CONNECTING
HOWE AVENUE
SAFETY & MOBILITY PLAN

APPENDIX B

ALTERNATIVES DEVELOPMENT REPORT
JUNE 2025

Connecting Howe Avenue – Alternatives Development Report

June 2025

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City of SACRAMENTO

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Glossary of Terms

95th percentile queue: A queue refers to a line of vehicles waiting at a location such as a traffic signal, that occurs when demand exceeds capacity. The 95th percentile queue is the length of vehicles waiting exceeded in only five percent of the analysis period, and is used to determine turn lane storage needs, such as the length of turn pockets. It is not representative of average daily conditions for most drivers.

AADT (Average Annual Daily Traffic) The average number of vehicles that travel on a street per day over the course of a year.

Alternative (Project Alternative): A design option being considered for modifying the street layout. Each alternative proposes different changes to the street design, including bike lanes, sidewalks, or signals.

APS (Accessible Pedestrian Signal): A device that uses audible tones or vibrations to help people with vision or hearing impairments safely cross the street at signalized crossings.

Bicycle Detection: A passive traffic signal system that detects the presence of a person bicycling to trigger a green light without requiring the without requiring manual activation.

Bicycle Level of Traffic Stress (BLTS): A numeric suitability rating (1 = meets comfort standards, 4 = does not meet comfort standards) that assesses how comfortable and protected a bike route feels to a person bicycling, accounting for factors like lane separation, width, and traffic speed.

Bike Lane and Buffered Bike Lane (Class II): A bike lane at roadway level separated by a painted line (Bike Lane) or a painted or physical buffer space between it and adjacent vehicle lanes (Buffered Bike Lane), increasing cyclist comfort and safety.

Buffer Zone (Landscape Buffer): A planted or paved space between the sidewalk or bike lane and the street, designed to increase comfort and reduce exposure to moving vehicles.

Cantilevered Bike Lane: A bike lane built onto the side of a bridge, extending out from the structure to create more space for people biking without removing vehicle lanes.

Channelized Right Turn: A dedicated turning lane at intersections that separates right-turning traffic from through lanes and allows turning traffic to either bypass or experience different traffic control than the adjacent through traffic. Channelized turn lanes often pose challenges for people walking or rolling due to higher vehicle speeds.

CEQA (California Environmental Quality Act): A state law that requires agencies to evaluate and disclose the environmental impacts of proposed projects.

Controlled Pedestrian Crossings: A designated area for people walking to cross a street where traffic is controlled (traffic signal, flashing beacons, or crossing signs) providing a predictable crossing opportunity.

Dilemma Zone Detection: A type of traffic signal technology that helps reduce crashes by better timing yellow lights so drivers don't have to choose between stopping suddenly or running the light.

High Injury Network: Streets or intersections where a high number of severe or fatal crashes have occurred, as identified by the city.

Leading Pedestrian Interval (LPI): A traffic signal timing strategy that gives people walking or biking a head start to cross the street before motor vehicle traffic receives a green light.

Level of Service (LOS): An intersection performance measure that assigns a letter grade (A through F) based on average motor vehicle delay, used to evaluate intersection operations.

Pedestrian Level of Traffic Stress (PLTS): A numeric suitability rating (1 = meets comfort standards, 4 = does not meet comfort standards) indicating the comfort of walking conditions based on sidewalk width, speed limits, and buffer presence.

Queue: A line of vehicles waiting to be served, such as at a traffic signal.

Right-of-Way (ROW): Space designated for use by the public for travel. This typically includes the street, landscaping, and sidewalks. The right-of-way includes land which may be owned by the City, other public agencies, utility companies, or private citizens and includes land which has an easement for use by the public for the purposes of travel infrastructure.

Roundabout: A circular intersection, used as an alternative to stop-sign or signal controlled intersections, designed to improve traffic flow and reduce crash severity by slowing vehicles and eliminating left-turn conflicts.

Sacramento Regional Transit District (SacRT): The regional public transit agency, responsible for operating transit services and collaborating on stop upgrades and access for people walking or rolling.

SacSim-19 Model: A travel demand forecasting tool developed by the Sacramento Area Council of Governments (SACOG) to simulate and forecast future traffic volumes and vehicle miles traveled under different growth scenarios.

