave/Park Ave** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	53	50	94.7%	21.2	5.9	C
	Through	892	880	98.7%	2.5	0.5	A
	Right Turn	8	8	100.0%	0.9	1.4	A
	Subtotal	953	938	98.5%	3.5	0.6	A
SB	Left Turn	4	4	87.5%	4.0	7.4	A
	Through	755	749	99.2%	14.2	3.6	B
	Right Turn	23	24	105.2%	18.6	9.5	B
	Subtotal	782	777	99.3%	14.2	3.5	B
EB	Left Turn	77	80	103.2%	50.4	5.9	D
	Through	5	5	92.0%	31.6	35.5	C
	Right Turn	129	129	99.7%	10.8	4.8	B
	Subtotal	211	213	100.8%	26.8	5.4	C
WB	Left Turn	6	5	80.0%	41.4	26.9	D
	Through	6	6	91.7%	41.7	31.3	D
	Right Turn	6	6	93.3%	6.5	5.8	A
	Subtotal	18	16	88.3%	32.9	17.5	C
Total		1,964	1,944	99.0%	10.7	1.9	B

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 13 **Emery St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	100	95	94.7%	19.4	4.4	C
	Through						
	Right Turn	5	5	90.0%	6.5	8.2	A
	Subtotal	105	99	94.5%	19.2	4.5	C
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	206	207	100.3%	0.7	0.2	A
	Right Turn	74	67	90.7%	0.7	0.4	A
	Subtotal	280	274	97.8%	0.7	0.1	A
WB	Left Turn	6	5	90.0%	1.6	2.5	A
	Through	76	74	97.5%	1.8	0.8	A
	Right Turn						
	Subtotal	82	80	97.0%	1.9	0.7	A
Total		467	453	96.9%	5.3	1.5	A

Intersection 14 **Watts Ave/Park Ave** **All-way Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	Total Delay (sec/veh) LOS
NB	Left Turn	24	24	98.8%	13.2	1.2	B
	Through						
	Right Turn	12	8	70.0%	11.3	4.6	B
	Subtotal	36	32	89.2%	13.0	1.2	B
SB	Left Turn	137	134	97.4%	7.4	0.7	A
	Through	5	5	100.0%	4.3	4.1	A
	Right Turn	86	86	99.8%	6.3	0.4	A
	Subtotal	228	224	98.4%	7.0	0.5	A
EB	Left Turn	11	10	93.6%	7.3	4.7	A
	Through	131	132	100.6%	6.4	0.8	A
	Right Turn	5	4	72.0%	3.9	3.4	A
	Subtotal	147	146	99.1%	6.5	0.7	A
WB	Left Turn						
	Through	126	119	94.7%	8.4	0.9	A
	Right Turn	50	49	98.4%	8.8	1.9	A
	Subtotal	176	169	95.7%	8.5	0.9	A
Total		587	571	97.2%	7.7	0.3	A

Vissim Post-Processor **40th St Transit Hub**
Average Results from 10 Runs **Alternative 2 (Modified Project)**
Volume and Delay by Movement **PM Peak Hour**

Intersection 15 **Harlan St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	15	15	97.3%	14.6	2.9	B
	Through						
	Right Turn	11	11	96.4%	6.1	2.9	A
	Subtotal	26	25	96.9%	11.3	1.2	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	137	136	99.3%	0.1	0.1	A
	Right Turn	11	12	106.4%	0.1	0.2	A
	Subtotal	148	148	99.9%	0.1	0.1	A
WB	Left Turn	16	15	95.6%	4.0	3.4	A
	Through	220	214	97.1%	1.0	0.3	A
	Right Turn						
	Subtotal	236	229	97.0%	1.2	0.2	A
Total		410	402	98.0%	1.5	0.3	A

Intersection 16 **Haven St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	18	16	89.4%	16.3	4.3	C
	Through						
	Right Turn	15	16	107.3%	13.3	1.7	B
	Subtotal	33	32	97.6%	14.3	1.2	B
SB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
EB	Left Turn						
	Through	133	132	99.2%	0.1	0.1	A
	Right Turn	5	5	104.0%	0.0	0.0	A
	Subtotal	138	137	99.4%	0.1	0.1	A
WB	Left Turn	6	5	80.0%	2.5	4.2	A
	Through	229	223	97.4%	0.2	0.2	A
	Right Turn						
	Subtotal	235	228	96.9%	0.2	0.3	A
Total		406	397	97.8%	1.3	0.1	A

Intersection 17 **Hollis St/Park Ave** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	11	8	72.7%	21.0	12.9	C
	Through	267	264	98.9%	15.2	3.6	B
	Right Turn	5	5	104.0%	9.1	10.2	A
	Subtotal	283	277	98.0%	15.4	3.6	B
SB	Left Turn	49	51	104.7%	18.1	6.8	B
	Through	292	291	99.6%	14.2	2.9	B
	Right Turn	24	21	86.3%	15.4	5.9	B
	Subtotal	365	363	99.4%	14.9	3.1	B
EB	Left Turn	54	53	97.6%	19.1	5.1	B
	Through	84	81	96.4%	13.9	2.6	B
	Right Turn	16	15	91.3%	11.8	11.0	B
	Subtotal	154	148	96.3%	15.8	3.6	B
WB	Left Turn	34	35	104.1%	16.0	9.0	B
	Through	86	80	93.3%	12.7	3.1	B
	Right Turn	128	123	95.7%	9.9	2.4	A
	Subtotal	248	238	96.0%	11.8	2.2	B
Total		1,050	1,026	97.8%	14.5	2.1	B

Intersection 18 **Holden St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	25	24	94.0%	9.4	0.5	A
	Through						
	Right Turn	24	24	101.7%	10.6	1.0	B
	Subtotal	49	48	97.8%	10.0	0.5	A
SB	Left Turn	16	15	90.6%	7.1	1.9	A
	Through	3	3	103.3%	2.7	4.5	A
	Right Turn	18	19	104.4%	7.2	1.6	A
	Subtotal	37	36	98.4%	7.2	1.1	A
EB	Left Turn	7	6	84.3%	0.1	0.2	A
	Through	114	109	95.4%	0.8	0.1	A
	Right Turn	9	8	85.6%	0.2	0.2	A
	Subtotal	130	122	94.2%	0.7	0.1	A
WB	Left Turn	3	1	46.7%	0.0	0.0	A
	Through	107	101	94.4%	0.1	0.1	A
	Right Turn	11	7	59.1%	0.0	0.0	A
	Subtotal	121	109	90.0%	0.1	0.1	A
Total		337	316	93.6%	2.7	0.3	A

Intersection 19 **Horton St/Park Ave** **All-way Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	14	11	80.0%	9.2	5.5	A
	Through	134	132	98.5%	15.6	3.3	C
	Right Turn	46	41	89.3%	10.6	3.5	B
	Subtotal	194	184	95.0%	14.4	3.2	B
SB	Left Turn	14	14	97.9%	8.4	3.4	A
	Through	131	129	98.6%	9.1	0.6	A
	Right Turn	6	4	70.0%	3.8	3.5	A
	Subtotal	151	147	97.4%	9.0	0.7	A
EB	Left Turn	13	12	94.6%	9.1	10.7	A
	Through	70	68	97.0%	9.6	2.4	A
	Right Turn	51	47	91.4%	7.4	1.5	A
	Subtotal	134	127	94.6%	8.8	2.2	A
WB	Left Turn	92	87	94.1%	8.1	3.0	A
	Through	53	52	97.2%	7.1	2.0	A
	Right Turn	5	5	96.0%	4.7	5.4	A
	Subtotal	150	143	95.3%	7.6	2.1	A
Total		629	601	95.6%	10.4	1.7	B

Intersection 20 **Hubbard St/Park Ave** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through	10	9	91.0%	10.9	4.1	B
	Right Turn	48	43	89.2%	12.0	0.8	B
	Subtotal	58	52	89.5%	12.0	0.6	B
SB	Left Turn	25	23	92.0%	7.4	0.9	A
	Through	5	5	106.0%	5.5	3.0	A
	Right Turn						
	Subtotal	30	28	94.3%	7.3	0.5	A
EB	Left Turn						
	Through	60	61	102.0%	0.3	0.3	A
	Right Turn	12	11	90.8%	0.2	0.5	A
	Subtotal	72	72	100.1%	0.3	0.3	A
WB	Left Turn	14	13	90.7%	0.4	0.4	A
	Through	40	41	102.8%	0.2	0.2	A
	Right Turn	18	13	72.8%	0.4	0.7	A
	Subtotal	72	67	92.9%	0.3	0.3	A
Total		232	219	94.5%	4.0	0.2	A

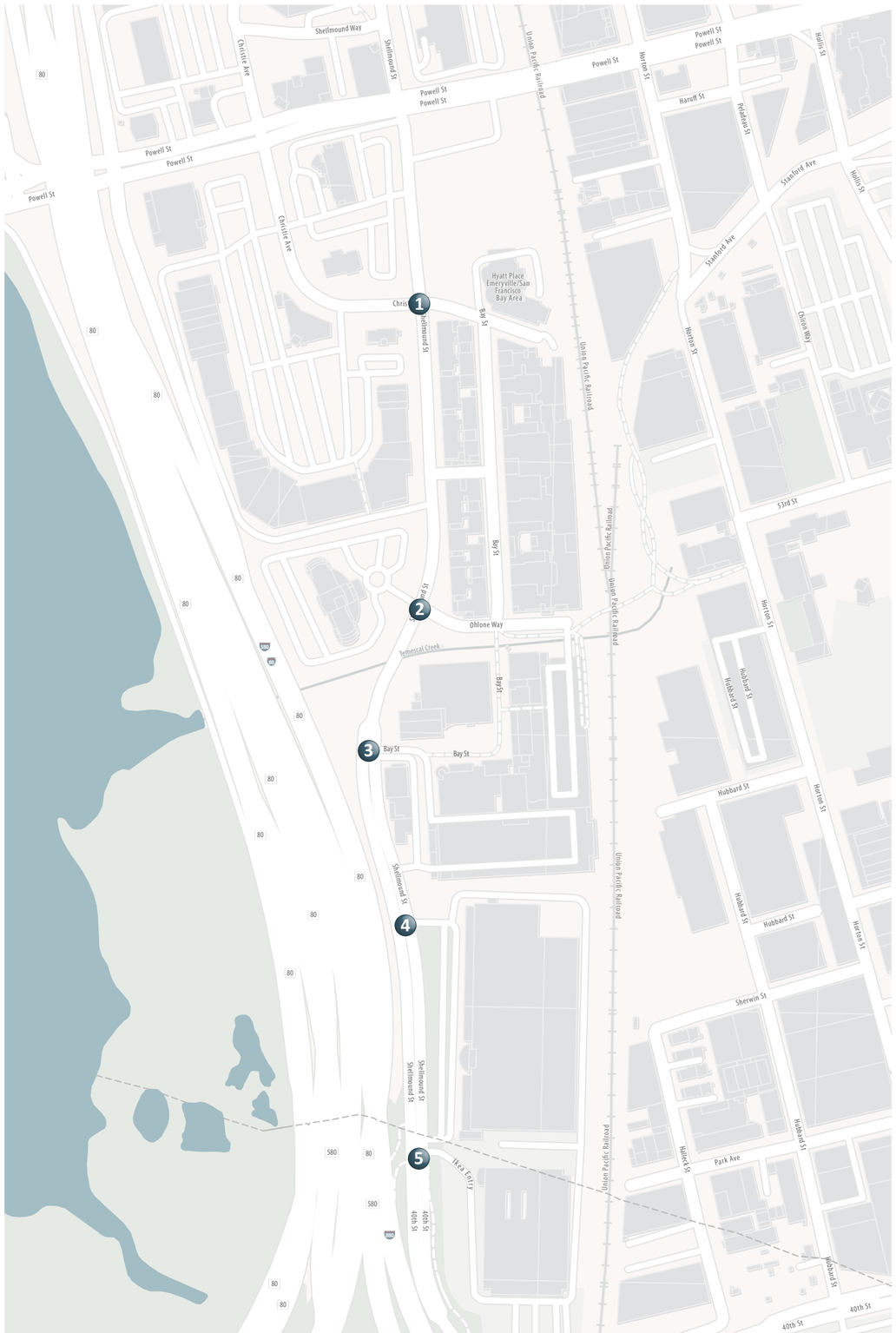
Intersection 21 **San Pablo Ave/45th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	87	87	99.7%	9.6	2.8	A
	Through	888	882	99.3%	6.1	1.0	A
	Right Turn						
	Subtotal	975	969	99.4%	6.4	0.9	A
SB	Left Turn						
	Through	671	667	99.4%	3.7	0.6	A
	Right Turn	29	29	98.6%	4.4	3.8	A
	Subtotal	700	696	99.4%	3.7	0.7	A
EB	Left Turn	65	65	99.2%	46.1	8.0	D
	Through						
	Right Turn	111	108	96.8%	24.5	5.7	C
	Subtotal	176	172	97.7%	32.6	5.7	C
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,851	1,836	99.2%	8.0	0.9	A

Intersection 22 **Hollis St/45th St** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	4	2	60.0%	5.3	8.2	A
	Through	422	415	98.3%	11.0	1.8	B
	Right Turn	24	22	90.0%	9.8	5.0	A
	Subtotal	450	439	97.5%	10.9	1.9	B
SB	Left Turn	53	51	95.3%	20.6	6.2	C
	Through	339	338	99.7%	7.0	1.6	A
	Right Turn	11	11	100.0%	5.2	3.2	A
	Subtotal	403	399	99.1%	8.6	1.4	A
EB	Left Turn	34	34	99.7%	20.4	4.4	C
	Through	25	25	100.4%	16.6	10.3	B
	Right Turn	5	5	96.0%	7.0	6.0	A
	Subtotal	64	64	99.7%	18.4	4.5	B
WB	Left Turn	21	20	95.7%	19.5	8.7	B
	Through	31	30	95.5%	16.3	3.9	B
	Right Turn	63	62	98.3%	7.4	1.7	A
	Subtotal	115	112	97.0%	12.6	2.1	B
Total		1,032	1,014	98.2%	10.7	1.1	B

Attachment F:
Multimodal Intersection Traffic Volumes (Part 2)