Safety Corridor: A street designation under California Vehicle Code Section 22358.7 which allows local authorities to designate a reduced speed limit from the one that would typically be applied based on an engineering and traffic survey. Safety corridors are designated based on a history of serious injuries and fatalities on a given street. No more than one-fifth of streets may be designated as safety corridors

Shared Use Path (Class I): A fully separated bike path shared by people walking and biking. A shared use path is defined separately from a separated bikeway by its width and the requirement that it have wide horizontal separation from vehicle traffic.

Sidewalk Scale Lighting: Low-level lighting installed along sidewalks to enhance nighttime visibility and comfort for people walking and biking.

Signal Modifications: Updates to traffic signal equipment to meet current standards, including pedestrian countdown timers, transit signal priority, and improved visibility.

Signal Timing: How long a traffic signal stays green, yellow, or red for each direction of travel.

Wayfinding: Signage and visual cues placed along transportation routes to guide people to key destinations, like parks, community centers, or transit stops.

Introduction

Howe Avenue is a multimodal street in Sacramento, California, functioning as a major connection across the American River and is classified as an arterial street in the city's transportation network. Howe Avenue is identified as a part of the High Injury Network in the City of Sacramento's *Vision Zero Action Plan*[1] (2018), indicating that it experiences a high number of fatal and serious injury crashes involving people walking, biking, rolling, and driving on Howe Avenue.

The Connecting Howe Avenue Safety & Mobility Plan (the Plan), funded through a Caltrans Sustainable Transportation Planning Grant, supports Sacramento's commitment to equitable engagement by involving local communities in identifying their transportation needs. The plan aims to improve safety and mobility for all users by evaluating current conditions and proposing specific actions to eliminate barriers, increase ADA accessibility and general access, and respond to community priorities. The project limits are along Howe Avenue from Fair Oaks Boulevard to the Sacramento Regional Transit (SacRT) Power Inn Light Rail Station just south of Folsom Boulevard.

The purpose of this report is to summarize the proposed design alternatives for the Connecting Howe Avenue Project.

Key Issues Identified in the Existing Conditions Analysis

The following conditions were determined from the existing conditions analysis that the project alternatives are to address:

- Level of Traffic Stress (LTS) 4 for people walking and biking: Both walking and biking along the corridor are rated at LTS 4, the highest stress level defined by the LTS framework, indicating that current conditions are not suitable for most people walking, rolling, or biking.
- Lack of space allocated for people walking on the west side of Howe Avenue.
- Lack of direct connection to the American River Parkway shared use path (Class I)
- Existing bicycle lanes do not meet Caltrans-recommended design standards: Caltrans Highway Design Manual (HDM) Chapter 1000 and Design Information Bulletin (DIB) 89 recommend a buffered bike lane or separated bikeway (Class IV) on high-speed (≥ 40 mph), high-volume arterials. Howe Avenue's 5-foot striped bike lanes do not provide the width or physical separation required by these guidelines, discouraging bicycling and limiting safe access to the American River Parkway and other nearby routes.

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[1] City of Sacramento. (2018). *Vision Zero action plan*. https://www.cityofsacramento.gov/content/dam/portal/pw/Transportation/VisionZero/Vision-Zero-Action-Plan-Adopted-August-2018.pdf

- Observed motor vehicle speeds exceed posted limits, increasing crash severity: Excessive speeding is a major issue along Howe Avenue, with observed 85th percentile speeds reaching 43.6 miles per hour in 40 miles per hour zones and 52.4 miles per hour in 50 miles per hour zones. Speeding that exceeds posted limits was the primary contributing factor in 104 crashes (representing 52% of all reported crashes) between 2018 and 2023. Many of these crashes were rear-end collisions, which are commonly associated with excessive speeds and abrupt braking in high-volume arterial street environments.
- Limited transit access due to sparse stop locations and insufficient walking and biking connections: Sparse bus stop coverage and inadequate walking and biking connections to transit create barriers to use. The SacRT Gold Line's Power Inn Station is a critical asset but remains difficult to access on foot or by bike via Howe Avenue and the bridge over the American River.
- Over 200 reported crashes between 2018 and 2023, with speeding and improper turning as leading factors.
- Constrained right-of-way on the Howe Avenue Bridge limits design flexibility and requires additional consideration.
- Community feedback identified barriers to walking, biking, and rolling: Common concerns include limited visibility at crossings, high motor vehicle speeds, lack of walking and biking infrastructure, and insufficient wayfinding signage. Public engagement indicated a desire to address these concerns through specific changes that support access across all modes.

Project Alternatives

The remainder of this report outlines several design alternatives considered for the project. First, shared elements across all alternatives are described, followed by the differentiating components. The feasibility and impacts of each alternative are then analyzed.

All alternatives presented are preliminary concepts and may evolve based on community and partner input.

Feasibility Analysis Methodology

To determine the feasibility of each proposed alternative, several forms of analysis were conducted. This analysis includes:

- Right-of-way assessment
- Level of Traffic Stress Analysis
- Safety Benefit Assessment
- Transit Assessment

The analysis methodology for each of these topics is described in further detail in the following sections.

Right-of-Way Assessment

The existing right-of-way along Howe Avenue was assessed using publicly available aerial imagery and right-of-way maps to document typical conditions across different segments of the corridor. The typical roadway and sidewalk configurations are summarized below:

- Fair Oaks Boulevard to American River Bridge: Six travel lanes (three in each direction) with sidewalks on both sides (generally, 102 feet of Right of Way).
- American River Bridge to Swarthmore Drive: Six travel lanes (three in each direction) with sidewalk only on the east side. (generally, 97 feet of Right of Way).
- Swarthmore Drive to La Riviera Drive connection: Four travel lanes (two in each direction), with limited sidewalk access. (generally, 92 feet of Right of Way with a median gap between the two bridge structures).
- La Riviera Drive to SacRT Power Inn Light Rail Station: Six travel lanes (three in each direction) with sidewalk only on the west side (generally, 110 feet of Right of Way).

Level of Traffic Stress Analysis

Bicycling LTS

The bicycling LTS analysis was calculated using the methodologies described in the Mineta Transportation Institute Report 11-19 *Low Stress Bicycling and Network Connectivity* (2012). Bicycling LTS scores measure the comfort level of a street segment through a variety of criteria such as street width (number of lanes), speed limit and/or prevailing speed, presence and width of bike lanes, signals, and presence and width of parking lanes. Each street segment is assigned an LTS score from 1 to 4, where 1 indicates the lowest stress level and 4 indicates the highest stress level for people bicycling. Typically, a LTS score of 1 indicates that the street segment is comfortable for people bicycling regardless of experience level, while an LTS of 4 indicates that the segment is suitable primarily for more confident or experienced bicyclists, as shown in **Figure 1**.