\# Study Intersection

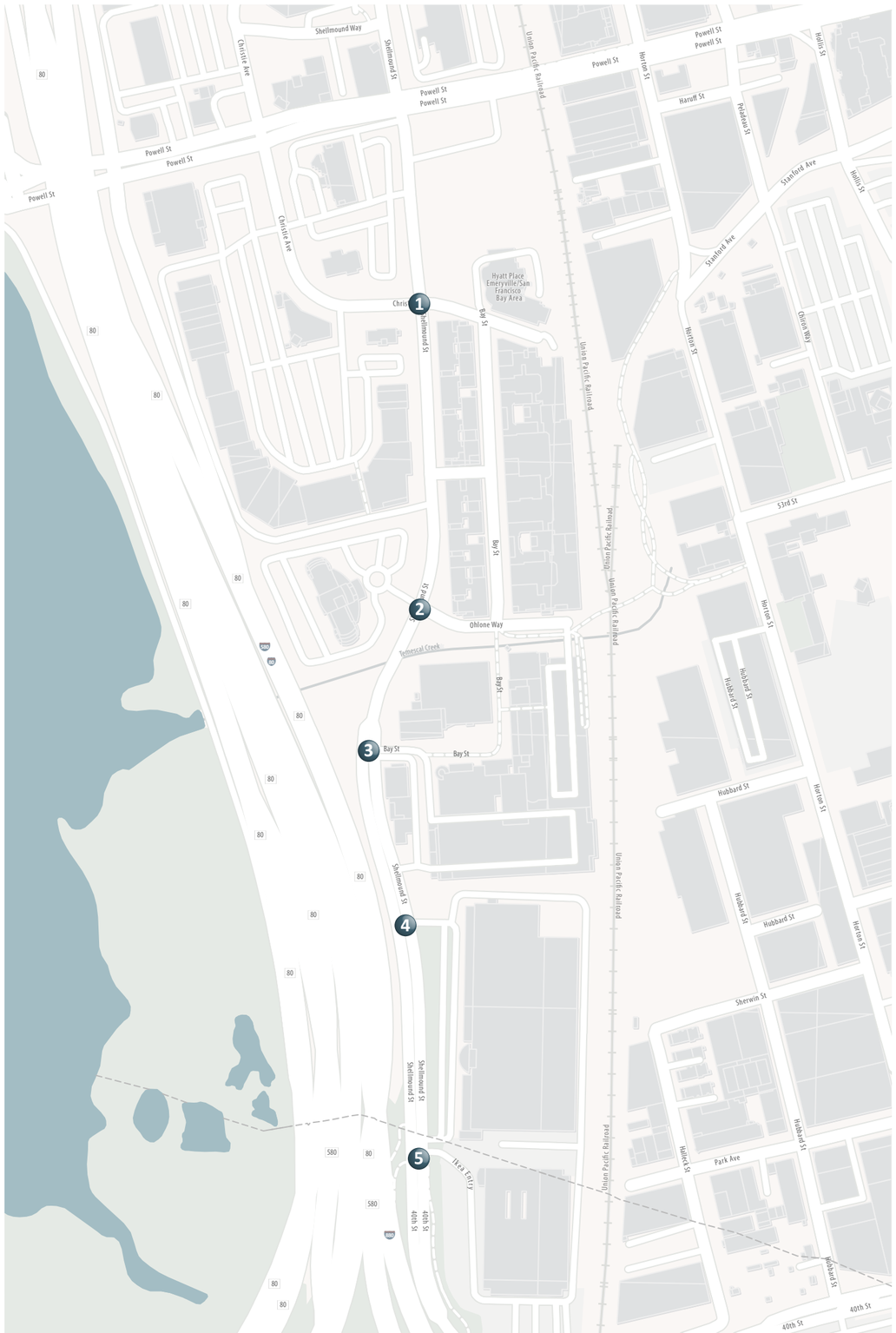
Signalized Intersection

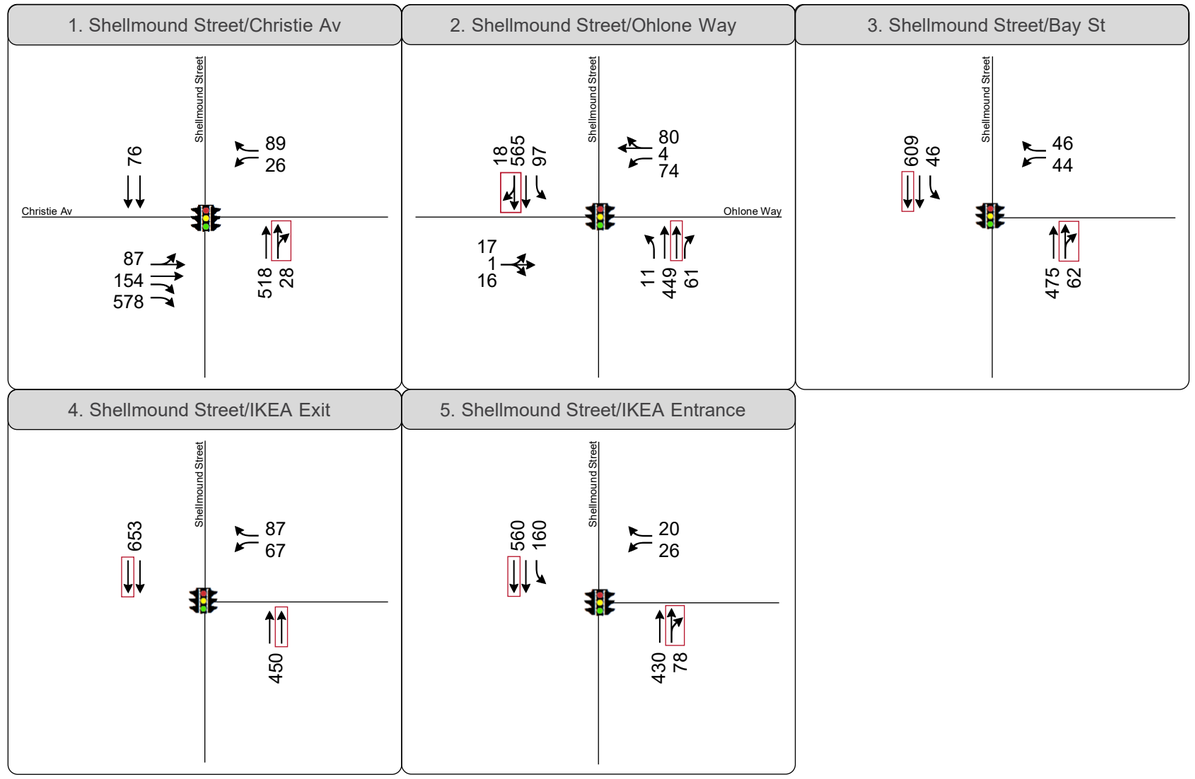
XX AM Peak Hour Traffic Volumes

Lane to be converted to transit-only in Scenarios 2 and 3

Appendix A-1

Scenario 1, 2 and 3: Weekday AM Peak Hour Intersection Traffic Volumes





Study Intersection

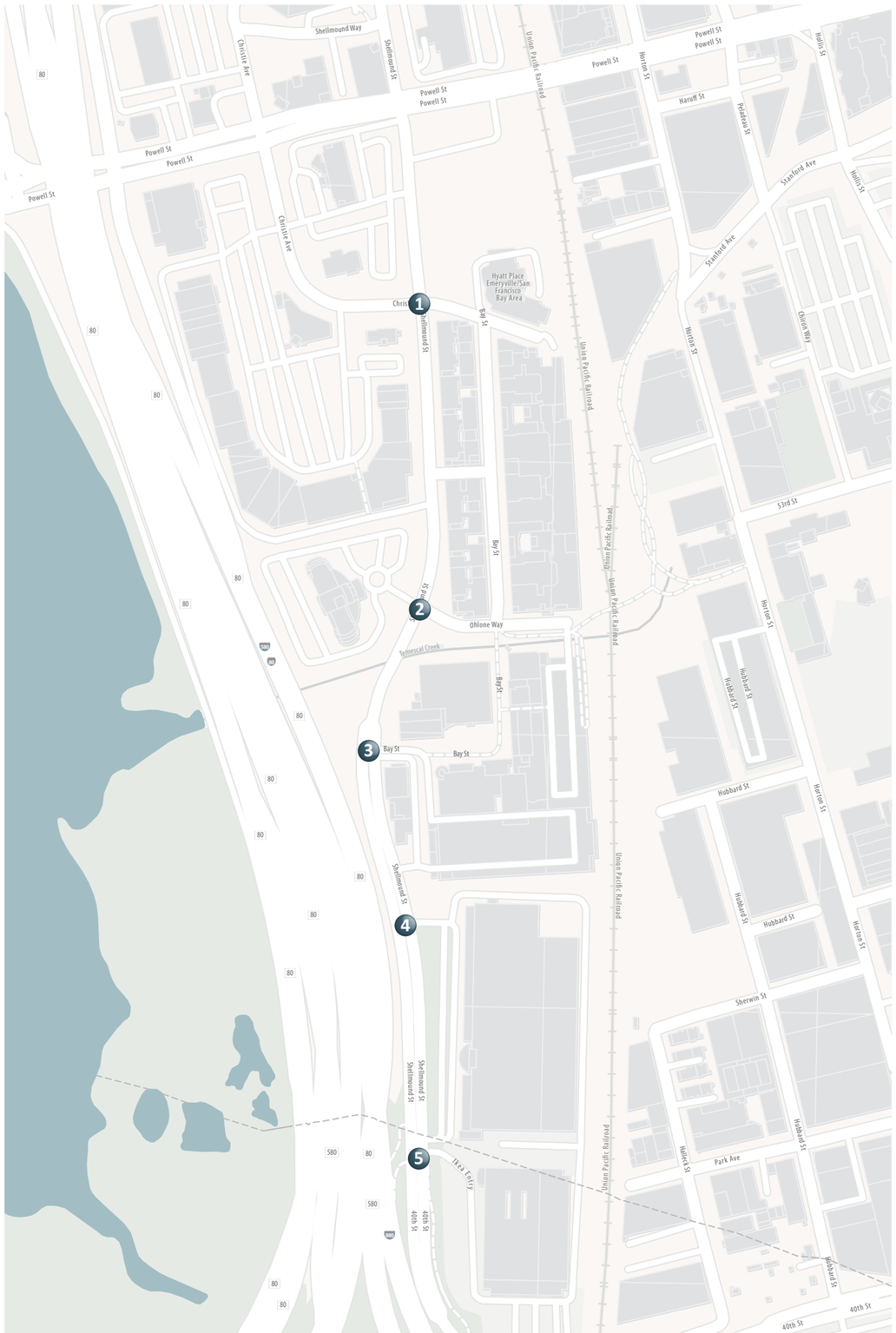
Signalized Intersection

XX Midday Peak Hour Traffic Volumes

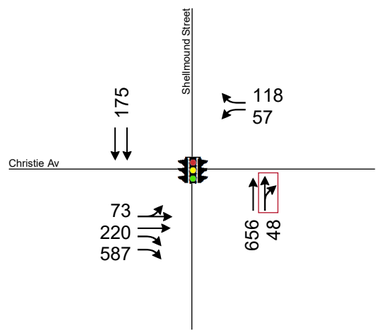
Lane to be converted to transit-only in Scenarios 2 and 3

Appendix A-2

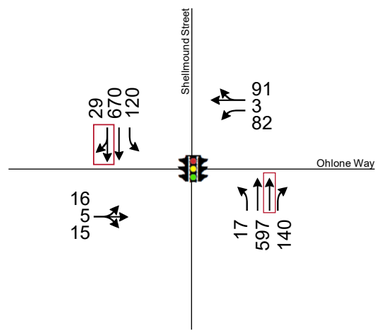
Scenario 1, 2 and 3: Weekday Midday Peak Hour Intersection Traffic Volumes



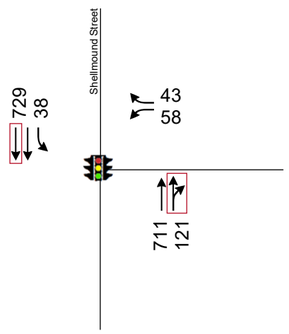
1. Shellmound Street/Christie Av



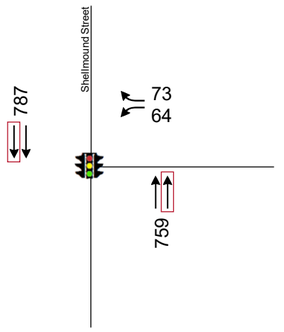
2. Shellmound Street/Ohlone Way



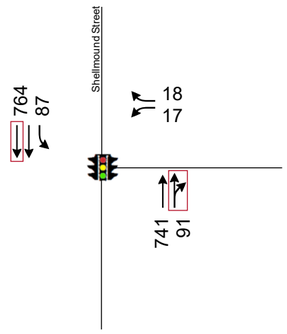
3. Shellmound Street/Bay St



4. Shellmound Street/IKEA Exit



5. Shellmound Street/IKEA Entrance



Study Intersection

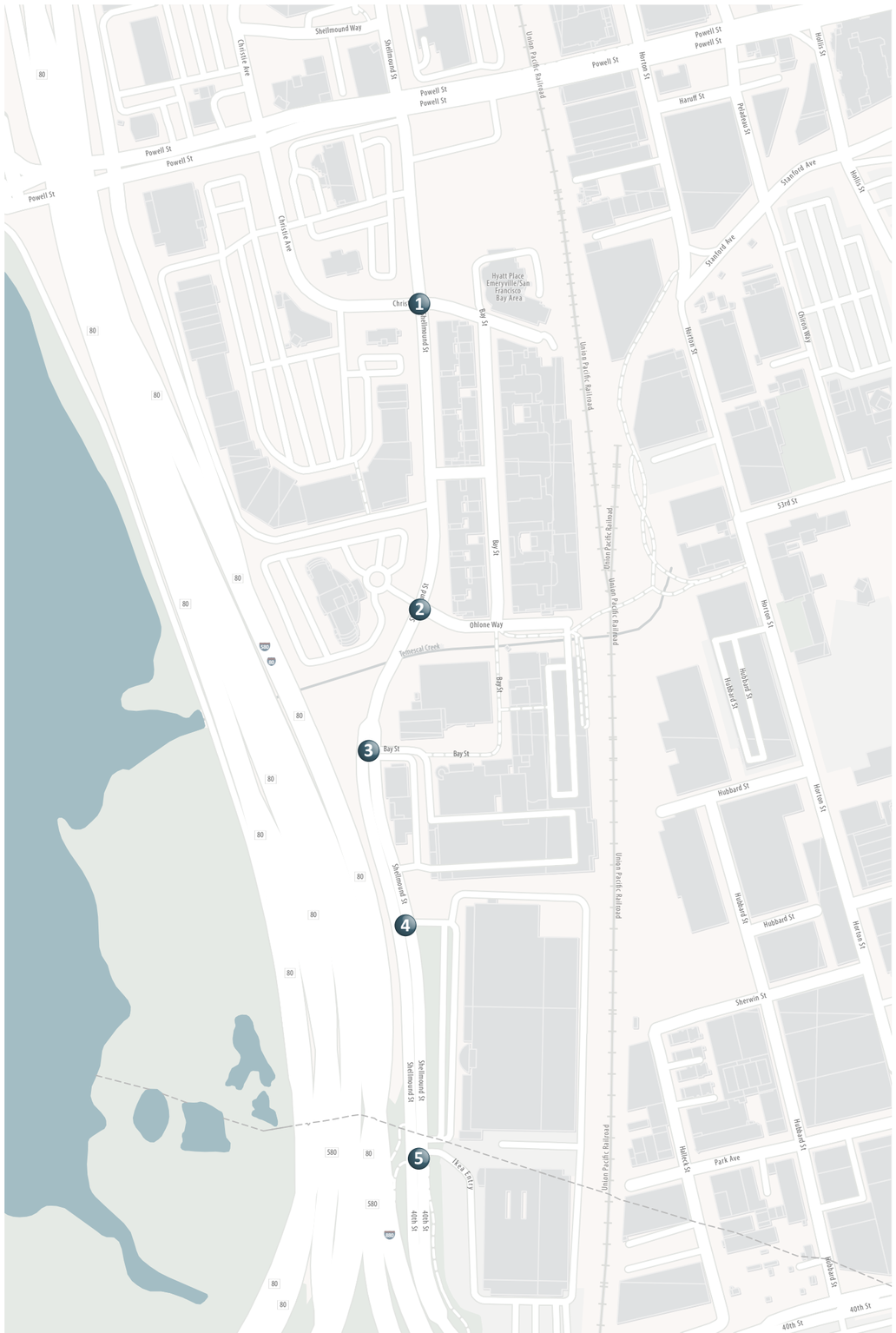
Signalized Intersection

XX PM Peak Hour Traffic Volumes

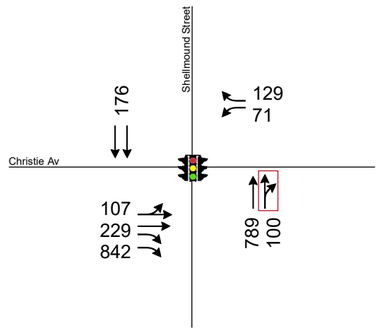
Lane to be converted to transit-only in Scenarios 2 and 3

Appendix A-3

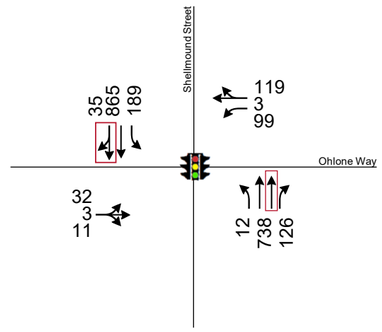
Scenario 1, 2 and 3: Weekday PM Peak Hour Intersection Traffic Volumes



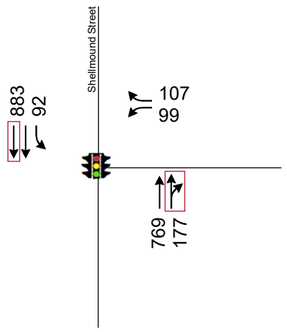
1. Shellmound Street/Christie Av



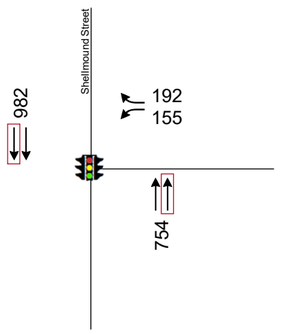
2. Shellmound Street/Ohlone Way



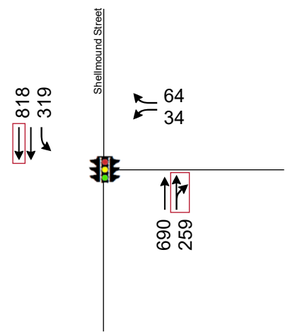
3. Shellmound Street/Bay St



4. Shellmound Street/IKEA Exit



5. Shellmound Street/IKEA Entrance



Study Intersection

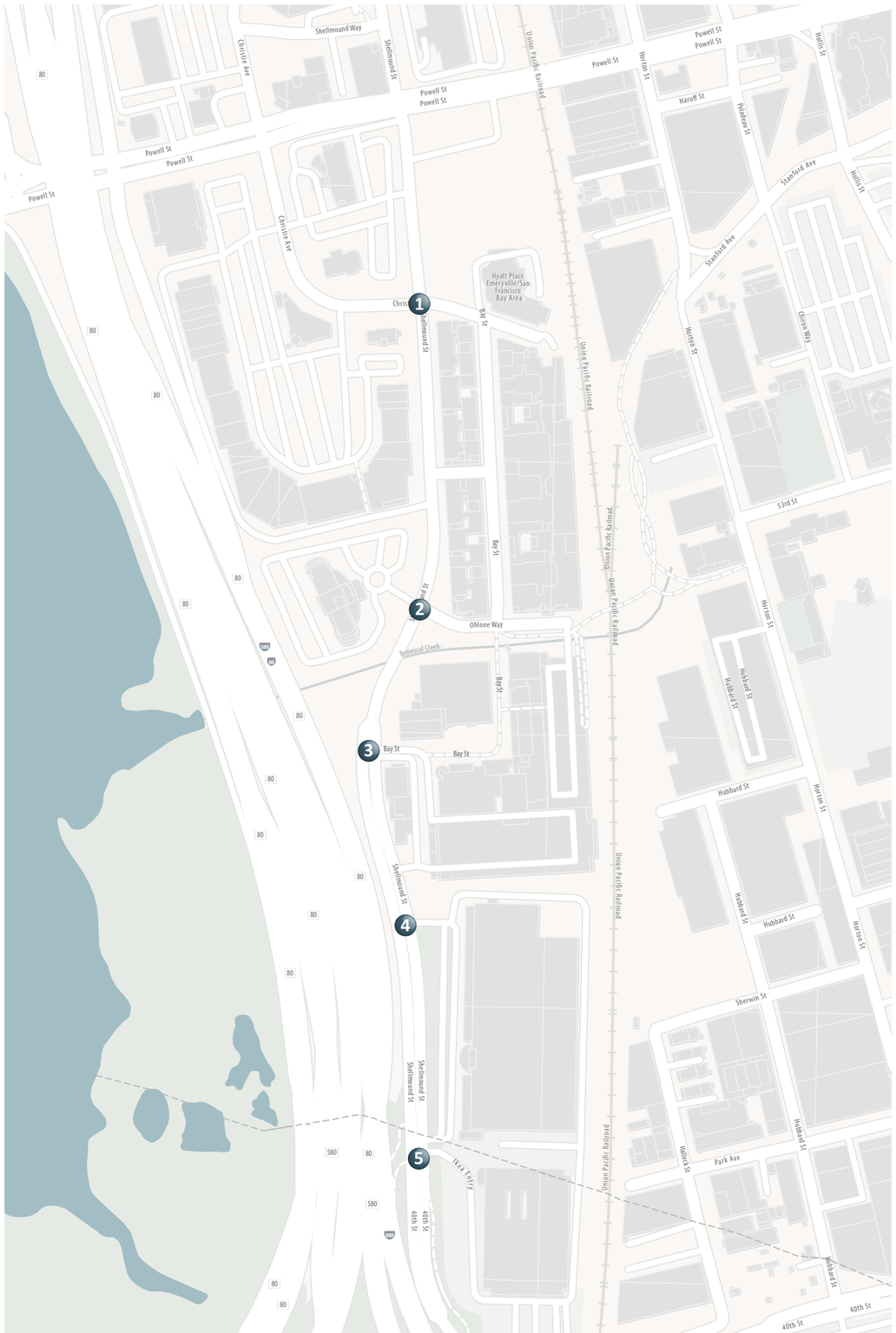
Signalized Intersection

XX Midday Peak Hour Traffic Volumes

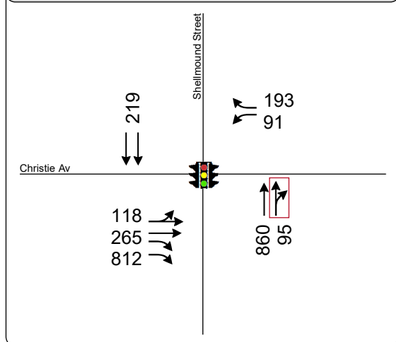
Lane to be converted to transit-only in Scenarios 2 and 3

Appendix A-4

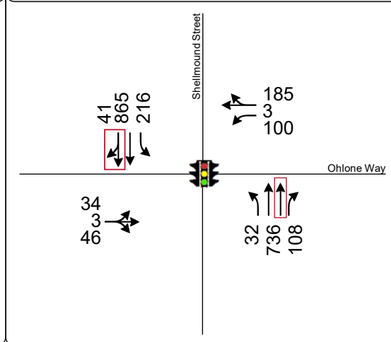
Scenario 1, 2 and 3: Weekend Midday Peak Hour Intersection Traffic Volumes