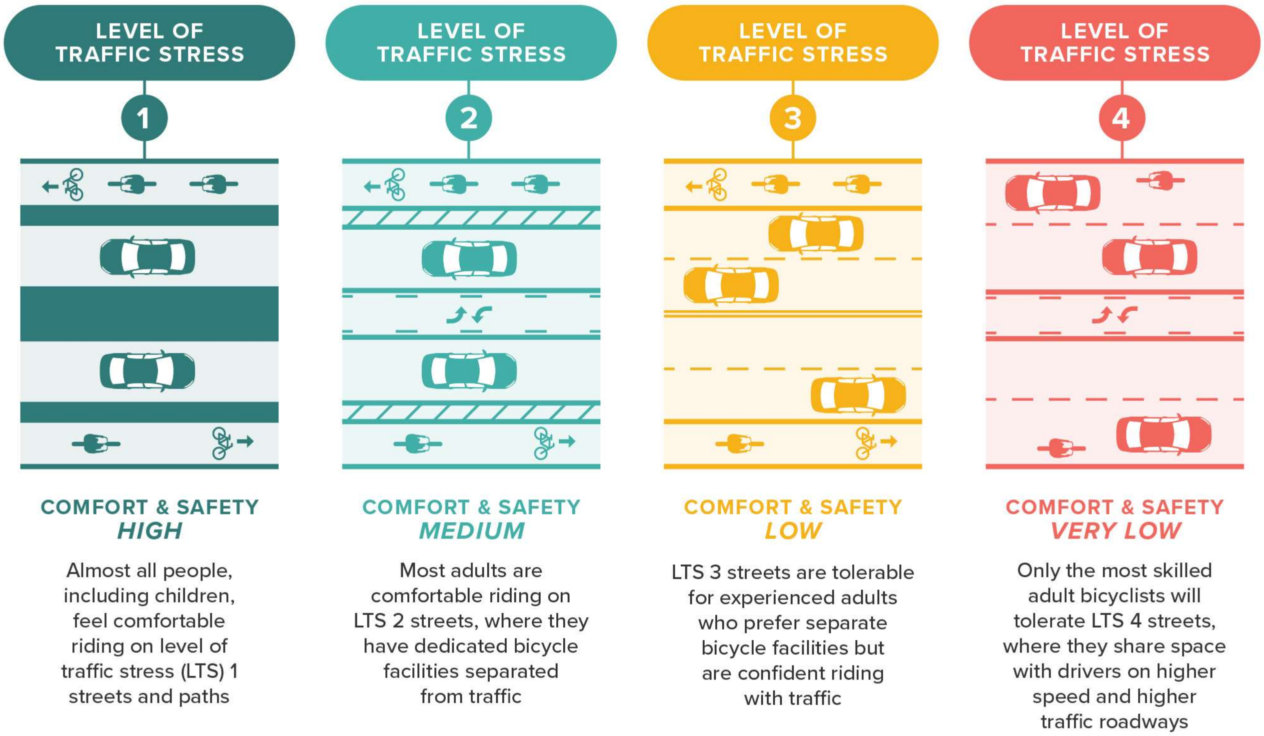

Figure 1. Bicycle Level of Traffic Stress Scores

Walking LTS

The walking level of traffic stress (LTS) analysis was conducted using the Oregon Department of Transportation (ODOT) Level of Traffic Stress Analysis Procedures (2020). Similar to the bicycling LTS methodology, the walking LTS method also uses several criteria to develop a LTS score of 1 through 4 including the presence of sidewalks, marked crosswalks, median refuges, motor vehicle traffic volume, and posted speed limits as shown in **Figure 2**.

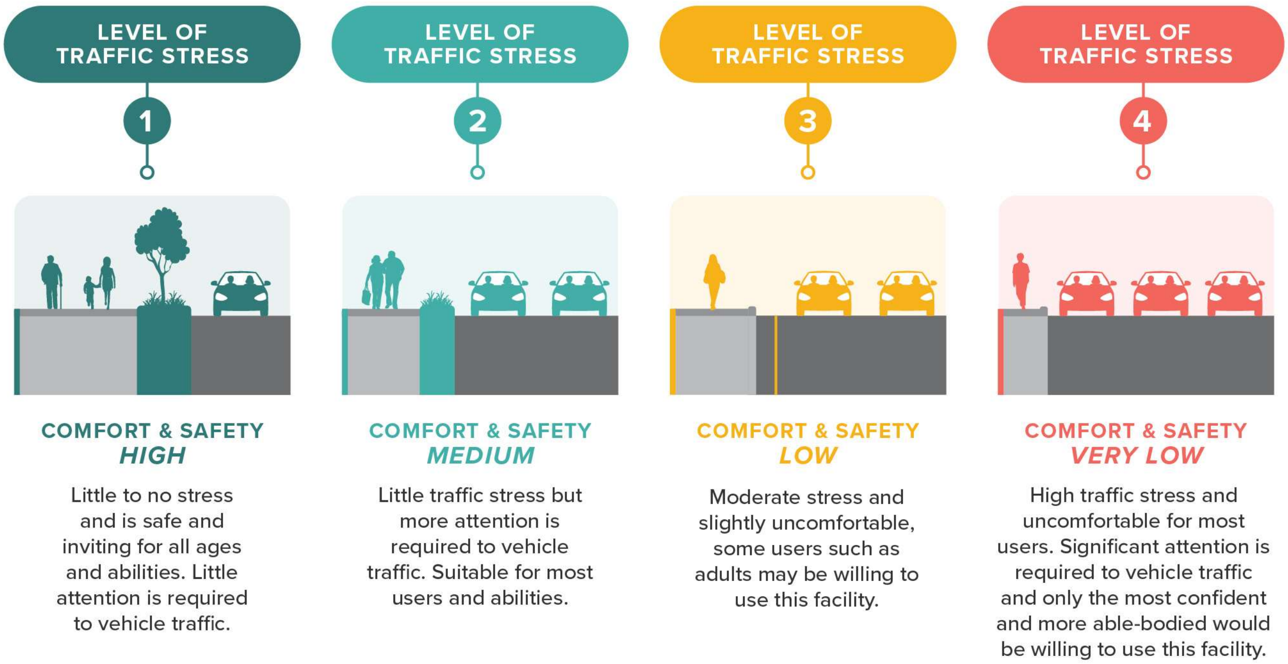

Figure 2. Walking Level of Traffic Stress

Safety Assessment

Each alternative was qualitatively reviewed for specific actions that directly address collision patterns which were identified in the Existing Conditions Report. This includes elements which lower motor vehicle speeds, reduce potential conflicts between vehicles or between vehicles and people walking, biking, or rolling, and improve user awareness of these potential conflicts. As this project is still in the planning phase, there is not sufficient design data at this time quantifying potential collision reductions associated with the proposed actions.

Transit Assessment

Each alternative was qualitatively reviewed for its compatibility with future transit enhancements (e.g., stop upgrades). SacRT owns, operates, and maintains transit facilities and services along Howe Avenue, however Howe Avenue was not included as a priority corridor in their 2023 Bus Stop Improvement Plan, and so they have not identified any planned and desired modifications to bus stops within the study area. The transit assessment of each alternative would identify if the project option is consistent with planned projects from SacRT for other corridors.

Community Priority Alignment

Based on community feedback from the Community Advisory Committee, during the in-person and virtual community workshops, and from the project website, the following community priorities for the project were identified:

- **Community-Focused Connectivity:** Address community-identified barriers to walking and biking, create connections to key destinations like the American River Parkway, and create a more balanced street that serves both local and regional needs.
- **Connections for People Walking and Biking:** Create an alternative with protected bike lanes that meet design standards are proposed and provide wider sidewalks with buffer zones where possible.
- **Speed Management and Safety Countermeasures:** Implement traffic calming strategies to reduce motor vehicle speeds and propose alternatives that consider both street design modifications and signal timing adjustments to reduce conflicts between motorists and people walking and biking.
- **Transit Connectivity:** Improve first- and last-mile connections to transit stops, improve bus stop amenities, and create direct connections for people walking or biking to transit.
- **Bridge Crossing Solutions:** Develop creative solutions for the constrained Howe Avenue Bridge, such as cantilevered paths or other modifications to accommodate people walking and biking.
- **Freeway Interchange Safety:** Coordinate with Caltrans to improve conditions for people walking and biking at US 50 ramp crossings through advanced warning systems, lighting upgrades, and potential signalization at ramp crosswalks.

Each alternative will be qualitatively evaluated for alignment with these priorities.

Alternatives Evaluation

Common Recommendations for All Alternatives

This section includes actions which are recommended across all alternatives. These are specific changes which directly address current collision trends or ADA accessibility gaps along the street.

Modify Signal Operations

For all alternatives, it is recommended that traffic signals be upgraded to meet current City standards. At a minimum, these modifications should include:

- Installation of retro-reflective backplates on signal heads
- Addition of advanced dilemma zone detection
- Upgrades to accessible pedestrian signal (APS)
- Implementation of leading pedestrian interval (LPI) signal timing per City policies and guidelines
- Replacement of curb ramps to meet current ADA accessibility standards
- Restriping of high-visibility crosswalks

LPIs are a signal timing strategy that gives people walking a 3- to 7-second head start before parallel motor vehicle traffic receives a green light. Recognized by the Federal Highway Administration as a proven safety countermeasure, LPIs have been shown to reduce collisions involving people walking and biking at intersections by up to 60% in some studies.

Install a shared use path through University Park to University Avenue

There is currently no connection between Howe Avenue and the American River Parkway shared use path that meets City guidelines and All-Ages-and-Ability guidance. This shared use path would be located at a connection point that maintains an acceptable grade, passes through public land, and connects to an existing shared use path and the American River Parkway.

Install a crosswalk and Rectangular Rapid Flashing Beacon (RRFB) across University Avenue

A new marked crosswalk with a RRFB is recommended across University Avenue to connect the shared use path (Class I) with University Park and the broader active transportation network. This location currently lacks a designated crossing for people walking or rolling, creating a barrier for people traveling between the American River Parkway, University Park, and nearby residential neighborhoods.

The RRFB would reinforce crossing priority for people walking or rolling and improve overall awareness at this uncontrolled location. To further increase driver compliance, the installation should include high-visibility crosswalk striping, advance yield markings, and appropriate signage.

Signalize Crossings at US 50 Ramps

Interchanges often present challenges for people walking or biking due to complex vehicle movements and limited infrastructure for these modes. Installing pedestrian-activated signals at the crossings on the west side of Howe Avenue, where it intersects with the US 50 on- and off-ramps, would improve ADA accessibility and reduce conflicts for those traveling north-south by biking, walking, or rolling.