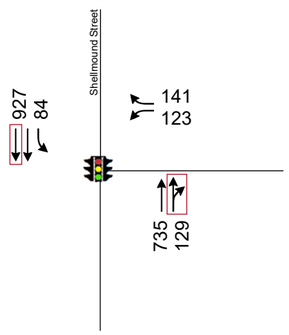
1. Shellmound Street/Christie Av



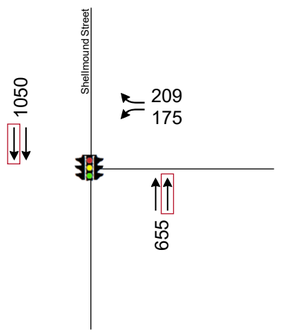
2. Shellmound Street/Ohlone Way



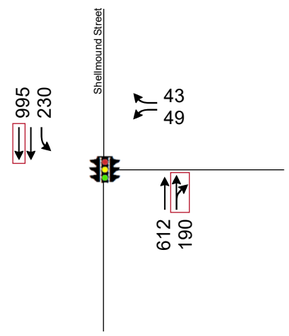
3. Shellmound Street/Bay St



4. Shellmound Street/IKEA Exit



5. Shellmound Street/IKEA Entrance



Study Intersection

Signalized Intersection

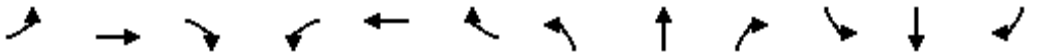
XX PM Peak Hour Traffic Volumes

Lane to be converted to transit-only in Scenarios 2 and 3

Appendix A-5

Scenario 1, 2 and 3: Weekend PM Peak Hour Intersection Traffic Volumes

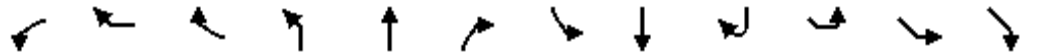
Attachment G:
Intersection LOS and Delay Calculation Worksheets (Part 2)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	245	21	0	73	0	287	23	0	57	0
Future Volume (vph)	25	30	245	21	0	73	0	287	23	0	57	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	11	12	9	12	12	11	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7			4.6	
Lane Util. Factor		0.95	*0.75	1.00		1.00		0.95			0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Frt		1.00	0.85	1.00		0.85		0.99			1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (prot)		3278	2175	1565		1450		2981			3241	
Flt Permitted		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (perm)		3278	2175	1565		1450		2981			3241	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	30	245	21	0	73	0	287	23	0	57	0
RTOR Reduction (vph)	0	0	170	0	0	68	0	3	0	0	0	0
Lane Group Flow (vph)	0	55	75	21	0	5	0	307	0	0	57	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA			NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3						
Actuated Green, G (s)		9.2	37.8	8.0		8.0		69.9			42.0	
Effective Green, g (s)		8.2	36.8	7.5		7.5		69.4			41.5	
Actuated g/C Ratio		0.07	0.31	0.06		0.06		0.58			0.35	
Clearance Time (s)		3.6		4.1		4.1		4.2			4.1	
Vehicle Extension (s)		2.5		2.5		2.5		3.0			3.0	
Lane Grp Cap (vph)		223	667	97		90		1724			1120	
v/s Ratio Prot		c0.02	0.03	c0.01				c0.10			0.02	
v/s Ratio Perm						0.00						
v/c Ratio		0.25	0.11	0.22		0.05		0.18			0.05	
Uniform Delay, d1		53.0	29.9	53.5		52.9		11.9			26.1	
Progression Factor		1.07	1.77	1.00		1.00		1.00			0.74	
Incremental Delay, d2		0.4	0.1	0.8		0.2		0.2			0.1	
Delay (s)		56.9	52.9	54.3		53.1		12.1			19.5	
Level of Service		E	D	D		D		B			B	
Approach Delay (s)		53.6			53.3			12.1			19.5	
Approach LOS		D			D			B			B	

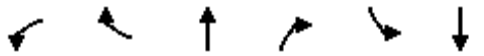
Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	15	2	10	9	256	26	16	280	27	44	2	16
Future Volume (vph)	15	2	10	9	256	26	16	280	27	44	2	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	10	12	9	12	11	9	9	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00			0.98	
Flpb, ped/bikes	0.93	1.00		1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.96	
Satd. Flow (prot)	1407	1400		1509	3353	1410	1509	2966			1611	
Flt Permitted	0.82	1.00		0.95	1.00	1.00	0.95	1.00			0.96	
Satd. Flow (perm)	1209	1400		1509	3353	1410	1509	2966			1611	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	2	10	9	256	26	16	280	27	44	2	16
RTOR Reduction (vph)	0	11	0	0	0	9	0	5	0	0	57	0
Lane Group Flow (vph)	15	1	0	9	256	17	16	302	0	0	5	0
Confl. Peds. (#/hr)	15		1			5			12	1		15
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA		Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2						
Actuated Green, G (s)	4.9	4.9		1.6	50.4	50.4	2.0	50.8			6.4	
Effective Green, g (s)	4.9	4.9		1.1	50.9	50.9	1.5	51.3			5.9	
Actuated g/C Ratio	0.06	0.06		0.01	0.64	0.64	0.02	0.64			0.07	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5			2.0	
Lane Grp Cap (vph)	74	85		20	2133	897	28	1901			118	
v/s Ratio Prot		0.00		0.01	0.08		c0.01	c0.10			c0.00	
v/s Ratio Perm	c0.01					0.01						
v/c Ratio	0.20	0.01		0.45	0.12	0.02	0.57	0.16			0.04	
Uniform Delay, d1	35.7	35.3		39.1	5.7	5.4	38.9	5.7			34.4	
Progression Factor	1.00	1.00		0.99	0.73	1.00	1.00	1.00			1.00	
Incremental Delay, d2	0.5	0.0		5.7	0.1	0.0	16.3	0.2			0.0	
Delay (s)	36.2	35.3		44.4	4.3	5.4	55.2	5.9			34.5	
Level of Service	D	D		D	A	A	E	A			C	
Approach Delay (s)	35.8				5.6			8.4			34.5	
Approach LOS	D				A			A			C	

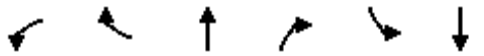
Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	4	287	2	2	309
Future Volume (vph)	0	4	287	2	2	309
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	12	9	11
Total Lost time (s)		4.0	4.2		4.0	4.2
Lane Util. Factor		1.00	0.95		1.00	0.95
Frpb, ped/bikes		1.00	1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00	1.00
Frt		0.85	1.00		1.00	1.00
Flt Protected		1.00	1.00		0.95	1.00
Satd. Flow (prot)		1450	3237		1509	3189
Flt Permitted		1.00	1.00		0.95	1.00
Satd. Flow (perm)		1450	3237		1509	3189
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4	287	2	2	309
RTOR Reduction (vph)	0	4	0	0	0	0
Lane Group Flow (vph)	0	0	289	0	2	309
Confl. Peds. (#/hr)	14			10		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8				
Actuated Green, G (s)		5.2	61.5		1.6	66.6
Effective Green, g (s)		4.7	62.0		1.1	67.1
Actuated g/C Ratio		0.06	0.78		0.01	0.84
Clearance Time (s)		3.5	4.7		3.5	4.7
Vehicle Extension (s)		2.0	2.5		2.0	2.5
Lane Grp Cap (vph)		85	2508		20	2674
v/s Ratio Prot			0.09		0.00	c0.10
v/s Ratio Perm		c0.00				
v/c Ratio		0.00	0.12		0.10	0.12
Uniform Delay, d1		35.4	2.2		39.0	1.2
Progression Factor		1.00	0.81		0.78	2.72
Incremental Delay, d2		0.0	0.1		0.8	0.1
Delay (s)		35.4	1.9		31.1	3.2
Level of Service		D	A		C	A
Approach Delay (s)	35.4		1.9			3.4
Approach LOS	D		A			A

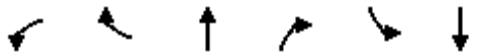
Intersection Summary			
HCM 2000 Control Delay	2.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



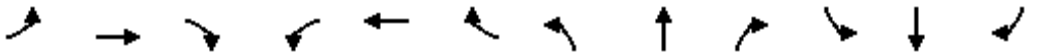
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	2	287	0	0	309
Future Volume (vph)	4	2	287	0	0	309
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	11	12	12	10
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	3241			3129
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	3241			3129
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	2	287	0	0	309
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	4	0	287	0	0	309
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	1.8	1.8	28.9			28.9
Effective Green, g (s)	1.3	1.3	29.4			29.4
Actuated g/C Ratio	0.03	0.03	0.73			0.73
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	56	50	2382			2299
v/s Ratio Prot	c0.00		0.09			c0.10
v/s Ratio Perm		0.00				
v/c Ratio	0.07	0.00	0.12			0.13
Uniform Delay, d1	18.8	18.7	1.5			1.6
Progression Factor	1.00	1.00	0.52			2.53
Incremental Delay, d2	0.4	0.0	0.1			0.1
Delay (s)	19.2	18.7	0.9			4.1
Level of Service	B	B	A			A
Approach Delay (s)	19.0		0.9			4.1
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	26.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	1	286	20	11	302
Future Volume (vph)	2	1	286	20	11	302
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1550	3094		1509	3129
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1550	3094		1509	3129
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	1	286	20	11	302
RTOR Reduction (vph)	0	1	2	0	0	0
Lane Group Flow (vph)	2	0	304	0	11	302
Confl. Peds. (#/hr)				4		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	1.8	7.2	65.1		1.8	69.9
Effective Green, g (s)	1.3	6.7	65.6		1.3	70.4
Actuated g/C Ratio	0.02	0.08	0.82		0.02	0.88
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	28	129	2537		24	2753
v/s Ratio Prot	c0.00	0.00	c0.10		c0.01	0.10
v/s Ratio Perm						
v/c Ratio	0.07	0.00	0.12		0.46	0.11
Uniform Delay, d1	38.8	33.6	1.4		39.0	0.6
Progression Factor	1.00	1.00	1.00		0.97	0.04
Incremental Delay, d2	1.3	0.0	0.1		5.0	0.1
Delay (s)	40.1	33.6	1.5		42.8	0.1
Level of Service	D	C	A		D	A
Approach Delay (s)	37.9		1.5			1.6
Approach LOS	D		A			A

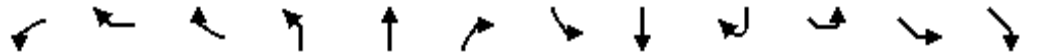
Intersection Summary			
HCM 2000 Control Delay	1.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	154	578	26	0	89	0	518	28	0	76	0
Future Volume (vph)	87	154	578	26	0	89	0	518	28	0	76	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	11	12	9	12	12	11	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7			4.6	
Lane Util. Factor		0.95	*0.75	1.00		1.00		0.95			0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Frt		1.00	0.85	1.00		0.85		0.99			1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (prot)		3293	2175	1565		1450		2992			3241	
Flt Permitted		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (perm)		3293	2175	1565		1450		2992			3241	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	154	578	26	0	89	0	518	28	0	76	0
RTOR Reduction (vph)	0	0	380	0	0	82	0	2	0	0	0	0
Lane Group Flow (vph)	0	241	198	26	0	7	0	544	0	0	76	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA			NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3						
Actuated Green, G (s)		13.6	42.2	10.0		10.0		63.5			35.6	
Effective Green, g (s)		12.6	41.2	9.5		9.5		63.0			35.1	
Actuated g/C Ratio		0.10	0.34	0.08		0.08		0.52			0.29	
Clearance Time (s)		3.6		4.1		4.1		4.2			4.1	
Vehicle Extension (s)		2.5		2.5		2.5		3.0			3.0	
Lane Grp Cap (vph)		345	746	123		114		1570			947	
v/s Ratio Prot		c0.07	0.09	c0.02				c0.18			0.02	
v/s Ratio Perm						0.00						
v/c Ratio		0.70	0.27	0.21		0.06		0.35			0.08	
Uniform Delay, d1		51.9	28.5	51.7		51.1		16.5			30.8	
Progression Factor		1.00	1.00	1.00		1.00		1.00			0.66	
Incremental Delay, d2		5.6	0.1	0.6		0.2		0.6			0.2	
Delay (s)		57.5	28.6	52.4		51.3		17.2			20.3	
Level of Service		E	C	D		D		B			C	
Approach Delay (s)		37.1			51.5			17.2			20.3	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



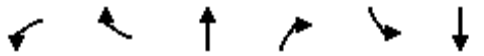
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	74	4	80	11	449	61	97	565	18	17	1	16
Future Volume (vph)	74	4	80	11	449	61	97	565	18	17	1	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	10	12	9	12	11	9	9	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	1.00			0.85	
Flpb, ped/bikes	0.86	1.00		1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00			0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1304	1400		1509	3353	1364	1509	2994			1362	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (perm)	1009	1400		1509	3353	1364	1509	2994			1362	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	74	4	80	11	449	61	97	565	18	17	1	16
RTOR Reduction (vph)	0	71	0	0	0	31	0	2	0	0	32	0
Lane Group Flow (vph)	74	13	0	11	449	30	97	581	0	0	2	0
Confl. Peds. (#/hr)	71		3			25			50	3		71
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA		Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2						
Actuated Green, G (s)	12.0	12.0		1.6	38.5	38.5	8.4	45.3			4.8	
Effective Green, g (s)	12.0	12.0		1.1	39.0	39.0	7.9	45.8			4.3	
Actuated g/C Ratio	0.15	0.15		0.01	0.49	0.49	0.10	0.57			0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5			2.0	
Lane Grp Cap (vph)	151	210		20	1634	664	149	1714			73	
v/s Ratio Prot		0.01		0.01	0.13		c0.06	c0.19			c0.00	
v/s Ratio Perm	c0.07					0.02						
v/c Ratio	0.49	0.06		0.55	0.27	0.04	0.65	0.34			0.03	
Uniform Delay, d1	31.2	29.2		39.2	12.1	10.7	34.7	9.1			35.9	
Progression Factor	1.00	1.00		1.45	0.27	0.26	1.00	1.00			1.00	
Incremental Delay, d2	0.9	0.0		16.9	0.4	0.1	7.5	0.5			0.1	
Delay (s)	32.1	29.2		74.0	3.7	2.9	42.2	9.6			35.9	
Level of Service	C	C		E	A	A	D	A			D	
Approach Delay (s)	30.6				5.1			14.3			35.9	
Approach LOS	C				A			B			D	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	46	475	62	46	609
Future Volume (vph)	44	46	475	62	46	609
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	12	9	11
Total Lost time (s)	4.0	4.0	4.2		4.0	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1621	1450	3163		1509	3189
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1621	1450	3163		1509	3189
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	46	475	62	46	609
RTOR Reduction (vph)	0	38	7	0	0	0
Lane Group Flow (vph)	44	8	530	0	46	609
Confl. Peds. (#/hr)	20			17		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2			
Actuated Green, G (s)	14.4	14.4	48.7		5.2	57.4
Effective Green, g (s)	13.9	13.9	49.2		4.7	57.9
Actuated g/C Ratio	0.17	0.17	0.62		0.06	0.72
Clearance Time (s)	3.5	3.5	4.7		3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5		2.0	2.5
Lane Grp Cap (vph)	281	251	1945		88	2308
v/s Ratio Prot	c0.03		0.17		c0.03	c0.19
v/s Ratio Perm		0.01				
v/c Ratio	0.16	0.03	0.27		0.52	0.26
Uniform Delay, d1	28.1	27.5	7.1		36.6	3.8
Progression Factor	1.00	1.00	0.76		1.32	0.45
Incremental Delay, d2	0.1	0.0	0.3		2.5	0.3
Delay (s)	28.2	27.5	5.8		50.7	2.0
Level of Service	C	C	A		D	A
Approach Delay (s)	27.8		5.8			5.4
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

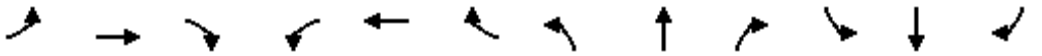


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	87	450	0	0	653
Future Volume (vph)	67	87	450	0	0	653
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	11	12	12	10
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	3241			3129
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	3241			3129
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	87	450	0	0	653
RTOR Reduction (vph)	0	76	0	0	0	0
Lane Group Flow (vph)	67	11	450	0	0	653
Confl. Peds. (#/hr)				11		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	5.4	5.4	25.3			25.3
Effective Green, g (s)	4.9	4.9	25.8			25.8
Actuated g/C Ratio	0.12	0.12	0.65			0.65
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	212	189	2090			2018
v/s Ratio Prot	c0.04		0.14			c0.21
v/s Ratio Perm		0.01				
v/c Ratio	0.32	0.06	0.22			0.32
Uniform Delay, d1	16.0	15.5	2.9			3.2
Progression Factor	1.00	1.00	0.98			1.00
Incremental Delay, d2	0.6	0.1	0.2			0.4
Delay (s)	16.6	15.6	3.1			3.6
Level of Service	B	B	A			A
Approach Delay (s)	16.1		3.1			3.6
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	4.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	20	430	78	160	560
Future Volume (vph)	26	20	430	78	160	560
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1550	3042		1509	3129
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1550	3042		1509	3129
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	20	430	78	160	560
RTOR Reduction (vph)	0	14	12	0	0	0
Lane Group Flow (vph)	26	6	496	0	160	560
Confl. Peds. (#/hr)	2			14		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6	24.5	47.8		12.3	63.1
Effective Green, g (s)	8.1	24.0	48.3		11.8	63.6
Actuated g/C Ratio	0.10	0.30	0.60		0.15	0.80
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	175	465	1836		222	2487
v/s Ratio Prot	c0.02	0.00	c0.16		c0.11	0.18
v/s Ratio Perm						
v/c Ratio	0.15	0.01	0.27		0.72	0.23
Uniform Delay, d1	32.8	19.7	7.5		32.5	2.0
Progression Factor	1.00	1.00	1.00		1.17	0.80
Incremental Delay, d2	0.5	0.0	0.4		9.1	0.2
Delay (s)	33.3	19.7	7.9		47.1	1.9
Level of Service	C	B	A		D	A
Approach Delay (s)	27.4		7.9			11.9
Approach LOS	C		A			B

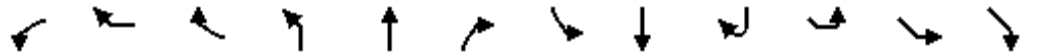
Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	220	587	57	0	118	0	656	48	0	175	0
Future Volume (vph)	73	220	587	57	0	118	0	656	48	0	175	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	11	12	9	12	12	11	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7			4.6	
Lane Util. Factor		0.95	*0.75	1.00		1.00		0.95			0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Frt		1.00	0.85	1.00		0.85		0.99			1.00	
Flt Protected		0.99	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (prot)		3312	2175	1565		1450		2984			3241	
Flt Permitted		0.99	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (perm)		3312	2175	1565		1450		2984			3241	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	220	587	57	0	118	0	656	48	0	175	0
RTOR Reduction (vph)	0	0	377	0	0	108	0	3	0	0	0	0
Lane Group Flow (vph)	0	293	210	57	0	10	0	701	0	0	175	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA			NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3						
Actuated Green, G (s)		15.3	43.9	10.8		10.8		61.0			33.1	
Effective Green, g (s)		14.3	42.9	10.3		10.3		60.5			32.6	
Actuated g/C Ratio		0.12	0.36	0.09		0.09		0.50			0.27	
Clearance Time (s)		3.6		4.1		4.1		4.2			4.1	
Vehicle Extension (s)		2.5		2.5		2.5		3.0			3.0	
Lane Grp Cap (vph)		394	777	134		124		1504			880	
v/s Ratio Prot		c0.09	0.10	c0.04				c0.23			0.05	
v/s Ratio Perm						0.01						
v/c Ratio		0.74	0.27	0.43		0.08		0.47			0.20	
Uniform Delay, d1		51.1	27.4	52.0		50.5		19.3			33.6	
Progression Factor		1.00	1.00	1.00		1.00		1.00			0.48	
Incremental Delay, d2		7.0	0.1	1.6		0.2		1.0			0.5	
Delay (s)		58.1	27.6	53.6		50.7		20.3			16.5	
Level of Service		E	C	D		D		C			B	
Approach Delay (s)		37.7			51.7			20.3			16.5	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



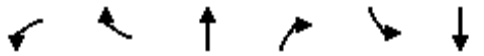
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	82	3	91	17	597	140	120	670	29	16	5	15
Future Volume (vph)	82	3	91	17	597	140	120	670	29	16	5	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	10	12	9	12	11	9	9	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	1.00			0.86	
Flpb, ped/bikes	0.87	1.00		1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	0.99			0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (prot)	1307	1400		1509	3353	1368	1509	2985			1398	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00			0.97	
Satd. Flow (perm)	1009	1400		1509	3353	1368	1509	2985			1398	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	82	3	91	17	597	140	120	670	29	16	5	15
RTOR Reduction (vph)	0	80	0	0	0	73	0	3	0	0	34	0
Lane Group Flow (vph)	82	14	0	17	597	67	120	696	0	0	2	0
Confl. Peds. (#/hr)	70		11			23			52	11		70
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA		Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2						
Actuated Green, G (s)	12.1	12.1		1.6	38.3	38.3	9.5	46.2			4.8	
Effective Green, g (s)	12.1	12.1		1.1	38.8	38.8	9.0	46.7			4.3	
Actuated g/C Ratio	0.15	0.15		0.01	0.48	0.48	0.11	0.58			0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5			2.0	
Lane Grp Cap (vph)	150	209		20	1606	655	167	1720			74	
v/s Ratio Prot		0.01		0.01	0.18		c0.08	c0.23			c0.00	
v/s Ratio Perm	c0.08					0.05						
v/c Ratio	0.55	0.07		0.85	0.37	0.10	0.72	0.40			0.03	
Uniform Delay, d1	31.9	29.6		39.9	13.4	11.6	34.8	9.5			36.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00			1.00	
Incremental Delay, d2	2.2	0.0		126.4	0.7	0.3	11.6	0.7			0.1	
Delay (s)	34.1	29.7		166.3	14.0	11.9	46.4	10.2			36.4	
Level of Service	C	C		F	B	B	D	B			D	
Approach Delay (s)	31.7				17.1			15.5			36.4	
Approach LOS	C				B			B			D	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	58	43	711	121	38	729
Future Volume (vph)	58	43	711	121	38	729
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	12	9	11
Total Lost time (s)	4.0	4.0	4.2		4.0	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1621	1450	3142		1509	3189
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1621	1450	3142		1509	3189
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	43	711	121	38	729
RTOR Reduction (vph)	0	36	10	0	0	0
Lane Group Flow (vph)	58	7	822	0	38	729
Confl. Peds. (#/hr)	24			18		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2			
Actuated Green, G (s)	14.4	14.4	48.9		5.0	57.4
Effective Green, g (s)	13.9	13.9	49.4		4.5	57.9
Actuated g/C Ratio	0.17	0.17	0.62		0.06	0.72
Clearance Time (s)	3.5	3.5	4.7		3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5		2.0	2.5
Lane Grp Cap (vph)	281	251	1940		84	2308
v/s Ratio Prot	c0.04		c0.26		c0.03	0.23
v/s Ratio Perm		0.01				
v/c Ratio	0.21	0.03	0.42		0.45	0.32
Uniform Delay, d1	28.3	27.4	7.9		36.6	4.0
Progression Factor	1.00	1.00	1.41		1.00	1.00
Incremental Delay, d2	0.1	0.0	0.7		1.4	0.4
Delay (s)	28.5	27.5	11.9		38.0	4.3
Level of Service	C	C	B		D	A
Approach Delay (s)	28.0		11.9			6.0
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

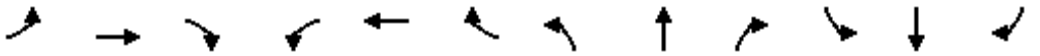


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	64	73	759	0	0	787
Future Volume (vph)	64	73	759	0	0	787
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	11	12	12	10
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	3241			3129
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	3241			3129
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	64	73	759	0	0	787
RTOR Reduction (vph)	0	64	0	0	0	0
Lane Group Flow (vph)	64	9	759	0	0	787
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	5.4	5.4	25.3			25.3
Effective Green, g (s)	4.9	4.9	25.8			25.8
Actuated g/C Ratio	0.12	0.12	0.65			0.65
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	212	189	2090			2018
v/s Ratio Prot	c0.04		0.23			c0.25
v/s Ratio Perm		0.01				
v/c Ratio	0.30	0.05	0.36			0.39
Uniform Delay, d1	16.0	15.5	3.3			3.4
Progression Factor	1.00	1.00	1.00			1.20
Incremental Delay, d2	0.6	0.1	0.5			0.6
Delay (s)	16.6	15.6	3.8			4.6
Level of Service	B	B	A			A
Approach Delay (s)	16.0		3.8			4.6
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	5.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	17	18	741	91	87	764
Future Volume (vph)	17	18	741	91	87	764
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1550	3066		1509	3129
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1550	3066		1509	3129
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	18	741	91	87	764
RTOR Reduction (vph)	0	14	7	0	0	0
Lane Group Flow (vph)	17	4	825	0	87	764
Confl. Peds. (#/hr)	2			19		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6	20.6	52.3		8.4	63.7
Effective Green, g (s)	8.1	20.1	52.8		7.9	64.2
Actuated g/C Ratio	0.10	0.25	0.66		0.10	0.80
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	174	386	2008		147	2492
v/s Ratio Prot	c0.01	0.00	c0.27		c0.06	0.24
v/s Ratio Perm						
v/c Ratio	0.10	0.01	0.41		0.59	0.31
Uniform Delay, d1	32.9	22.8	6.6		34.8	2.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.3	0.0	0.6		4.2	0.3
Delay (s)	33.2	22.8	7.2		39.0	2.5
Level of Service	C	C	A		D	A
Approach Delay (s)	27.9		7.2			6.3
Approach LOS	C		A			A

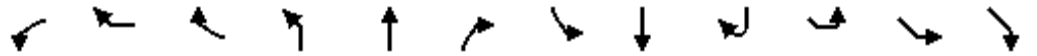
Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	11.8
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	229	842	71	0	129	0	789	100	0	176	0
Future Volume (vph)	107	229	842	71	0	129	0	789	100	0	176	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	11	12	9	12	12	11	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7			4.6	
Lane Util. Factor		0.95	*0.75	1.00		1.00		0.95			0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Frt		1.00	0.85	1.00		0.85		0.98			1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (prot)		3333	2197	1580		1464		2992			3273	
Flt Permitted		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (perm)		3333	2197	1580		1464		2992			3273	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	229	842	71	0	129	0	789	100	0	176	0
RTOR Reduction (vph)	0	0	534	0	0	117	0	7	0	0	0	0
Lane Group Flow (vph)	0	336	308	71	0	12	0	882	0	0	176	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA			NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3						
Actuated Green, G (s)		16.3	44.9	11.4		11.4		59.4			31.5	
Effective Green, g (s)		15.3	43.9	10.9		10.9		58.9			31.0	
Actuated g/C Ratio		0.13	0.37	0.09		0.09		0.49			0.26	
Clearance Time (s)		3.6		4.1		4.1		4.2			4.1	
Vehicle Extension (s)		2.5		2.5		2.5		3.0			3.0	
Lane Grp Cap (vph)		424	803	143		132		1468			845	
v/s Ratio Prot		c0.10	0.14	c0.04				c0.29			0.05	
v/s Ratio Perm						0.01						
v/c Ratio		0.79	0.38	0.50		0.09		0.60			0.21	
Uniform Delay, d1		50.8	28.1	51.9		50.0		22.1			34.9	
Progression Factor		1.14	3.05	1.00		1.00		0.24			0.44	
Incremental Delay, d2		8.5	0.2	2.0		0.2		1.6			0.6	
Delay (s)		66.5	85.9	53.9		50.2		6.9			16.1	
Level of Service		E	F	D		D		A			B	
Approach Delay (s)		80.4			51.5			6.9			16.1	
Approach LOS		F			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	46.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	99	3	119	12	738	126	189	865	35	32	3	11
Future Volume (vph)	99	3	119	12	738	126	189	865	35	32	3	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	10	12	9	12	11	9	9	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93	1.00	0.99			0.90	
Flpb, ped/bikes	0.75	1.00		1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	0.99			0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.96	
Satd. Flow (prot)	1145	1414		1524	3386	1359	1524	2993			1491	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00			0.96	
Satd. Flow (perm)	876	1414		1524	3386	1359	1524	2993			1491	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	3	119	12	738	126	189	865	35	32	3	11
RTOR Reduction (vph)	0	101	0	0	0	59	0	2	0	0	44	0
Lane Group Flow (vph)	99	21	0	12	738	67	189	898	0	0	2	0
Confl. Peds. (#/hr)	151					22			121			151
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA		Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2						
Actuated Green, G (s)	20.5	20.5		3.2	47.2	47.2	29.6	73.6			6.4	
Effective Green, g (s)	20.5	20.5		2.7	47.7	47.7	29.1	74.1			5.9	
Actuated g/C Ratio	0.17	0.17		0.02	0.40	0.40	0.24	0.62			0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5			2.0	
Lane Grp Cap (vph)	149	241		34	1345	540	369	1848			73	
v/s Ratio Prot		0.01		0.01	c0.22		0.12	c0.30			c0.00	
v/s Ratio Perm	c0.11					0.05						
v/c Ratio	0.66	0.09		0.35	0.55	0.12	0.51	0.49			0.03	
Uniform Delay, d1	46.5	41.9		57.8	27.9	22.9	39.3	12.5			54.3	
Progression Factor	1.00	1.00		0.78	0.67	0.53	0.80	0.60			1.00	
Incremental Delay, d2	8.3	0.1		2.1	1.5	0.4	0.4	0.8			0.1	
Delay (s)	54.9	41.9		47.4	20.2	12.6	31.8	8.2			54.4	
Level of Service	D	D		D	C	B	C	A			D	
Approach Delay (s)	47.7				19.5			12.3			54.4	
Approach LOS	D				B			B			D	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	99	107	769	177	92	883
Future Volume (vph)	99	107	769	177	92	883
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	12	9	11
Total Lost time (s)	4.0	4.0	4.2		4.0	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1637	1464	3124		1524	3221
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1637	1464	3124		1524	3221
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	107	769	177	92	883
RTOR Reduction (vph)	0	90	11	0	0	0
Lane Group Flow (vph)	99	17	935	0	92	883
Confl. Peds. (#/hr)	41			26		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2			
Actuated Green, G (s)	19.6	19.6	76.8		11.9	92.2
Effective Green, g (s)	19.1	19.1	77.3		11.4	92.7
Actuated g/C Ratio	0.16	0.16	0.64		0.10	0.77
Clearance Time (s)	3.5	3.5	4.7		3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5		2.0	2.5
Lane Grp Cap (vph)	260	233	2012		144	2488
v/s Ratio Prot	c0.06		c0.30		c0.06	0.27
v/s Ratio Perm		0.01				
v/c Ratio	0.38	0.07	0.46		0.64	0.35
Uniform Delay, d1	45.2	42.9	10.8		52.3	4.3
Progression Factor	1.00	1.00	0.56		0.75	1.67
Incremental Delay, d2	0.3	0.0	0.7		5.9	0.4
Delay (s)	45.5	43.0	6.8		45.0	7.5
Level of Service	D	D	A		D	A
Approach Delay (s)	44.2		6.8			11.1
Approach LOS	D		A			B

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

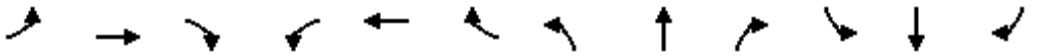
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	192	754	0	0	982
Future Volume (vph)	155	192	754	0	0	982
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	11	12	12	10
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1750	1565	3273			3160
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1750	1565	3273			3160
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	155	192	754	0	0	982
RTOR Reduction (vph)	0	108	0	0	0	0
Lane Group Flow (vph)	155	84	754	0	0	982
Confl. Peds. (#/hr)				35		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	10.9	10.9	39.8			39.8
Effective Green, g (s)	10.4	10.4	40.3			40.3
Actuated g/C Ratio	0.17	0.17	0.67			0.67
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	303	271	2198			2122
v/s Ratio Prot	c0.09		0.23			c0.31
v/s Ratio Perm		0.05				
v/c Ratio	0.51	0.31	0.34			0.46
Uniform Delay, d1	22.5	21.7	4.2			4.7
Progression Factor	1.00	1.00	1.60			0.76
Incremental Delay, d2	1.1	0.5	0.4			0.7
Delay (s)	23.6	22.1	7.1			4.3
Level of Service	C	C	A			A
Approach Delay (s)	22.8		7.1			4.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	690	259	319	818
Future Volume (vph)	34	64	690	259	319	818
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1565	2963		1524	3160
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1750	1565	2963		1524	3160
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	64	690	259	319	818
RTOR Reduction (vph)	0	27	20	0	0	0
Lane Group Flow (vph)	34	37	929	0	319	818
Confl. Peds. (#/hr)	6			47		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	10.5	44.0	68.3		29.9	101.2
Effective Green, g (s)	10.0	43.5	68.8		29.4	101.7
Actuated g/C Ratio	0.08	0.36	0.57		0.24	0.85
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	145	567	1698		373	2678
v/s Ratio Prot	c0.02	0.02	c0.31		c0.21	0.26
v/s Ratio Perm						
v/c Ratio	0.23	0.07	0.55		0.86	0.31
Uniform Delay, d1	51.4	25.0	15.9		43.3	1.9
Progression Factor	1.00	1.00	1.00		1.03	0.66
Incremental Delay, d2	1.0	0.1	1.3		15.4	0.3
Delay (s)	52.4	25.0	17.2		60.0	1.5
Level of Service	D	C	B		E	A
Approach Delay (s)	34.5		17.2			17.9
Approach LOS	C		B			B

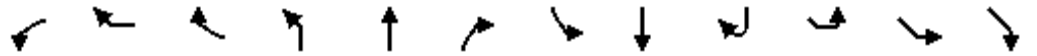
Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	265	812	91	0	193	0	860	95	0	219	0
Future Volume (vph)	118	265	812	91	0	193	0	860	95	0	219	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	11	12	9	12	12	11	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7			4.6	
Lane Util. Factor		0.95	*0.75	1.00		1.00		0.95			0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00			1.00	
Frt		1.00	0.85	1.00		0.85		0.99			1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (prot)		3335	2197	1580		1464		2998			3273	
Flt Permitted		0.98	1.00	0.95		1.00		1.00			1.00	
Satd. Flow (perm)		3335	2197	1580		1464		2998			3273	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	265	812	91	0	193	0	860	95	0	219	0
RTOR Reduction (vph)	0	0	507	0	0	174	0	6	0	0	0	0
Lane Group Flow (vph)	0	383	305	91	0	19	0	949	0	0	219	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA			NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3						
Actuated Green, G (s)		17.5	46.1	12.3		12.3		57.3			29.4	
Effective Green, g (s)		16.5	45.1	11.8		11.8		56.8			28.9	
Actuated g/C Ratio		0.14	0.38	0.10		0.10		0.47			0.24	
Clearance Time (s)		3.6		4.1		4.1		4.2			4.1	
Vehicle Extension (s)		2.5		2.5		2.5		3.0			3.0	
Lane Grp Cap (vph)		458	825	155		143		1419			788	
v/s Ratio Prot		c0.11	0.14	c0.06				c0.32			0.07	
v/s Ratio Perm						0.01						
v/c Ratio		0.84	0.37	0.59		0.13		0.67			0.28	
Uniform Delay, d1		50.4	27.1	51.8		49.4		24.4			37.1	
Progression Factor		1.07	2.94	1.00		1.00		1.00			0.42	
Incremental Delay, d2		11.0	0.2	4.6		0.3		2.5			0.9	
Delay (s)		65.1	80.0	56.4		49.7		26.9			16.3	
Level of Service		E	E	E		D		C			B	
Approach Delay (s)		75.2			51.9			26.9			16.3	
Approach LOS		E			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	50.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	63.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



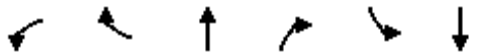
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	100	3	185	32	736	108	216	865	41	34	3	46
Future Volume (vph)	100	3	185	32	736	108	216	865	41	34	3	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	10	12	9	12	11	9	9	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2			4.0	
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	1.00	0.95			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.94	1.00	0.98			0.75	
Flpb, ped/bikes	0.72	1.00		1.00	1.00	1.00	1.00	1.00			1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	0.99			0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (prot)	1101	1414		1524	3386	1378	1524	2977			1205	
Flt Permitted	0.70	1.00		0.95	1.00	1.00	0.95	1.00			0.98	
Satd. Flow (perm)	815	1414		1524	3386	1378	1524	2977			1205	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	100	3	185	32	736	108	216	865	41	34	3	46
RTOR Reduction (vph)	0	156	0	0	0	60	0	2	0	0	79	0
Lane Group Flow (vph)	100	32	0	32	736	48	216	904	0	0	4	0
Confl. Peds. (#/hr)	190					18			158			190
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA		Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2						
Actuated Green, G (s)	17.5	17.5		5.1	41.0	41.0	28.8	64.7			6.4	
Effective Green, g (s)	17.5	17.5		4.6	41.5	41.5	28.3	65.2			5.9	
Actuated g/C Ratio	0.16	0.16		0.04	0.38	0.38	0.26	0.59			0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7			3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5			2.0	
Lane Grp Cap (vph)	129	224		63	1277	519	392	1764			64	
v/s Ratio Prot		0.02		0.02	c0.22		0.14	c0.30			c0.00	
v/s Ratio Perm	c0.12					0.03						
v/c Ratio	0.78	0.14		0.51	0.58	0.09	0.55	0.51			0.07	
Uniform Delay, d1	44.4	39.8		51.6	27.3	22.1	35.4	13.1			49.4	
Progression Factor	1.00	1.00		0.69	0.67	0.83	1.00	1.00			1.00	
Incremental Delay, d2	22.8	0.1		2.2	1.8	0.3	1.0	1.1			0.2	
Delay (s)	67.1	39.9		37.6	19.9	18.6	36.3	14.2			49.6	
Level of Service	E	D		D	B	B	D	B			D	
Approach Delay (s)	49.4				20.4			18.4			49.6	
Approach LOS	D				C			B			D	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	141	735	129	84	927
Future Volume (vph)	123	141	735	129	84	927
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	11	11	11	12	9	11
Total Lost time (s)	4.0	4.0	4.2		4.0	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1637	1464	3128		1524	3221
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1637	1464	3128		1524	3221
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	123	141	735	129	84	927
RTOR Reduction (vph)	0	116	8	0	0	0
Lane Group Flow (vph)	123	25	856	0	84	927
Confl. Peds. (#/hr)	65			52		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2			
Actuated Green, G (s)	19.7	19.7	69.3		9.3	82.1
Effective Green, g (s)	19.2	19.2	69.8		8.8	82.6
Actuated g/C Ratio	0.17	0.17	0.63		0.08	0.75
Clearance Time (s)	3.5	3.5	4.7		3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5		2.0	2.5
Lane Grp Cap (vph)	285	255	1984		121	2418
v/s Ratio Prot	c0.08		c0.27		c0.06	0.29
v/s Ratio Perm		0.02				
v/c Ratio	0.43	0.10	0.43		0.69	0.38
Uniform Delay, d1	40.5	38.1	10.1		49.3	4.8
Progression Factor	1.00	1.00	0.48		0.73	2.54
Incremental Delay, d2	0.4	0.1	0.7		11.5	0.4
Delay (s)	40.9	38.2	5.5		47.4	12.6
Level of Service	D	D	A		D	B
Approach Delay (s)	39.5		5.5			15.5
Approach LOS	D		A			B

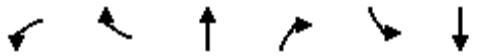
Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	175	209	655	0	0	1050
Future Volume (vph)	175	209	655	0	0	1050
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	11	12	12	10
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	0.95			0.95
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1750	1565	3273			3160
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1750	1565	3273			3160
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	209	655	0	0	1050
RTOR Reduction (vph)	0	72	0	0	0	0
Lane Group Flow (vph)	175	137	655	0	0	1050
Confl. Peds. (#/hr)				28		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	11.1	11.1	34.6			34.6
Effective Green, g (s)	10.6	10.6	35.1			35.1
Actuated g/C Ratio	0.19	0.19	0.64			0.64
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	337	301	2088			2016
v/s Ratio Prot	c0.10		0.20			c0.33
v/s Ratio Perm		0.09				
v/c Ratio	0.52	0.46	0.31			0.52
Uniform Delay, d1	19.9	19.6	4.5			5.4
Progression Factor	1.00	1.00	1.42			0.77
Incremental Delay, d2	1.0	0.8	0.4			0.9
Delay (s)	20.9	20.4	6.8			5.1
Level of Service	C	C	A			A
Approach Delay (s)	20.7		6.8			5.1
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