Pedestrian-activated signals would increase visibility and reduce conflicts at these currently uncontrolled, marked crosswalks, locations where driver yield rates are low as vehicles merge between Howe Avenue and US 50. A signalized crossing would clearly establish right-of-way, reducing uncertainty and potential conflicts between people walking and drivers.

To further increase visibility and driver awareness, additional actions such as advance warning signs, flashing beacons, and high-visibility signal heads could be incorporated.

Implementing these signalized crossings would require coordination and formal agreements between the City and Caltrans, given the shared jurisdiction over these state highway ramps.

US 50 Ramp Signalization Feasibility Discussion

For both US 50 ramps, based on observed volumes and signal timing, it is estimated that there is sufficient vehicle storage to prevent queues from extending back to upstream intersections, even under multiple, closely spaced people walking or rolling or bicycling activations.

At the US 50 westbound (WB) off-ramp:

- Two lanes exit from Howe Avenue onto the ramp. From the crosswalk across the ramp, there is approximately 250 feet of vehicle storage before queues would extend back to the US 50 WB off-ramp at College Town Drive intersection.
- The AM peak volume for this ramp is 494 vehicles per hour (approximately one vehicle every 7 seconds). Assuming an average vehicle length of 25 feet, it would take approximately 140 seconds for queues to reach the intersection[2].

[2] 2 lanes × 250 feet ÷ 25 feet per vehicle × 7 seconds = 140 seconds.

- The estimated red signal duration for people walking or rolling or bicycle crossing is approximately 24 seconds[3]. During the AM peak, the highest observed volume of people walking or rolling or bicycling across the ramp is 6 per hour, with a maximum of 2 in any 15-minute period.
- Given the available storage and typical crossing intervals, the likelihood of queues extending back to the intersection is low[4].

At Howe Avenue at US 50 eastbound (EB) on-ramp:

- One lane exits Howe Avenue. There is approximately 750 feet of vehicle storage between the crosswalk and the point where queues would extend back to the US 50 WB on-ramp.
- The PM peak volume for this ramp is 800 vehicles per hour (about one vehicle every 4.5 seconds). At that rate, the queue would take approximately 135 seconds to reach the upstream ramp[5].
- The estimated red signal duration for a people walking or rolling or bicycling call at this location is about 20 seconds[6]. The PM peak volume of people walking or rolling or bicycling is 10 per hour, with a maximum of 3 in any 15-minute window.
- Even with three consecutive activations (totaling approximately 60 seconds of red time), queues would be expected to remain within available storage, reaching only about 335 feet.

Install Signal Ahead Warning Signs

Signal Ahead[7] warning signs would help reduce rear-end crashes by alerting drivers in advance to upcoming traffic signals, particularly in areas with limited visibility or where signals may be unexpected. By warning drivers to prepare to slow down or stop, these signs help mitigate sudden braking due to unanticipated signals.

Placement distances for “Signal Ahead” signs depend on factors such as motor vehicle travel speed and visibility. They are positioned to provide adequate Perception-Identification-Emotion-Volition (PIEV) time for drivers to react appropriately. On streets like Howe Avenue, these signs are recommended at the first signalized intersection after a

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[3] Including a 7-second walk interval, an 11-second flashing don't walk (FDW) interval based on a 36-foot crossing at 3.5 feet per second, a 4.4-second yellow clearance for a 40 mph street, and a 1-second all-red interval (7 + 11 + 4.4 + 1 = 23.4 seconds).

[4] Two consecutive activations would result in 48 seconds of red time, well below the 140-second threshold, and generate a queue approximately 175 feet long.

[5] 1 lane × 750 feet ÷ 25 feet per vehicle × 4.5 seconds = 135 seconds.

[6] Including a 7-second walk interval, a 7-second FDW (for a 23-foot crossing), a 4.4-second yellow clearance, and a 1-second all-red (7 + 7 + 4.4 + 1 = 19.4 seconds).

[7] These signs are categorized under "Advance Traffic Control" warning signs and are identified with the MUTCD code W3-3.

stretch of high-speed travel, such as Swarthmore Drive, to indicate to drivers they are transitioning into a more controlled traffic environment as part of a gateway treatment strategy.