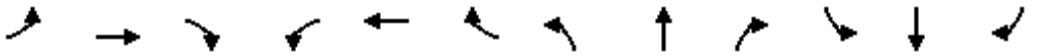


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	43	612	190	230	995
Future Volume (vph)	49	43	612	190	230	995
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1565	3008		1524	3160
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1750	1565	3008		1524	3160
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	43	612	190	230	995
RTOR Reduction (vph)	0	29	14	0	0	0
Lane Group Flow (vph)	49	14	788	0	230	995
Confl. Peds. (#/hr)	9			30		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	10.7	35.6	66.7		21.3	91.0
Effective Green, g (s)	10.2	35.1	67.2		20.8	91.5
Actuated g/C Ratio	0.09	0.32	0.61		0.19	0.83
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	162	499	1837		288	2628
v/s Ratio Prot	c0.03	0.01	c0.26		c0.15	0.31
v/s Ratio Perm						
v/c Ratio	0.30	0.03	0.43		0.80	0.38
Uniform Delay, d1	46.6	25.7	11.3		42.6	2.3
Progression Factor	1.00	1.00	1.00		0.95	1.21
Incremental Delay, d2	1.3	0.0	0.7		12.1	0.4
Delay (s)	47.9	25.8	12.0		52.7	3.1
Level of Service	D	C	B		D	A
Approach Delay (s)	37.5		12.0			12.4
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	56.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G-2:
Scenario 2 HCM 2000 Intersection Results

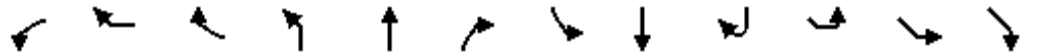
FEHR PEERS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	245	21	0	73	0	287	23	0	57	0
Future Volume (vph)	25	30	245	21	0	73	0	287	23	0	57	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3278	2175	1565		1350		1588	1481		3129	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3278	2175	1565		1350		1588	1481		3129	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	30	245	21	0	73	0	287	23	0	57	0
RTOR Reduction (vph)	0	0	0	0	0	68	0	0	11	0	0	0
Lane Group Flow (vph)	0	55	245	21	0	5	0	287	12	0	57	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		16.8	29.4	8.0		8.0		62.3	62.3		50.5	
Effective Green, g (s)		15.8	28.4	7.5		7.5		61.8	62.3		50.0	
Actuated g/C Ratio		0.13	0.24	0.06		0.06		0.51	0.52		0.42	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		431	514	97		84		817	768		1303	
v/s Ratio Prot		0.02	c0.11	c0.01				c0.18			0.02	
v/s Ratio Perm						0.00			0.01			
v/c Ratio		0.13	0.48	0.22		0.05		0.35	0.02		0.04	
Uniform Delay, d1		46.0	39.4	53.5		52.9		17.2	14.0		20.8	
Progression Factor		0.94	0.96	1.00		1.00		1.00	1.00		0.67	
Incremental Delay, d2		0.1	0.5	0.8		0.2		1.2	0.0		0.1	
Delay (s)		43.5	38.2	54.3		53.1		18.4	14.0		14.0	
Level of Service		D	D	D		D		B	B		B	
Approach Delay (s)		39.1			53.4			18.1			14.0	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	15	2	10	9	256	26	16	280	27	44	2	16
Future Volume (vph)	15	2	10	9	256	26	16	280	27	44	2	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	5.2	5.2	4.0	5.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.96		0.97	
Flpb, ped/bikes	0.89	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1339	1450		1509	1588	1426	1509	1647	1433		1590	
Flt Permitted	0.82	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	1151	1450		1509	1588	1426	1509	1647	1433		1590	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	2	10	9	256	26	16	280	27	44	2	16
RTOR Reduction (vph)	0	11	0	0	0	10	0	0	10	0	57	0
Lane Group Flow (vph)	15	1	0	9	256	16	16	280	17	0	5	0
Confl. Peds. (#/hr)	15		1			5			12	1		15
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	4.9	4.9		1.6	50.4	50.4	2.0	50.8	50.8		6.4	
Effective Green, g (s)	4.9	4.9		1.1	49.9	49.9	1.5	50.3	50.8		5.9	
Actuated g/C Ratio	0.06	0.06		0.01	0.62	0.62	0.02	0.63	0.63		0.07	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	70	88		20	990	889	28	1035	909		117	
v/s Ratio Prot		0.00		0.01	0.16		c0.01	c0.17			c0.00	
v/s Ratio Perm	c0.01					0.01			0.01			
v/c Ratio	0.21	0.01		0.45	0.26	0.02	0.57	0.27	0.02		0.04	
Uniform Delay, d1	35.7	35.3		39.1	6.8	5.7	38.9	6.6	5.4		34.4	
Progression Factor	1.00	1.00		1.35	0.25	1.00	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.6	0.0		5.7	0.6	0.0	16.3	0.6	0.0		0.1	
Delay (s)	36.3	35.3		58.7	2.3	5.8	55.2	7.3	5.4		34.5	
Level of Service	D	D		E	A	A	E	A	A		C	
Approach Delay (s)	35.8				4.4			9.5			34.5	
Approach LOS	D				A			A			C	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

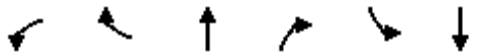
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	4	287	2	2	309
Future Volume (vph)	0	4	287	2	2	309
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)		4.0	5.2	4.7	4.0	5.2
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00	0.95	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1400	1647	1432	1509	1594
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1400	1647	1432	1509	1594
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4	287	2	2	309
RTOR Reduction (vph)	0	4	0	0	0	0
Lane Group Flow (vph)	0	0	287	2	2	309
Confl. Peds. (#/hr)	14			10		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8		2		
Actuated Green, G (s)		5.2	61.5	61.5	1.6	66.6
Effective Green, g (s)		4.7	61.0	61.5	1.1	66.1
Actuated g/C Ratio		0.06	0.76	0.77	0.01	0.83
Clearance Time (s)		3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)		2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)		82	1255	1100	20	1317
v/s Ratio Prot			0.17		0.00	c0.19
v/s Ratio Perm		c0.00		0.00		
v/c Ratio		0.00	0.23	0.00	0.10	0.23
Uniform Delay, d1		35.4	2.7	2.1	39.0	1.5
Progression Factor		1.00	0.79	1.00	1.13	0.54
Incremental Delay, d2		0.0	0.4	0.0	0.8	0.4
Delay (s)		35.4	2.6	2.1	44.8	1.2
Level of Service		D	A	A	D	A
Approach Delay (s)	35.4		2.6			1.5
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	2.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

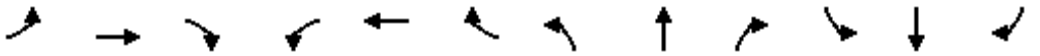
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	2	287	0	0	309
Future Volume (vph)	4	2	287	0	0	309
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	5.2			5.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	1647			1588
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	1647			1588
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	2	287	0	0	309
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	4	0	287	0	0	309
Confl. Peds. (#/hr)				5		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	1.8	1.8	28.9			28.9
Effective Green, g (s)	1.3	1.3	28.4			28.4
Actuated g/C Ratio	0.03	0.03	0.71			0.71
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	56	50	1169			1127
v/s Ratio Prot	c0.00		0.17			c0.19
v/s Ratio Perm		0.00				
v/c Ratio	0.07	0.00	0.25			0.27
Uniform Delay, d1	18.8	18.7	2.0			2.1
Progression Factor	1.00	1.00	0.51			0.63
Incremental Delay, d2	0.4	0.0	0.5			0.6
Delay (s)	19.2	18.7	1.5			1.9
Level of Service	B	B	A			A
Approach Delay (s)	19.0		1.5			1.9
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	1.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	1	286	20	11	302
Future Volume (vph)	2	1	286	20	11	302
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	5.2		3.5	5.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1500	1630		1509	1647
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1500	1630		1509	1647
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	1	286	20	11	302
RTOR Reduction (vph)	0	1	1	0	0	0
Lane Group Flow (vph)	2	0	305	0	11	302
Confl. Peds. (#/hr)				4		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	1.8	7.2	65.1		1.8	69.9
Effective Green, g (s)	1.3	6.7	64.6		1.3	69.4
Actuated g/C Ratio	0.02	0.08	0.81		0.02	0.87
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	28	125	1316		24	1428
v/s Ratio Prot	c0.00	0.00	c0.19		c0.01	0.18
v/s Ratio Perm						
v/c Ratio	0.07	0.00	0.23		0.46	0.21
Uniform Delay, d1	38.8	33.6	1.8		39.0	0.9
Progression Factor	1.00	1.00	1.00		1.00	0.04
Incremental Delay, d2	1.3	0.0	0.4		4.9	0.3
Delay (s)	40.1	33.6	2.2		43.8	0.4
Level of Service	D	C	A		D	A
Approach Delay (s)	37.9		2.2			1.9
Approach LOS	D		A			A

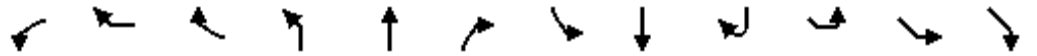
Intersection Summary			
HCM 2000 Control Delay	2.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	154	578	26	0	89	0	518	28	0	76	0
Future Volume (vph)	87	154	578	26	0	89	0	518	28	0	76	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3293	2175	1565		1350		1588	1480		3129	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3293	2175	1565		1350		1588	1480		3129	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	154	578	26	0	89	0	518	28	0	76	0
RTOR Reduction (vph)	0	0	0	0	0	82	0	0	18	0	0	0
Lane Group Flow (vph)	0	241	578	26	0	7	0	518	10	0	76	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		32.4	40.0	10.1		10.1		44.6	44.6		37.8	
Effective Green, g (s)		31.4	39.0	9.6		9.6		44.1	44.6		37.3	
Actuated g/C Ratio		0.26	0.32	0.08		0.08		0.37	0.37		0.31	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		861	706	125		108		583	550		972	
v/s Ratio Prot		0.07	c0.27	c0.02				c0.33			0.02	
v/s Ratio Perm						0.01			0.01			
v/c Ratio		0.28	0.82	0.21		0.07		0.89	0.02		0.08	
Uniform Delay, d1		35.3	37.2	51.6		51.1		35.6	23.9		29.2	
Progression Factor		0.91	0.91	1.00		1.00		1.00	1.00		0.48	
Incremental Delay, d2		0.1	6.9	0.6		0.2		18.1	0.1		0.2	
Delay (s)		32.2	40.7	52.2		51.2		53.7	23.9		14.2	
Level of Service		C	D	D		D		D	C		B	
Approach Delay (s)		38.2			51.5			52.2			14.2	
Approach LOS		D			D			D			B	

Intersection Summary			
HCM 2000 Control Delay	42.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	74	4	80	11	449	61	97	565	18	17	1	16
Future Volume (vph)	74	4	80	11	449	61	97	565	18	17	1	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	5.2	5.2	4.0	5.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96	1.00	1.00	0.90		0.74	
Flpb, ped/bikes	0.77	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1168	1450		1509	1588	1398	1509	1647	1343		1197	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	904	1450		1509	1588	1398	1509	1647	1343		1197	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	74	4	80	11	449	61	97	565	18	17	1	16
RTOR Reduction (vph)	0	71	0	0	0	32	0	0	8	0	32	0
Lane Group Flow (vph)	74	13	0	11	449	29	97	565	10	0	2	0
Confl. Peds. (#/hr)	71		3			25			50	3		71
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	12.0	12.0		1.6	38.9	38.9	8.0	45.3	45.3		4.8	
Effective Green, g (s)	12.0	12.0		1.1	38.4	38.4	7.5	44.8	45.3		4.3	
Actuated g/C Ratio	0.15	0.15		0.01	0.48	0.48	0.09	0.56	0.57		0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	135	217		20	762	671	141	922	760		64	
v/s Ratio Prot		0.01		0.01	0.28		c0.06	c0.34			c0.00	
v/s Ratio Perm	c0.08					0.02			0.01			
v/c Ratio	0.55	0.06		0.55	0.59	0.04	0.69	0.61	0.01		0.03	
Uniform Delay, d1	31.5	29.2		39.2	15.1	11.0	35.1	11.8	7.6		35.9	
Progression Factor	1.00	1.00		1.38	0.48	2.13	1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.4	0.0		16.0	3.1	0.1	10.6	3.0	0.0		0.1	
Delay (s)	33.9	29.2		70.0	10.4	23.6	45.7	14.8	7.6		35.9	
Level of Service	C	C		E	B	C	D	B	A		D	
Approach Delay (s)	31.4				13.2			19.0			35.9	
Approach LOS	C				B			B			D	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

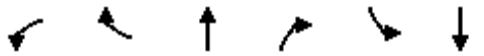
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	46	475	62	46	609
Future Volume (vph)	44	46	475	62	46	609
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	5.2	4.7	4.0	5.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1565	1400	1647	1411	1509	1594
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1565	1400	1647	1411	1509	1594
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	46	475	62	46	609
RTOR Reduction (vph)	0	38	0	19	0	0
Lane Group Flow (vph)	44	8	475	43	46	609
Confl. Peds. (#/hr)	20			17		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	14.4	14.4	48.9	48.9	5.0	57.4
Effective Green, g (s)	13.9	13.9	48.4	48.9	4.5	56.9
Actuated g/C Ratio	0.17	0.17	0.60	0.61	0.06	0.71
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	271	243	996	862	84	1133
v/s Ratio Prot	c0.03		0.29		0.03	c0.38
v/s Ratio Perm		0.01		0.03		
v/c Ratio	0.16	0.03	0.48	0.05	0.55	0.54
Uniform Delay, d1	28.1	27.5	8.8	6.2	36.8	5.4
Progression Factor	1.00	1.00	0.71	0.73	1.20	0.82
Incremental Delay, d2	0.1	0.0	1.6	0.1	3.4	1.6
Delay (s)	28.2	27.5	7.8	4.7	47.5	6.0
Level of Service	C	C	A	A	D	A
Approach Delay (s)	27.8		7.5			8.9
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

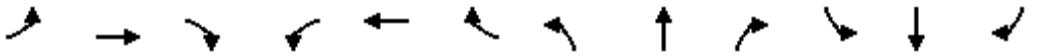
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	87	450	0	0	653
Future Volume (vph)	67	87	450	0	0	653
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	5.2			5.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	1647			1588
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	1647			1588
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	87	450	0	0	653
RTOR Reduction (vph)	0	76	0	0	0	0
Lane Group Flow (vph)	67	11	450	0	0	653
Confl. Peds. (#/hr)				11		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	5.4	5.4	25.3			25.3
Effective Green, g (s)	4.9	4.9	24.8			24.8
Actuated g/C Ratio	0.12	0.12	0.62			0.62
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	212	189	1021			984
v/s Ratio Prot	c0.04		0.27			c0.41
v/s Ratio Perm		0.01				
v/c Ratio	0.32	0.06	0.44			0.66
Uniform Delay, d1	16.0	15.5	4.0			4.9
Progression Factor	1.00	1.00	1.46			1.15
Incremental Delay, d2	0.6	0.1	1.2			3.1
Delay (s)	16.6	15.6	7.0			8.8
Level of Service	B	B	A			A
Approach Delay (s)	16.1		7.0			8.8
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	20	430	78	160	560
Future Volume (vph)	26	20	430	78	160	560
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	5.2		3.5	5.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1500	1605		1509	1647
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1500	1605		1509	1647
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	20	430	78	160	560
RTOR Reduction (vph)	0	14	5	0	0	0
Lane Group Flow (vph)	26	6	503	0	160	560
Confl. Peds. (#/hr)	2			14		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6	24.5	47.8		12.3	63.1
Effective Green, g (s)	8.1	24.0	47.3		11.8	62.6
Actuated g/C Ratio	0.10	0.30	0.59		0.15	0.78
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	175	450	948		222	1288
v/s Ratio Prot	c0.02	0.00	c0.31		c0.11	0.34
v/s Ratio Perm						
v/c Ratio	0.15	0.01	0.53		0.72	0.43
Uniform Delay, d1	32.8	19.7	9.7		32.5	2.9
Progression Factor	1.00	1.00	1.00		0.95	0.63
Incremental Delay, d2	0.5	0.0	2.1		8.1	0.9
Delay (s)	33.3	19.7	11.9		39.0	2.7
Level of Service	C	B	B		D	A
Approach Delay (s)	27.4		11.9			10.8
Approach LOS	C		B			B

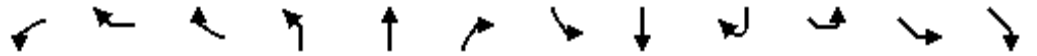
Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	57.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	220	587	57	0	118	0	656	48	0	175	0
Future Volume (vph)	73	220	587	57	0	118	0	656	48	0	175	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.6	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.99	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3312	2175	1565		1350		1588	1480		3129	
Flt Permitted		0.99	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3312	2175	1565		1350		1588	1480		3129	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	220	587	57	0	118	0	656	48	0	175	0
RTOR Reduction (vph)	0	0	0	0	0	108	0	0	27	0	0	0
Lane Group Flow (vph)	0	293	587	57	0	10	0	656	21	0	175	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		24.0	44.6	10.8		10.8		52.3	52.3		32.4	
Effective Green, g (s)		23.0	43.6	10.3		10.3		51.8	52.3		31.9	
Actuated g/C Ratio		0.19	0.36	0.09		0.09		0.43	0.44		0.27	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.1	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		634	790	134		115		685	645		831	
v/s Ratio Prot		0.09	c0.27	c0.04				c0.41			0.06	
v/s Ratio Perm						0.01			0.01			
v/c Ratio		0.46	0.74	0.43		0.09		0.96	0.03		0.21	
Uniform Delay, d1		43.0	33.3	52.0		50.5		33.0	19.4		34.3	
Progression Factor		1.01	0.90	1.00		1.00		1.00	1.00		0.32	
Incremental Delay, d2		0.4	3.4	1.6		0.2		25.4	0.1		0.6	
Delay (s)		43.8	33.5	53.6		50.8		58.5	19.5		11.7	
Level of Service		D	C	D		D		E	B		B	
Approach Delay (s)		36.9			51.7			55.8			11.7	
Approach LOS		D			D			E			B	

Intersection Summary			
HCM 2000 Control Delay	42.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	82	3	91	17	597	140	120	670	29	16	5	15
Future Volume (vph)	82	3	91	17	597	140	120	670	29	16	5	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.89		0.77	
Flpb, ped/bikes	0.78	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1177	1450		1509	1588	1401	1509	1647	1339		1252	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	909	1450		1509	1588	1401	1509	1647	1339		1252	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	82	3	91	17	597	140	120	670	29	16	5	15
RTOR Reduction (vph)	0	80	0	0	0	61	0	0	13	0	34	0
Lane Group Flow (vph)	82	14	0	17	597	79	120	670	16	0	2	0
Confl. Peds. (#/hr)	70		11			23			52	11		70
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	12.1	12.1		1.6	37.5	37.5	9.3	45.2	45.2		4.8	
Effective Green, g (s)	12.1	12.1		1.1	38.0	38.0	8.8	45.7	45.2		4.3	
Actuated g/C Ratio	0.15	0.15		0.01	0.48	0.48	0.11	0.57	0.57		0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	137	219		20	754	665	165	940	756		67	
v/s Ratio Prot		0.01		0.01	c0.38		c0.08	0.41			c0.00	
v/s Ratio Perm	c0.09					0.06			0.01			
v/c Ratio	0.60	0.06		0.85	0.79	0.12	0.73	0.71	0.02		0.03	
Uniform Delay, d1	31.7	29.1		39.4	17.7	11.7	34.4	12.4	7.7		35.9	
Progression Factor	1.00	1.00		1.29	0.78	1.06	1.00	1.00	1.00		1.00	
Incremental Delay, d2	4.6	0.0		108.3	6.6	0.3	12.7	4.6	0.1		0.1	
Delay (s)	36.3	29.1		159.0	20.4	12.7	47.1	17.0	7.7		35.9	
Level of Service	D	C		F	C	B	D	B	A		D	
Approach Delay (s)	32.5				22.1			21.1			35.9	
Approach LOS	C				C			C			D	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

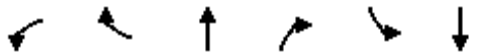
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	58	43	711	121	38	729
Future Volume (vph)	58	43	711	121	38	729
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1565	1400	1647	1408	1509	1594
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1565	1400	1647	1408	1509	1594
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	43	711	121	38	729
RTOR Reduction (vph)	0	36	0	24	0	0
Lane Group Flow (vph)	58	7	711	97	38	729
Confl. Peds. (#/hr)	24			18		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	14.4	14.4	48.9	48.9	5.0	57.4
Effective Green, g (s)	13.9	13.9	49.4	48.9	4.5	57.9
Actuated g/C Ratio	0.17	0.17	0.62	0.61	0.06	0.72
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	271	243	1017	860	84	1153
v/s Ratio Prot	c0.04		c0.43		0.03	c0.46
v/s Ratio Perm		0.01		0.07		
v/c Ratio	0.21	0.03	0.70	0.11	0.45	0.63
Uniform Delay, d1	28.4	27.5	10.3	6.5	36.6	5.6
Progression Factor	1.00	1.00	0.75	0.71	1.26	0.70
Incremental Delay, d2	0.1	0.0	3.3	0.2	1.1	2.1
Delay (s)	28.5	27.5	10.9	4.8	47.2	6.1
Level of Service	C	C	B	A	D	A
Approach Delay (s)	28.1		10.0			8.1
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	10.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

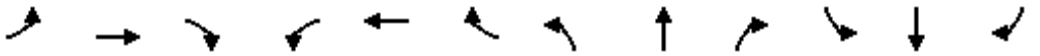
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	64	73	759	0	0	787
Future Volume (vph)	64	73	759	0	0	787
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	1647			1588
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	1647			1588
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	64	73	759	0	0	787
RTOR Reduction (vph)	0	64	0	0	0	0
Lane Group Flow (vph)	64	9	759	0	0	787
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	5.4	5.4	25.3			25.3
Effective Green, g (s)	4.9	4.9	25.8			25.8
Actuated g/C Ratio	0.12	0.12	0.65			0.65
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	212	189	1062			1024
v/s Ratio Prot	c0.04		0.46			c0.50
v/s Ratio Perm		0.01				
v/c Ratio	0.30	0.05	0.71			0.77
Uniform Delay, d1	16.0	15.5	4.7			5.0
Progression Factor	1.00	1.00	1.83			1.06
Incremental Delay, d2	0.6	0.1	2.8			4.6
Delay (s)	16.6	15.6	11.3			9.9
Level of Service	B	B	B			A
Approach Delay (s)	16.0		11.3			9.9
Approach LOS	B		B			A

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	17	18	741	91	87	764
Future Volume (vph)	17	18	741	91	87	764
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1500	1616		1509	1647
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1500	1616		1509	1647
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	18	741	91	87	764
RTOR Reduction (vph)	0	14	3	0	0	0
Lane Group Flow (vph)	17	5	829	0	87	764
Confl. Peds. (#/hr)	2			19		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6	20.5	51.8		8.3	63.1
Effective Green, g (s)	8.1	20.0	52.3		7.8	63.6
Actuated g/C Ratio	0.10	0.25	0.65		0.10	0.80
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	175	375	1056		147	1309
v/s Ratio Prot	c0.01	0.00	c0.51		0.06	c0.46
v/s Ratio Perm						
v/c Ratio	0.10	0.01	0.78		0.59	0.58
Uniform Delay, d1	32.6	22.6	9.9		34.6	3.1
Progression Factor	1.00	1.00	1.00		1.00	0.57
Incremental Delay, d2	0.3	0.0	5.9		3.2	1.5
Delay (s)	32.9	22.6	15.7		38.0	3.3
Level of Service	C	C	B		D	A
Approach Delay (s)	27.6		15.7			6.8
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	229	842	71	0	129	0	789	100	0	176	0
Future Volume (vph)	107	229	842	71	0	129	0	789	100	0	176	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3333	2197	1580		1363		1604	1495		3160	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3333	2197	1580		1363		1604	1495		3160	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	229	842	71	0	129	0	789	100	0	176	0
RTOR Reduction (vph)	0	0	0	0	0	118	0	0	44	0	0	0
Lane Group Flow (vph)	0	336	842	71	0	11	0	789	56	0	176	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		31.5	52.1	11.0		11.0		44.6	44.6		24.8	
Effective Green, g (s)		30.5	51.1	10.5		10.5		44.1	44.6		24.3	
Actuated g/C Ratio		0.25	0.43	0.09		0.09		0.37	0.37		0.20	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		847	935	138		119		589	555		639	
v/s Ratio Prot		0.10	c0.38	c0.04				c0.49			0.06	
v/s Ratio Perm						0.01			0.04			
v/c Ratio		0.40	0.90	0.51		0.09		1.34	0.10		0.28	
Uniform Delay, d1		37.1	32.1	52.3		50.4		37.9	24.6		40.4	
Progression Factor		1.03	0.89	1.00		1.00		0.72	0.90		0.32	
Incremental Delay, d2		0.2	10.5	2.4		0.3		159.1	0.2		1.0	
Delay (s)		38.3	39.0	54.7		50.6		186.5	22.2		14.2	
Level of Service		D	D	D		D		F	C		B	
Approach Delay (s)		38.8			52.1			168.0			14.2	
Approach LOS		D			D			F			B	

Intersection Summary			
HCM 2000 Control Delay	85.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

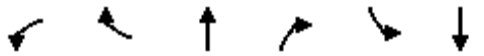
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	99	3	119	12	738	126	189	865	35	32	3	11
Future Volume (vph)	99	3	119	12	738	126	189	865	35	32	3	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96	1.00	1.00	0.69		0.83	
Flpb, ped/bikes	0.62	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	951	1464		1524	1604	1401	1524	1663	1047		1377	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	728	1464		1524	1604	1401	1524	1663	1047		1377	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	3	119	12	738	126	189	865	35	32	3	11
RTOR Reduction (vph)	0	99	0	0	0	47	0	0	14	0	44	0
Lane Group Flow (vph)	99	23	0	12	738	79	189	865	21	0	2	0
Confl. Peds. (#/hr)	151					22			121			151
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	22.6	22.6		3.2	56.1	56.1	18.6	71.5	71.5		6.4	
Effective Green, g (s)	22.6	22.6		2.7	56.6	56.6	18.1	72.0	71.5		5.9	
Actuated g/C Ratio	0.19	0.19		0.02	0.47	0.47	0.15	0.60	0.60		0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	137	275		34	756	660	229	997	623		67	
v/s Ratio Prot		0.02		0.01	c0.46		0.12	c0.52			c0.00	
v/s Ratio Perm	c0.14					0.06			0.02			
v/c Ratio	0.72	0.08		0.35	0.98	0.12	0.83	0.87	0.03		0.03	
Uniform Delay, d1	45.8	40.2		57.8	31.0	17.8	49.4	20.0	10.0		54.3	
Progression Factor	1.00	1.00		1.29	0.71	1.24	0.80	0.53	1.00		1.00	
Incremental Delay, d2	14.7	0.0		1.7	23.0	0.3	13.0	6.4	0.1		0.1	
Delay (s)	60.5	40.2		76.5	45.1	22.3	52.7	17.1	10.1		54.4	
Level of Service	E	D		E	D	C	D	B	B		D	
Approach Delay (s)	49.3				42.2			23.1			54.4	
Approach LOS	D				D			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	99	107	769	177	92	883
Future Volume (vph)	99	107	769	177	92	883
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.90	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1580	1414	1663	1369	1524	1610
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1580	1414	1663	1369	1524	1610
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	107	769	177	92	883
RTOR Reduction (vph)	0	90	0	28	0	0
Lane Group Flow (vph)	99	17	769	149	92	883
Confl. Peds. (#/hr)	41			26		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	19.6	19.6	77.0	77.0	11.7	92.2
Effective Green, g (s)	19.1	19.1	77.5	77.0	11.2	92.7
Actuated g/C Ratio	0.16	0.16	0.65	0.64	0.09	0.77
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	251	225	1074	878	142	1243
v/s Ratio Prot	c0.06		0.46		0.06	c0.55
v/s Ratio Perm		0.01		0.11		
v/c Ratio	0.39	0.08	0.72	0.17	0.65	0.71
Uniform Delay, d1	45.3	42.9	14.0	8.6	52.5	6.9
Progression Factor	1.00	1.00	0.69	0.55	1.11	0.53
Incremental Delay, d2	0.4	0.1	3.2	0.3	4.0	1.9
Delay (s)	45.6	43.0	12.9	5.1	62.4	5.5
Level of Service	D	D	B	A	E	A
Approach Delay (s)	44.3		11.5			10.9
Approach LOS	D		B			B

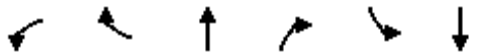
Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



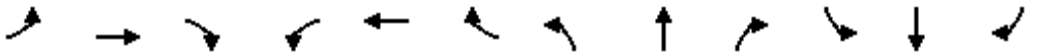
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	192	754	0	0	982
Future Volume (vph)	155	192	754	0	0	982
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1750	1565	1663			1604
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1750	1565	1663			1604
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	155	192	754	0	0	982
RTOR Reduction (vph)	0	161	0	0	0	0
Lane Group Flow (vph)	155	31	754	0	0	982
Confl. Peds. (#/hr)				35		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	10.2	10.2	40.5			40.5
Effective Green, g (s)	9.7	9.7	41.0			41.0
Actuated g/C Ratio	0.16	0.16	0.68			0.68
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	282	253	1136			1096
v/s Ratio Prot	c0.09		0.45			c0.61
v/s Ratio Perm		0.02				
v/c Ratio	0.55	0.12	0.66			0.90
Uniform Delay, d1	23.1	21.5	5.5			7.8
Progression Factor	1.00	1.00	1.23			1.48
Incremental Delay, d2	1.7	0.2	0.3			8.8
Delay (s)	24.9	21.7	7.1			20.3
Level of Service	C	C	A			C
Approach Delay (s)	23.1		7.1			20.3
Approach LOS	C		A			C

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	690	259	319	818
Future Volume (vph)	34	64	690	259	319	818
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1515	1566		1524	1663
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1750	1515	1566		1524	1663
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	64	690	259	319	818
RTOR Reduction (vph)	0	38	11	0	0	0
Lane Group Flow (vph)	34	26	938	0	319	818
Confl. Peds. (#/hr)	6			47		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	10.5	49.1	63.2		35.0	101.2
Effective Green, g (s)	10.0	48.6	63.7		34.5	101.7
Actuated g/C Ratio	0.08	0.41	0.53		0.29	0.85
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	145	613	831		438	1409
v/s Ratio Prot	c0.02	0.02	c0.60		c0.21	0.49
v/s Ratio Perm						
v/c Ratio	0.23	0.04	1.13		0.73	0.58
Uniform Delay, d1	51.4	21.6	28.1		38.5	2.7
Progression Factor	1.00	1.00	1.00		0.90	0.63
Incremental Delay, d2	1.0	0.0	73.1		2.7	0.9
Delay (s)	52.4	21.6	101.3		37.4	2.6
Level of Service	D	C	F		D	A
Approach Delay (s)	32.3		101.3			12.4
Approach LOS	C		F			B

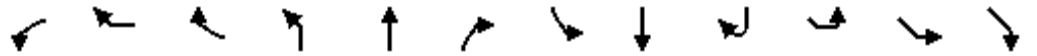
Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	265	812	91	0	193	0	860	95	0	219	0
Future Volume (vph)	118	265	812	91	0	193	0	860	95	0	219	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3335	2197	1580		1363		1604	1495		3160	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3335	2197	1580		1363		1604	1495		3160	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	265	812	91	0	193	0	860	95	0	219	0
RTOR Reduction (vph)	0	0	0	0	0	173	0	0	52	0	0	0
Lane Group Flow (vph)	0	383	812	91	0	20	0	860	43	0	219	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		31.2	51.8	11.8		11.8		34.1	34.1		14.3	
Effective Green, g (s)		30.2	50.8	11.3		11.3		33.6	34.1		13.8	
Actuated g/C Ratio		0.27	0.46	0.10		0.10		0.31	0.31		0.13	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		915	1014	162		140		489	463		396	
v/s Ratio Prot		0.11	c0.37	c0.06				c0.54			0.07	
v/s Ratio Perm						0.01			0.03			
v/c Ratio		0.42	0.80	0.56		0.14		1.76	0.09		0.55	
Uniform Delay, d1		32.7	25.3	47.0		44.9		38.2	27.0		45.2	
Progression Factor		1.05	0.86	1.00		1.00		1.22	2.27		0.44	
Incremental Delay, d2		0.2	3.9	3.6		0.3		345.1	0.2		5.2	
Delay (s)		34.5	25.6	50.6		45.3		391.8	61.5		25.2	
Level of Service		C	C	D		D		F	E		C	
Approach Delay (s)		28.5			47.0			359.0			25.2	
Approach LOS		C			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	149.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



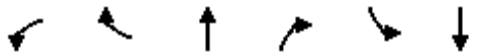
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	100	3	185	32	736	108	216	865	41	34	3	46
Future Volume (vph)	100	3	185	32	736	108	216	865	41	34	3	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.96	1.00	1.00	0.63		0.58	
Flpb, ped/bikes	0.78	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1182	1464		1524	1604	1413	1524	1663	962		933	
Flt Permitted	0.41	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.98	
Satd. Flow (perm)	512	1464		1524	1604	1413	1524	1663	962		933	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	100	3	185	32	736	108	216	865	41	34	3	46
RTOR Reduction (vph)	0	151	0	0	0	61	0	0	18	0	79	0
Lane Group Flow (vph)	100	37	0	32	736	47	216	865	23	0	4	0
Confl. Peds. (#/hr)	190					18			158			190
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	20.2	20.2		6.7	47.0	47.0	20.1	60.4	60.4		6.4	
Effective Green, g (s)	20.2	20.2		6.2	47.5	47.5	19.6	60.9	60.4		5.9	
Actuated g/C Ratio	0.18	0.18		0.06	0.43	0.43	0.18	0.55	0.55		0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	94	268		85	692	610	271	920	528		50	
v/s Ratio Prot		0.03		0.02	c0.46		c0.14	c0.52			c0.00	
v/s Ratio Perm	c0.20					0.03			0.02			
v/c Ratio	1.06	0.14		0.38	1.06	0.08	0.80	0.94	0.04		0.09	
Uniform Delay, d1	44.9	37.6		50.0	31.2	18.4	43.3	22.9	11.5		49.5	
Progression Factor	1.00	1.00		0.80	0.67	0.63	0.97	0.51	0.00		1.00	
Incremental Delay, d2	111.2	0.1		0.8	48.4	0.2	9.8	13.7	0.1		0.3	
Delay (s)	156.1	37.7		40.8	69.4	11.8	51.7	25.3	0.1		49.8	
Level of Service	F	D		D	E	B	D	C	A		D	
Approach Delay (s)	78.8				61.2			29.4			49.8	
Approach LOS	E				E			C			D	

Intersection Summary			
HCM 2000 Control Delay	47.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	141	735	129	84	927
Future Volume (vph)	123	141	735	129	84	927
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.85	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1580	1414	1663	1286	1524	1610
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1580	1414	1663	1286	1524	1610
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	123	141	735	129	84	927
RTOR Reduction (vph)	0	116	0	23	0	0
Lane Group Flow (vph)	123	25	735	106	84	927
Confl. Peds. (#/hr)	65			52		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	19.7	19.7	68.6	68.6	10.0	82.1
Effective Green, g (s)	19.2	19.2	69.1	68.6	9.5	82.6
Actuated g/C Ratio	0.17	0.17	0.63	0.62	0.09	0.75
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	275	246	1044	801	131	1208
v/s Ratio Prot	c0.08		0.44		0.06	c0.58
v/s Ratio Perm		0.02		0.08		
v/c Ratio	0.45	0.10	0.70	0.13	0.64	0.77
Uniform Delay, d1	40.6	38.1	13.6	8.5	48.6	8.1
Progression Factor	1.00	1.00	0.74	0.80	0.63	0.44
Incremental Delay, d2	0.4	0.1	3.3	0.3	3.3	2.0
Delay (s)	41.1	38.2	13.4	7.1	33.7	5.6
Level of Service	D	D	B	A	C	A
Approach Delay (s)	39.5		12.5			7.9
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



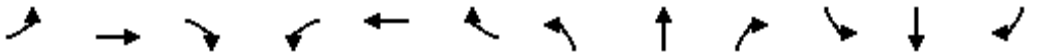
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	175	209	655	0	0	1050
Future Volume (vph)	175	209	655	0	0	1050
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1750	1565	1663			1604
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1750	1565	1663			1604
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	209	655	0	0	1050
RTOR Reduction (vph)	0	171	0	0	0	0
Lane Group Flow (vph)	175	38	655	0	0	1050
Confl. Peds. (#/hr)				28		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	10.5	10.5	35.2			35.2
Effective Green, g (s)	10.0	10.0	35.7			35.7
Actuated g/C Ratio	0.18	0.18	0.65			0.65
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	318	284	1079			1041
v/s Ratio Prot	c0.10		0.39			c0.65
v/s Ratio Perm		0.02				
v/c Ratio	0.55	0.13	0.61			1.01
Uniform Delay, d1	20.5	18.9	5.6			9.6
Progression Factor	1.00	1.00	1.16			1.22
Incremental Delay, d2	1.6	0.2	1.7			25.2
Delay (s)	22.1	19.0	8.2			37.0
Level of Service	C	B	A			D
Approach Delay (s)	20.4		8.2			37.0
Approach LOS	C		A			D

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	43	612	190	230	995
Future Volume (vph)	49	43	612	190	230	995
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1515	1589		1524	1663
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1750	1515	1589		1524	1663
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	43	612	190	230	995
RTOR Reduction (vph)	0	31	8	0	0	0
Lane Group Flow (vph)	49	12	794	0	230	995
Confl. Peds. (#/hr)	9			30		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	10.7	32.2	70.1		17.9	91.0
Effective Green, g (s)	10.2	31.7	70.6		17.4	91.5
Actuated g/C Ratio	0.09	0.29	0.64		0.16	0.83
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	162	436	1019		241	1383
v/s Ratio Prot	c0.03	0.01	c0.50		c0.15	0.60
v/s Ratio Perm						
v/c Ratio	0.30	0.03	0.78		0.95	0.72
Uniform Delay, d1	46.6	28.1	14.1		45.9	3.9
Progression Factor	1.00	1.00	1.00		0.99	0.54
Incremental Delay, d2	1.3	0.0	5.9		23.7	1.2
Delay (s)	47.9	28.1	20.0		69.3	3.3
Level of Service	D	C	C		E	A
Approach Delay (s)	38.6		20.0			15.7
Approach LOS	D		C			B

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

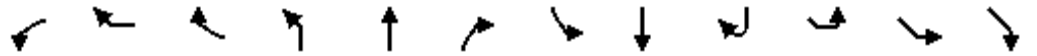
Appendix G-3:
Scenario 3 HCM 2000 Intersection Results



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	30	245	21	0	73	0	287	23	0	57	0
Future Volume (vph)	25	30	245	21	0	73	0	287	23	0	57	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3278	2175	1565		1350		1588	1481		3129	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3278	2175	1565		1350		1588	1481		3129	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	25	30	245	21	0	73	0	287	23	0	57	0
RTOR Reduction (vph)	0	0	0	0	0	68	0	0	12	0	0	0
Lane Group Flow (vph)	0	55	245	21	0	5	0	287	11	0	57	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		15.4	31.0	8.0		8.0		53.7	53.7		38.9	
Effective Green, g (s)		14.4	30.0	7.5		7.5		53.2	53.7		38.4	
Actuated g/C Ratio		0.13	0.27	0.07		0.07		0.48	0.49		0.35	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		429	593	106		92		768	722		1092	
v/s Ratio Prot		0.02	c0.11	c0.01				c0.18			0.02	
v/s Ratio Perm						0.00			0.01			
v/c Ratio		0.13	0.41	0.20		0.05		0.37	0.02		0.05	
Uniform Delay, d1		42.3	32.8	48.4		47.9		17.9	14.5		23.7	
Progression Factor		0.96	0.97	1.00		1.00		0.87	1.00		0.54	
Incremental Delay, d2		0.1	0.3	0.7		0.2		1.4	0.0		0.1	
Delay (s)		40.6	32.0	49.1		48.1		17.0	14.6		12.9	
Level of Service		D	C	D		D		B	B		B	
Approach Delay (s)		33.6			48.3			16.8			12.9	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