Reduce Posted Speed Limits

Unsafe speeds[8] are a contributing factor in 40% of all crashes on Howe Avenue. Additionally, 49% of these crashes are rear-end crashes. Recent amendments to the California Vehicle Code through Assembly Bills 43 and 1938 authorize local jurisdictions to reduce posted speed limits by five miles per hour under specific conditions. These conditions include streets designated as Safety Corridors or those adjacent to land uses that attract high volumes of people walking and biking. However, only one five-mile-per-hour reduction may be applied per street segment.

[8] The California Vehicle Code defines "unsafe speed" in Section 22350, known as the Basic Speed Law. The statute states:

"No person shall drive a vehicle upon a highway at a speed greater than is reasonable or prudent having due regard for weather, visibility, the traffic on, and the surface and width of, the highway, and in no event at a speed which endangers the safety of persons or property"

Alternative 1

Description

Alternative 1 addresses the primary challenges of accommodating people biking on Howe Avenue while maintaining the corridor's existing motor vehicle capacity. With observed travel speeds exceeding 50 mph and daily volumes nearing 59,000 vehicles[9], the current bike lanes create conditions that do not meet recommended design standards for arterial streets. Current city standards recommend a separated bike lane (Class IV) for these types of streets, which must be at least 12 feet wide and would require an additional 7 feet of width. Rather than retrofitting a separated bike lane (Class IV) into a constrained street, this alternative proposes removing the existing bike lanes on Howe Avenue and encouraging people biking to use the existing striped bike lanes (Class II) on University Avenue; a nearby parallel route with posted speeds of 25 mph and substantially lower vehicular volumes. The change in routes for this section of Howe Avenue could add up to one half mile to bike trips.

Removing the bike lanes on Howe Avenue would allow the available space to be converted into a buffer zone, improving comfort and meeting city design standards for people biking. The composition of the sidewalk and buffer zone, a total width of 10 feet, would be subject to city design standards to provide accessible walking space while limiting city maintenance requirements. Considerations would include maximizing the walkable area and utilizing hardscape or landscape treatments adjacent to the new curb. While this change would increase biking distances for some users, it would provide a more comfortable experience for people biking to the American River Parkway.

Most elements in Alternative 1 are consistent across all alternatives and were described in the previous section. Elements specific to this alternative include:

- Remove the existing 5-foot bike lane (Class II) on Howe Avenue and encourage the use of University Avenue as an alternative connection.
- Re-allocate space from the existing bike lane (Class II), which does not meet city design standards, to install a buffer next to the sidewalk.
- Add a crosswalk and pedestrian signal across Howe Avenue at the north side of University Park
- Close the sidewalk gap on the west side of Howe Avenue between the new pedestrian signal and the University Avenue Overpass, and between the University Avenue Overpass and the American River Bridge
- Restrict east side University Avenue Overpass and Bridge Access and install directional wayfinding signage for people walking and biking, and

[9] https://www.cityofsacramento.gov/community-development/planning/long-range/general-plan/2040-general-plan

- Install directional signage and markers at the north and south end of American River Bridge.

These elements are further described below.

Remove Existing Bikeways on Howe Avenue and Encourage Use of University as an Alternative Route

Current city standards on a 50 MPH arterial street require a separated bike lane. However, the lack of available right of way on Howe Avenue (See the Corridor Concept Screening section for further information on screened elements) makes this infeasible. As an alternative, people biking would be encouraged through signage to use University Avenue to access the Guy West Bridge and the American River Parkway shared use path, and the City's bicycle map updated to remove Howe Avenue as having a bikeway. University Avenue is a low-speed, low volume street with striped bikeways and is included on the City's bicycle network map.

Widen Sidewalks and add a Buffer Zone with Vertical Delineators

Howe Avenue is not wide enough to include standard bikeways without reducing the number of vehicle travel lanes. City Ordinance 10.76.010[10] allows people to bicycle on sidewalk under certain requirements. In lieu of providing on-street bicycle infrastructure, this alternative widens existing sidewalks to 6 feet to allow people bicycling, walking, and rolling to navigate potential conflicts between users. Vertical Delineators can help to visually reinforce the edge of a vehicle travel lane, discourage encroachment, and signal a more constrained cross-section. Note that the 10-foot width available for the sidewalk and buffer zone is not sufficient for a two-way shared use path (Class I) per AASHTO Guidance (2012).