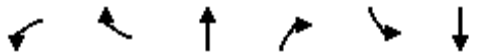
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	15	0	10	9	256	26	16	280	27	44	0	16
Future Volume (vph)	15	0	10	9	256	26	16	280	27	44	0	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	5.2	5.2	4.0	5.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93	1.00	1.00	0.87		0.85	
Flpb, ped/bikes	0.57	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	863	1450		1509	1588	1343	1509	1647	1301		1403	
Flt Permitted	0.72	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	653	1450		1509	1588	1343	1509	1647	1301		1403	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	0	10	9	256	26	16	280	27	44	0	16
RTOR Reduction (vph)	0	9	0	0	0	8	0	0	8	0	57	0
Lane Group Flow (vph)	15	1	0	9	256	18	16	280	19	0	3	0
Confl. Peds. (#/hr)	71		3			25			50	3		71
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	8.4	8.4		1.6	74.9	74.9	4.0	77.3	77.3		6.4	
Effective Green, g (s)	8.4	8.4		1.1	74.4	74.4	3.5	76.8	77.3		5.9	
Actuated g/C Ratio	0.08	0.08		0.01	0.68	0.68	0.03	0.70	0.70		0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	49	110		15	1074	908	48	1149	914		75	
v/s Ratio Prot		0.00		0.01	0.16		c0.01	c0.17			c0.00	
v/s Ratio Perm	c0.02					0.01			0.01			
v/c Ratio	0.31	0.01		0.60	0.24	0.02	0.33	0.24	0.02		0.04	
Uniform Delay, d1	48.0	46.9		54.2	6.9	5.8	52.1	6.0	4.9		49.4	
Progression Factor	1.00	1.00		0.87	0.82	1.00	1.53	0.11	1.00		1.00	
Incremental Delay, d2	1.3	0.0		36.0	0.5	0.0	1.4	0.5	0.0		0.1	
Delay (s)	49.3	47.0		83.1	6.1	5.9	81.2	1.1	5.0		49.5	
Level of Service	D	D		F	A	A	F	A	A		D	
Approach Delay (s)	48.4				8.5			5.4			49.5	
Approach LOS	D				A			A			D	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	17.8
Intersection Capacity Utilization	44.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	4	287	2	2	309
Future Volume (vph)	0	4	287	2	2	309
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)		4.0	5.2	4.7	4.0	5.2
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00	0.95	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00
Frt		0.85	1.00	0.85	1.00	1.00
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1400	1647	1427	1509	1594
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1400	1647	1427	1509	1594
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	4	287	2	2	309
RTOR Reduction (vph)	0	4	0	1	0	0
Lane Group Flow (vph)	0	0	287	1	2	309
Confl. Peds. (#/hr)	20			17		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)		2.0	39.7	39.7	1.6	44.8
Effective Green, g (s)		1.5	39.2	39.7	1.1	44.3
Actuated g/C Ratio		0.03	0.71	0.72	0.02	0.81
Clearance Time (s)		3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)		2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)		38	1173	1030	30	1283
v/s Ratio Prot			0.17		0.00	c0.19
v/s Ratio Perm		c0.00		0.00		
v/c Ratio		0.00	0.24	0.00	0.07	0.24
Uniform Delay, d1		26.0	2.7	2.1	26.4	1.3
Progression Factor		1.00	0.34	0.40	1.30	0.74
Incremental Delay, d2		0.0	0.5	0.0	0.3	0.4
Delay (s)		26.0	1.4	0.8	34.7	1.4
Level of Service		C	A	A	C	A
Approach Delay (s)	26.0		1.4			1.6
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	1.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	13.2
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

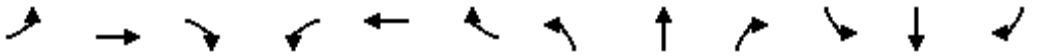


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	4	2	287	0	0	309
Future Volume (vph)	4	2	287	0	0	309
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	5.2			5.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	1647			1588
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	1647			1588
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	4	2	287	0	0	309
RTOR Reduction (vph)	0	2	0	0	0	0
Lane Group Flow (vph)	4	0	287	0	0	309
Confl. Peds. (#/hr)				11		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	1.8	1.8	43.9			43.9
Effective Green, g (s)	1.3	1.3	43.4			43.4
Actuated g/C Ratio	0.02	0.02	0.79			0.79
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	40	36	1299			1253
v/s Ratio Prot	c0.00		0.17			c0.19
v/s Ratio Perm		0.00				
v/c Ratio	0.10	0.00	0.22			0.25
Uniform Delay, d1	26.3	26.2	1.5			1.5
Progression Factor	1.00	1.00	0.87			0.21
Incremental Delay, d2	0.8	0.0	0.4			0.5
Delay (s)	27.1	26.2	1.7			0.8
Level of Service	C	C	A			A
Approach Delay (s)	26.8		1.7			0.8
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	1.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	10.3
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	2	1	286	20	11	302
Future Volume (vph)	2	1	286	20	11	302
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	5.2		3.5	5.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1500	1629		1509	1647
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1500	1629		1509	1647
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	2	1	286	20	11	302
RTOR Reduction (vph)	0	1	1	0	0	0
Lane Group Flow (vph)	2	0	305	0	11	302
Confl. Peds. (#/hr)	2			14		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	1.8	9.0	93.3		3.6	99.9
Effective Green, g (s)	1.3	8.5	92.8		3.1	99.4
Actuated g/C Ratio	0.01	0.08	0.84		0.03	0.90
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	20	115	1374		42	1488
v/s Ratio Prot	c0.00	0.00	c0.19		0.01	c0.18
v/s Ratio Perm						
v/c Ratio	0.10	0.00	0.22		0.26	0.20
Uniform Delay, d1	53.8	46.8	1.7		52.3	0.6
Progression Factor	1.00	1.00	1.00		0.81	0.45
Incremental Delay, d2	2.7	0.0	0.4		1.2	0.3
Delay (s)	56.4	46.8	2.0		43.5	0.6
Level of Service	E	D	A		D	A
Approach Delay (s)	53.2		2.0			2.1
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	2.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	154	578	26	0	89	0	518	28	0	76	0
Future Volume (vph)	87	154	578	26	0	89	0	518	28	0	76	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3293	2175	1565		1350		1588	1480		3129	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3293	2175	1565		1350		1588	1480		3129	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	87	154	578	26	0	89	0	518	28	0	76	0
RTOR Reduction (vph)	0	0	0	0	0	82	0	0	16	0	0	0
Lane Group Flow (vph)	0	241	578	26	0	7	0	518	12	0	76	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		24.4	51.0	10.1		10.1		52.6	52.6		26.8	
Effective Green, g (s)		23.4	50.0	9.6		9.6		52.1	52.6		26.3	
Actuated g/C Ratio		0.19	0.42	0.08		0.08		0.43	0.44		0.22	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		642	906	125		108		689	648		685	
v/s Ratio Prot		0.07	c0.27	c0.02				c0.33			0.02	
v/s Ratio Perm						0.01			0.01			
v/c Ratio		0.38	0.64	0.21		0.07		0.75	0.02		0.11	
Uniform Delay, d1		42.0	27.8	51.6		51.1		28.5	19.1		37.5	
Progression Factor		0.98	0.88	1.00		1.00		0.62	1.00		0.53	
Incremental Delay, d2		0.3	1.2	0.6		0.2		6.8	0.0		0.3	
Delay (s)		41.4	25.8	52.2		51.2		24.5	19.1		20.4	
Level of Service		D	C	D		D		C	B		C	
Approach Delay (s)		30.4			51.5			24.2			20.4	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

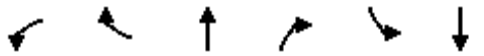
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	74	4	80	11	449	61	97	565	18	17	1	16
Future Volume (vph)	74	4	80	11	449	61	97	565	18	17	1	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.92	1.00	1.00	0.86		0.71	
Flpb, ped/bikes	0.78	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1179	1450		1509	1588	1336	1509	1647	1286		1148	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	912	1450		1509	1588	1336	1509	1647	1286		1148	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	74	4	80	11	449	61	97	565	18	17	1	16
RTOR Reduction (vph)	0	71	0	0	0	26	0	0	6	0	33	0
Lane Group Flow (vph)	74	13	0	11	449	35	97	565	12	0	1	0
Confl. Peds. (#/hr)	71		3			25			50	3		71
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	18.6	18.6		1.6	67.5	67.5	12.8	78.7	78.7		4.8	
Effective Green, g (s)	18.6	18.6		1.1	68.0	68.0	12.3	79.2	78.7		4.3	
Actuated g/C Ratio	0.16	0.16		0.01	0.57	0.57	0.10	0.66	0.66		0.04	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	141	224		13	899	757	154	1087	843		41	
v/s Ratio Prot		0.01		0.01	0.28		c0.06	c0.34			c0.00	
v/s Ratio Perm	c0.08					0.03			0.01			
v/c Ratio	0.52	0.06		0.85	0.50	0.05	0.63	0.52	0.01		0.03	
Uniform Delay, d1	46.6	43.2		59.4	15.7	11.6	51.7	10.6	7.2		55.8	
Progression Factor	1.00	1.00		0.94	0.67	8.23	1.35	0.41	1.00		1.00	
Incremental Delay, d2	1.6	0.0		157.0	1.9	0.1	4.8	1.5	0.0		0.1	
Delay (s)	48.3	43.3		212.6	12.5	95.3	74.4	5.8	7.2		55.9	
Level of Service	D	D		F	B	F	E	A	A		E	
Approach Delay (s)	45.6				26.4			15.6			55.9	
Approach LOS	D				C			B			E	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	44	46	475	62	46	609
Future Volume (vph)	44	46	475	62	46	609
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.95	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1565	1400	1647	1422	1509	1594
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1565	1400	1647	1422	1509	1594
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	44	46	475	62	46	609
RTOR Reduction (vph)	0	42	0	22	0	0
Lane Group Flow (vph)	44	4	475	40	46	609
Confl. Peds. (#/hr)	20			17		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	6.0	6.0	39.0	39.0	3.3	45.8
Effective Green, g (s)	5.5	5.5	39.5	39.0	2.8	46.3
Actuated g/C Ratio	0.09	0.09	0.66	0.65	0.05	0.77
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	143	128	1084	924	70	1230
v/s Ratio Prot	c0.03		0.29		0.03	c0.38
v/s Ratio Perm		0.00		0.03		
v/c Ratio	0.31	0.03	0.44	0.04	0.66	0.50
Uniform Delay, d1	25.5	24.8	4.9	3.8	28.1	2.5
Progression Factor	1.00	1.00	0.71	0.51	0.89	1.60
Incremental Delay, d2	0.4	0.0	1.2	0.1	14.1	1.3
Delay (s)	25.9	24.9	4.7	2.0	39.2	5.3
Level of Service	C	C	A	A	D	A
Approach Delay (s)	25.4		4.4			7.7
Approach LOS	C		A			A

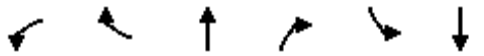
Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



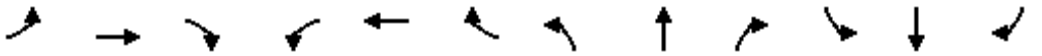
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	67	87	450	0	0	653
Future Volume (vph)	67	87	450	0	0	653
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	1647			1588
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	1647			1588
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	87	450	0	0	653
RTOR Reduction (vph)	0	77	0	0	0	0
Lane Group Flow (vph)	67	10	450	0	0	653
Confl. Peds. (#/hr)				11		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	7.3	7.3	43.4			43.4
Effective Green, g (s)	6.8	6.8	43.9			43.9
Actuated g/C Ratio	0.11	0.11	0.73			0.73
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	196	175	1205			1161
v/s Ratio Prot	c0.04		0.27			c0.41
v/s Ratio Perm		0.01				
v/c Ratio	0.34	0.06	0.37			0.56
Uniform Delay, d1	24.5	23.7	3.0			3.7
Progression Factor	1.00	1.00	1.41			1.17
Incremental Delay, d2	0.8	0.1	0.8			1.8
Delay (s)	25.3	23.8	5.0			6.1
Level of Service	C	C	A			A
Approach Delay (s)	24.5		5.0			6.1
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	51.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	26	20	430	78	160	560
Future Volume (vph)	26	20	430	78	160	560
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1500	1604		1509	1647
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1500	1604		1509	1647
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	26	20	430	78	160	560
RTOR Reduction (vph)	0	15	3	0	0	0
Lane Group Flow (vph)	26	5	505	0	160	560
Confl. Peds. (#/hr)	2			14		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6	29.2	83.1		17.0	103.1
Effective Green, g (s)	8.1	28.7	83.6		16.5	103.6
Actuated g/C Ratio	0.07	0.24	0.70		0.14	0.86
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	116	358	1117		207	1421
v/s Ratio Prot	c0.02	0.00	c0.31		c0.11	0.34
v/s Ratio Perm						
v/c Ratio	0.22	0.01	0.45		0.77	0.39
Uniform Delay, d1	53.0	34.8	8.1		49.9	1.7
Progression Factor	1.00	1.00	1.00		0.96	0.67
Incremental Delay, d2	1.2	0.0	1.3		13.2	0.7
Delay (s)	54.2	34.9	9.4		61.3	1.9
Level of Service	D	C	A		E	A
Approach Delay (s)	45.8		9.4			15.1
Approach LOS	D		A			B

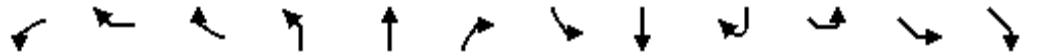
Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	220	587	57	0	118	0	656	48	0	175	0
Future Volume (vph)	73	220	587	57	0	118	0	656	48	0	175	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.99	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3312	2175	1565		1350		1588	1481		3129	
Flt Permitted		0.99	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3312	2175	1565		1350		1588	1481		3129	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	73	220	587	57	0	118	0	656	48	0	175	0
RTOR Reduction (vph)	0	0	0	0	0	108	0	0	26	0	0	0
Lane Group Flow (vph)	0	293	587	57	0	10	0	656	22	0	175	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		22.4	51.0	10.8		10.8		53.9	53.9		26.1	
Effective Green, g (s)		21.4	50.0	10.3		10.3		53.4	53.9		25.6	
Actuated g/C Ratio		0.18	0.42	0.09		0.09		0.44	0.45		0.21	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		590	906	134		115		706	665		667	
v/s Ratio Prot		0.09	c0.27	c0.04				c0.41			0.06	
v/s Ratio Perm						0.01			0.01			
v/c Ratio		0.50	0.65	0.43		0.09		0.93	0.03		0.26	
Uniform Delay, d1		44.4	28.0	52.0		50.5		31.5	18.5		39.3	
Progression Factor		1.00	1.00	1.00		1.00		0.58	0.39		0.38	
Incremental Delay, d2		0.5	1.4	1.6		0.2		17.3	0.1		0.9	
Delay (s)		44.9	29.4	53.6		50.8		35.6	7.3		16.0	
Level of Service		D	C	D		D		D	A		B	
Approach Delay (s)		34.6			51.7			33.6			16.0	
Approach LOS		C			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.7
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	82	3	91	17	597	140	120	670	29	16	5	15
Future Volume (vph)	82	3	91	17	597	140	120	670	29	16	5	15
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93	1.00	1.00	0.85		0.75	
Flpb, ped/bikes	0.79	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1190	1450		1509	1588	1343	1509	1647	1279		1209	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.97	
Satd. Flow (perm)	919	1450		1509	1588	1343	1509	1647	1279		1209	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	82	3	91	17	597	140	120	670	29	16	5	15
RTOR Reduction (vph)	0	79	0	0	0	49	0	0	10	0	35	0
Lane Group Flow (vph)	82	15	0	17	597	91	120	670	19	0	1	0
Confl. Peds. (#/hr)	70		11			23			52	11		70
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	18.9	18.9		3.2	65.7	65.7	14.3	76.8	76.8		4.8	
Effective Green, g (s)	18.9	18.9		2.7	66.2	66.2	13.8	77.3	76.8		4.3	
Actuated g/C Ratio	0.16	0.16		0.02	0.55	0.55	0.12	0.64	0.64		0.04	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	144	228		33	876	740	173	1060	818		43	
v/s Ratio Prot		0.01		0.01	c0.38		c0.08	0.41			c0.00	
v/s Ratio Perm	c0.09					0.07			0.01			
v/c Ratio	0.57	0.06		0.52	0.68	0.12	0.69	0.63	0.02		0.03	
Uniform Delay, d1	46.8	43.0		58.0	19.3	12.9	51.1	12.8	7.9		55.8	
Progression Factor	1.00	1.00		0.99	0.63	0.94	1.16	0.80	1.00		1.00	
Incremental Delay, d2	3.1	0.0		4.7	3.6	0.3	7.9	2.4	0.0		0.1	
Delay (s)	49.8	43.1		62.1	15.9	12.4	67.1	12.7	7.9		55.9	
Level of Service	D	D		E	B	B	E	B	A		E	
Approach Delay (s)	46.2				16.3			20.5			55.9	
Approach LOS	D				B			C			E	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	58	43	711	121	38	729
Future Volume (vph)	58	43	711	121	38	729
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.95	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1565	1400	1647	1420	1509	1594
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1565	1400	1647	1420	1509	1594
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	58	43	711	121	38	729
RTOR Reduction (vph)	0	39	0	30	0	0
Lane Group Flow (vph)	58	4	711	91	38	729
Confl. Peds. (#/hr)	24			18		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	6.0	6.0	39.0	39.0	3.3	45.8
Effective Green, g (s)	5.5	5.5	39.5	39.0	2.8	46.3
Actuated g/C Ratio	0.09	0.09	0.66	0.65	0.05	0.77
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	143	128	1084	923	70	1230
v/s Ratio Prot	c0.04		c0.43		0.03	c0.46
v/s Ratio Perm		0.00		0.06		
v/c Ratio	0.41	0.03	0.66	0.10	0.54	0.59
Uniform Delay, d1	25.7	24.8	6.2	3.9	28.0	2.9
Progression Factor	1.00	1.00	0.79	0.28	0.91	1.50
Incremental Delay, d2	0.7	0.0	2.6	0.2	3.7	1.7
Delay (s)	26.4	24.9	7.5	1.3	29.1	6.0
Level of Service	C	C	A	A	C	A
Approach Delay (s)	25.7		6.6			7.2
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

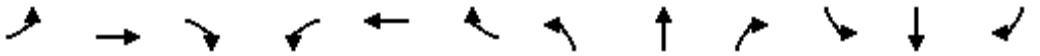
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	64	73	759	0	0	787
Future Volume (vph)	64	73	759	0	0	787
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1732	1550	1647			1588
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1732	1550	1647			1588
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	64	73	759	0	0	787
RTOR Reduction (vph)	0	65	0	0	0	0
Lane Group Flow (vph)	64	8	759	0	0	787
Confl. Peds. (#/hr)				15		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	7.2	7.2	43.5			43.5
Effective Green, g (s)	6.7	6.7	44.0			44.0
Actuated g/C Ratio	0.11	0.11	0.73			0.73
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	193	173	1207			1164
v/s Ratio Prot	c0.04		0.46			c0.50
v/s Ratio Perm		0.01				
v/c Ratio	0.33	0.05	0.63			0.68
Uniform Delay, d1	24.6	23.8	4.0			4.2
Progression Factor	1.00	1.00	1.71			0.84
Incremental Delay, d2	0.7	0.1	1.9			2.7
Delay (s)	25.3	23.9	8.7			6.3
Level of Service	C	C	A			A
Approach Delay (s)	24.6		8.7			6.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	17	18	741	91	87	764
Future Volume (vph)	17	18	741	91	87	764
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	4.1	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1732	1500	1615		1509	1647
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1732	1500	1615		1509	1647
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	17	18	741	91	87	764
RTOR Reduction (vph)	0	15	2	0	0	0
Lane Group Flow (vph)	17	3	830	0	87	764
Confl. Peds. (#/hr)	2			19		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	8 1	2		1	6
Permitted Phases						
Actuated Green, G (s)	8.6	21.6	90.7		9.4	103.1
Effective Green, g (s)	8.1	21.1	91.2		8.9	103.6
Actuated g/C Ratio	0.07	0.18	0.76		0.07	0.86
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	116	263	1227		111	1421
v/s Ratio Prot	c0.01	0.00	c0.51		c0.06	0.46
v/s Ratio Perm						
v/c Ratio	0.15	0.01	0.68		0.78	0.54
Uniform Delay, d1	52.7	40.8	7.1		54.6	2.1
Progression Factor	1.00	1.00	1.00		1.01	0.61
Incremental Delay, d2	0.7	0.0	3.0		22.5	1.1
Delay (s)	53.4	40.9	10.1		77.5	2.4
Level of Service	D	D	B		E	A
Approach Delay (s)	47.0		10.1			10.1
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	229	842	71	0	129	0	789	100	0	176	0
Future Volume (vph)	107	229	842	71	0	129	0	789	100	0	176	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3333	2197	1580		1363		1604	1495		3160	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3333	2197	1580		1363		1604	1495		3160	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	107	229	842	71	0	129	0	789	100	0	176	0
RTOR Reduction (vph)	0	0	0	0	0	120	0	0	31	0	0	0
Lane Group Flow (vph)	0	336	842	71	0	9	0	789	69	0	176	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		33.1	63.1	11.5		11.5		66.5	66.5		36.3	
Effective Green, g (s)		32.1	62.1	11.0		11.0		66.0	66.5		35.8	
Actuated g/C Ratio		0.21	0.41	0.07		0.07		0.44	0.44		0.24	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		713	909	115		99		705	662		754	
v/s Ratio Prot		0.10	c0.38	c0.04				c0.49			0.06	
v/s Ratio Perm						0.01			0.05			
v/c Ratio		0.47	0.93	0.62		0.10		1.12	0.10		0.23	
Uniform Delay, d1		51.5	41.8	67.5		64.9		42.0	24.4		46.0	
Progression Factor		1.00	1.00	1.00		1.00		0.41	0.15		0.74	
Incremental Delay, d2		0.4	15.0	8.2		0.3		65.9	0.2		0.7	
Delay (s)		51.9	56.7	75.6		65.2		83.3	3.7		34.8	
Level of Service		D	E	E		E		F	A		C	
Approach Delay (s)		55.4			68.9			74.4			34.8	
Approach LOS		E			E			E			C	

Intersection Summary			
HCM 2000 Control Delay	61.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.7
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	99	3	119	12	738	126	189	865	35	32	3	11
Future Volume (vph)	99	3	119	12	738	126	189	865	35	32	3	11
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.92	1.00	1.00	0.62		0.81	
Flpb, ped/bikes	0.54	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (prot)	826	1464		1524	1604	1340	1524	1663	940		1347	
Flt Permitted	0.73	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.96	
Satd. Flow (perm)	632	1464		1524	1604	1340	1524	1663	940		1347	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	3	119	12	738	126	189	865	35	32	3	11
RTOR Reduction (vph)	0	101	0	0	0	34	0	0	11	0	44	0
Lane Group Flow (vph)	99	21	0	12	738	92	189	865	24	0	2	0
Confl. Peds. (#/hr)	151					22			121			151
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	23.2	23.2		3.2	78.5	78.5	25.6	100.9	100.9		6.4	
Effective Green, g (s)	23.2	23.2		2.7	79.0	79.0	25.1	101.4	100.9		5.9	
Actuated g/C Ratio	0.15	0.15		0.02	0.53	0.53	0.17	0.68	0.67		0.04	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	97	226		27	844	705	255	1124	632		52	
v/s Ratio Prot		0.01		0.01	c0.46		0.12	c0.52			c0.00	
v/s Ratio Perm	c0.16					0.07			0.03			
v/c Ratio	1.02	0.09		0.44	0.87	0.13	0.74	0.77	0.04		0.03	
Uniform Delay, d1	63.4	54.4		72.9	31.1	18.0	59.4	16.4	8.2		69.3	
Progression Factor	1.00	1.00		0.86	0.63	0.68	0.77	0.51	0.84		1.00	
Incremental Delay, d2	97.1	0.1		3.1	9.5	0.3	7.4	3.9	0.1		0.1	
Delay (s)	160.5	54.5		65.5	29.2	12.5	53.4	12.2	7.0		69.4	
Level of Service	F	D		E	C	B	D	B	A		E	
Approach Delay (s)	101.9				27.3			19.2			69.4	
Approach LOS	F				C			B			E	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	99	107	769	177	92	883
Future Volume (vph)	99	107	769	177	92	883
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1580	1414	1663	1406	1524	1610
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1580	1414	1663	1406	1524	1610
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	99	107	769	177	92	883
RTOR Reduction (vph)	0	95	0	41	0	0
Lane Group Flow (vph)	99	12	769	136	92	883
Confl. Peds. (#/hr)	41			26		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	8.6	8.6	46.6	46.6	8.1	58.2
Effective Green, g (s)	8.1	8.1	47.1	46.6	7.6	58.7
Actuated g/C Ratio	0.11	0.11	0.63	0.62	0.10	0.78
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	170	152	1044	873	154	1260
v/s Ratio Prot	c0.06		0.46		0.06	c0.55
v/s Ratio Perm		0.01		0.10		
v/c Ratio	0.58	0.08	0.74	0.16	0.60	0.70
Uniform Delay, d1	31.8	30.1	9.7	6.0	32.2	3.9
Progression Factor	1.00	1.00	1.00	1.11	1.03	1.15
Incremental Delay, d2	3.3	0.1	3.8	0.3	2.5	2.0
Delay (s)	35.1	30.2	13.4	6.9	35.7	6.5
Level of Service	D	C	B	A	D	A
Approach Delay (s)	32.5		12.2			9.3
Approach LOS	C		B			A

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

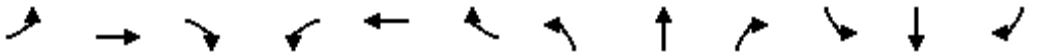
c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	155	192	754	0	0	982
Future Volume (vph)	155	192	754	0	0	982
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1750	1565	1663			1604
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1750	1565	1663			1604
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	155	192	754	0	0	982
RTOR Reduction (vph)	0	166	0	0	0	0
Lane Group Flow (vph)	155	26	754	0	0	982
Confl. Peds. (#/hr)				35		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	10.6	10.6	55.1			55.1
Effective Green, g (s)	10.1	10.1	55.6			55.6
Actuated g/C Ratio	0.13	0.13	0.74			0.74
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	235	210	1232			1189
v/s Ratio Prot	c0.09		0.45			c0.61
v/s Ratio Perm		0.02				
v/c Ratio	0.66	0.12	0.61			0.83
Uniform Delay, d1	30.8	28.6	4.6			6.5
Progression Factor	1.00	1.00	1.69			0.69
Incremental Delay, d2	5.9	0.2	0.9			5.1
Delay (s)	36.7	28.7	8.7			9.5
Level of Service	D	C	A			A
Approach Delay (s)	32.3		8.7			9.5
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	34	64	690	259	319	818
Future Volume (vph)	34	64	690	259	319	818
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	3.5	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1515	1559		1524	1663
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1750	1515	1559		1524	1663
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	34	64	690	259	319	818
RTOR Reduction (vph)	0	44	6	0	0	0
Lane Group Flow (vph)	34	20	943	0	319	818
Confl. Peds. (#/hr)	6			47		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	1 8	2		1	6
Permitted Phases						
Actuated Green, G (s)	10.6	50.9	91.4		36.7	131.1
Effective Green, g (s)	10.1	46.3	91.9		36.2	131.6
Actuated g/C Ratio	0.07	0.31	0.61		0.24	0.88
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	117	467	955		367	1459
v/s Ratio Prot	c0.02	0.01	c0.60		c0.21	0.49
v/s Ratio Perm						
v/c Ratio	0.29	0.04	0.99		0.87	0.56
Uniform Delay, d1	66.5	36.3	28.5		54.6	2.2
Progression Factor	1.00	1.00	1.00		1.02	0.88
Incremental Delay, d2	1.7	0.0	26.2		11.8	0.9
Delay (s)	68.2	36.3	54.7		67.3	2.9
Level of Service	E	D	D		E	A
Approach Delay (s)	47.4		54.7			20.9
Approach LOS	D		D			C

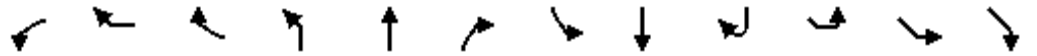
Intersection Summary			
HCM 2000 Control Delay	36.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	265	812	91	0	193	0	860	95	0	219	0
Future Volume (vph)	118	265	812	91	0	193	0	860	95	0	219	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	11	10	12	9	12	9	12	12	10	12
Total Lost time (s)		4.6	4.6	4.6		4.6		4.7	4.2		4.5	
Lane Util. Factor		0.95	*0.75	1.00		1.00		1.00	1.00		0.95	
Frpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00		1.00		1.00	1.00		1.00	
Frt		1.00	0.85	1.00		0.85		1.00	0.85		1.00	
Flt Protected		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (prot)		3335	2197	1580		1363		1604	1495		3160	
Flt Permitted		0.98	1.00	0.95		1.00		1.00	1.00		1.00	
Satd. Flow (perm)		3335	2197	1580		1363		1604	1495		3160	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	118	265	812	91	0	193	0	860	95	0	219	0
RTOR Reduction (vph)	0	0	0	0	0	177	0	0	31	0	0	0
Lane Group Flow (vph)	0	383	812	91	0	16	0	860	64	0	219	0
Confl. Bikes (#/hr)			7						2			2
Turn Type	Split	NA	custom	Prot		Perm		NA	Perm		NA	
Protected Phases	4	4	4 5	3				2			6	
Permitted Phases						3			2			
Actuated Green, G (s)		31.6	61.5	12.9		12.9		67.4	67.4		37.3	
Effective Green, g (s)		30.6	60.5	12.4		12.4		66.9	67.4		36.8	
Actuated g/C Ratio		0.20	0.40	0.08		0.08		0.45	0.45		0.25	
Clearance Time (s)		3.6		4.1		4.1		4.2	4.2		4.0	
Vehicle Extension (s)		2.5		2.5		2.5		3.0	3.0		3.0	
Lane Grp Cap (vph)		680	886	130		112		715	671		775	
v/s Ratio Prot		0.11	c0.37	c0.06				c0.54			0.07	
v/s Ratio Perm						0.01			0.04			
v/c Ratio		0.56	0.92	0.70		0.14		1.20	0.10		0.28	
Uniform Delay, d1		53.7	42.4	67.0		63.9		41.5	23.8		45.9	
Progression Factor		1.00	1.00	1.00		1.00		0.51	0.43		0.81	
Incremental Delay, d2		0.9	13.9	14.1		0.4		100.0	0.2		0.9	
Delay (s)		54.6	56.3	81.1		64.3		121.2	10.3		38.0	
Level of Service		D	E	F		E		F	B		D	
Approach Delay (s)		55.7			69.7			110.2			38.0	
Approach LOS		E			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	75.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	21.7
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



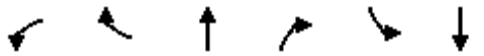
Movement	WBL	WBR	WBR2	NBL	NBT	NBR	SBL	SBT	SBR	SEL2	SEL	SER
Lane Configurations												
Traffic Volume (vph)	100	3	185	32	736	108	216	865	41	34	3	46
Future Volume (vph)	100	3	185	32	736	108	216	865	41	34	3	46
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	9	11	12	9	9	11	9	10	12	12	12	12
Total Lost time (s)	4.6	4.6		4.0	4.2	4.2	4.0	4.2	4.7		4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.93	1.00	1.00	0.51		0.57	
Flpb, ped/bikes	0.49	1.00		1.00	1.00	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85		1.00	1.00	0.85	1.00	1.00	0.85		0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	750	1464		1524	1604	1358	1524	1663	777		915	
Flt Permitted	0.70	1.00		0.95	1.00	1.00	0.95	1.00	1.00		0.98	
Satd. Flow (perm)	555	1464		1524	1604	1358	1524	1663	777		915	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	100	3	185	32	736	108	216	865	41	34	3	46
RTOR Reduction (vph)	0	164	0	0	0	38	0	0	13	0	79	0
Lane Group Flow (vph)	100	24	0	32	736	70	216	865	28	0	4	0
Confl. Peds. (#/hr)	190					18			158			190
Confl. Bikes (#/hr)									10			1
Turn Type	Perm	Prot		Prot	NA	Perm	Prot	NA	Perm	Prot	Prot	
Protected Phases		8		5	2		1	6		7	7	
Permitted Phases	8					2			6			
Actuated Green, G (s)	16.8	16.8		5.6	85.5	85.5	23.3	103.2	103.2		8.1	
Effective Green, g (s)	16.8	16.8		5.1	86.0	86.0	22.8	103.7	103.2		7.6	
Actuated g/C Ratio	0.11	0.11		0.03	0.57	0.57	0.15	0.69	0.69		0.05	
Clearance Time (s)	4.6	4.6		3.5	4.7	4.7	3.5	4.7	4.7		3.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.5	2.5	2.0	2.5	2.5		2.0	
Lane Grp Cap (vph)	62	163		51	919	778	231	1149	534		46	
v/s Ratio Prot		0.02		0.02	c0.46		c0.14	0.52			c0.00	
v/s Ratio Perm	c0.18					0.05			0.04			
v/c Ratio	1.61	0.15		0.63	0.80	0.09	0.94	0.75	0.05		0.09	
Uniform Delay, d1	66.6	60.1		71.5	25.2	14.4	62.9	14.9	7.6		67.9	
Progression Factor	1.00	1.00		0.93	0.91	1.64	1.32	0.60	1.66		1.00	
Incremental Delay, d2	338.1	0.2		12.0	5.4	0.2	34.4	3.5	0.1		0.3	
Delay (s)	404.7	60.3		78.3	28.3	23.7	117.6	12.4	12.7		68.2	
Level of Service	F	E		E	C	C	F	B	B		E	
Approach Delay (s)	179.9				29.6			32.7			68.2	
Approach LOS	F				C			C			E	

Intersection Summary			
HCM 2000 Control Delay	50.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	123	141	735	129	84	927
Future Volume (vph)	123	141	735	129	84	927
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	10	10	10	12	9	10
Total Lost time (s)	4.0	4.0	4.2	4.7	4.0	4.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.89	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1580	1414	1663	1343	1524	1610
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1580	1414	1663	1343	1524	1610
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	123	141	735	129	84	927
RTOR Reduction (vph)	0	121	0	35	0	0
Lane Group Flow (vph)	123	20	735	94	84	927
Confl. Peds. (#/hr)	65			52		
Confl. Bikes (#/hr)				18		
Bus Blockages (#/hr)	0	0	0	0	0	8
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	8		2		1	6
Permitted Phases		8	2	2		
Actuated Green, G (s)	10.9	10.9	44.6	44.6	7.8	55.9
Effective Green, g (s)	10.4	10.4	45.1	44.6	7.3	56.4
Actuated g/C Ratio	0.14	0.14	0.60	0.59	0.10	0.75
Clearance Time (s)	3.5	3.5	4.7	4.7	3.5	4.7
Vehicle Extension (s)	2.0	2.0	2.5	2.5	2.0	2.5
Lane Grp Cap (vph)	219	196	1000	798	148	1210
v/s Ratio Prot	c0.08		0.44		0.06	c0.58
v/s Ratio Perm		0.01		0.07		
v/c Ratio	0.56	0.10	0.73	0.12	0.57	0.77
Uniform Delay, d1	30.2	28.2	10.7	6.6	32.3	5.4
Progression Factor	1.00	1.00	0.81	0.37	0.92	1.67
Incremental Delay, d2	2.0	0.1	4.2	0.3	1.6	2.6
Delay (s)	32.1	28.3	12.8	2.7	31.4	11.7
Level of Service	C	C	B	A	C	B
Approach Delay (s)	30.1		11.3			13.3
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	175	209	655	0	0	1050
Future Volume (vph)	175	209	655	0	0	1050
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	13	10	12	12	9
Total Lost time (s)	5.1	5.1	4.2			4.2
Lane Util. Factor	1.00	1.00	1.00			1.00
Frpb, ped/bikes	1.00	1.00	1.00			1.00
Flpb, ped/bikes	1.00	1.00	1.00			1.00
Frt	1.00	0.85	1.00			1.00
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1750	1565	1663			1604
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1750	1565	1663			1604
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	209	655	0	0	1050
RTOR Reduction (vph)	0	179	0	0	0	0
Lane Group Flow (vph)	175	30	655	0	0	1050
Confl. Peds. (#/hr)				28		
Confl. Bikes (#/hr)				19		
Turn Type	Prot	Perm	NA			NA
Protected Phases	8		2			6
Permitted Phases		8				
Actuated Green, G (s)	11.3	11.3	54.4			54.4
Effective Green, g (s)	10.8	10.8	54.9			54.9
Actuated g/C Ratio	0.14	0.14	0.73			0.73
Clearance Time (s)	4.6	4.6	4.7			4.7
Vehicle Extension (s)	2.5	2.5	3.0			3.0
Lane Grp Cap (vph)	252	225	1217			1174
v/s Ratio Prot	c0.10		0.39			c0.65
v/s Ratio Perm		0.02				
v/c Ratio	0.69	0.13	0.54			0.89
Uniform Delay, d1	30.5	28.0	4.4			7.8
Progression Factor	1.00	1.00	1.35			1.09
Incremental Delay, d2	7.4	0.2	1.2			7.4
Delay (s)	38.0	28.2	7.2			16.0
Level of Service	D	C	A			B
Approach Delay (s)	32.7		7.2			16.0
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	9.3
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	49	43	612	190	230	995
Future Volume (vph)	49	43	612	190	230	995
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width	13	12	10	12	9	10
Total Lost time (s)	4.1	3.5	4.2		3.5	4.2
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	1515	1584		1524	1663
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1750	1515	1584		1524	1663
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	49	43	612	190	230	995
RTOR Reduction (vph)	0	32	4	0	0	0
Lane Group Flow (vph)	49	11	798	0	230	995
Confl. Peds. (#/hr)	9			30		
Confl. Bikes (#/hr)				20		
Turn Type	Prot	pt+ov	NA		Prot	NA
Protected Phases	8	1 8	2		1	6
Permitted Phases						
Actuated Green, G (s)	13.8	44.4	97.9		27.0	127.9
Effective Green, g (s)	13.3	39.8	98.4		26.5	128.4
Actuated g/C Ratio	0.09	0.27	0.66		0.18	0.86
Clearance Time (s)	3.6		4.7		3.0	4.7
Vehicle Extension (s)	3.6		3.6		2.0	3.6
Lane Grp Cap (vph)	155	401	1039		269	1423
v/s Ratio Prot	c0.03	0.01	c0.50		c0.15	0.60
v/s Ratio Perm						
v/c Ratio	0.32	0.03	0.77		0.86	0.70
Uniform Delay, d1	64.1	40.8	17.9		59.9	3.9
Progression Factor	1.00	1.00	1.00		0.92	1.03
Incremental Delay, d2	1.4	0.0	5.4		11.9	1.4
Delay (s)	65.5	40.8	23.3		66.9	5.4
Level of Service	E	D	C		E	A
Approach Delay (s)	54.0		23.3			17.0
Approach LOS	D		C			B

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	11.8
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			