Add a Crosswalk and Pedestrian Signal across Howe Avenue at University Park and close west side sidewalk gaps

Due to the lack of sidewalk on the West Side of Howe Avenue between American River Drive and the bridge, there is no direct connection between the sidewalks on the north side of the American River (east side only) and the sidewalks on the south side of the American River (west side only). A crosswalk with a pedestrian signal before the University Avenue overpass would provide a protected crossing opportunity for people walking. Installing sidewalks in the gaps on the west side of Howe Avenue between the crosswalk and the bridge would then provide a direct connection across the river while minimizing necessary tree removals.

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[10] [City of Sacramento Ordinance 10.76.010]

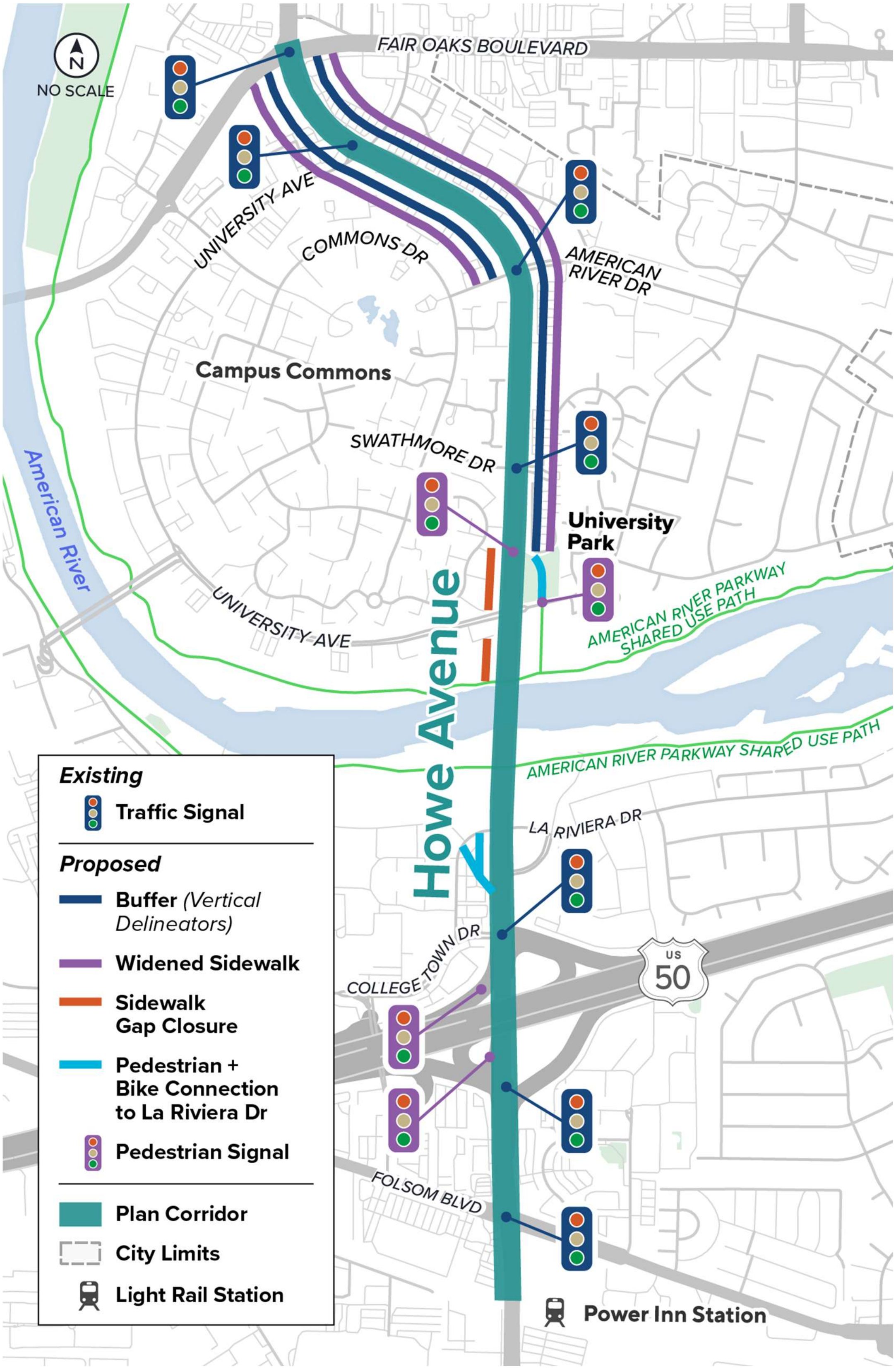

Figure 3: Alternative 1 Overview

Restrict East Side Bridge Access

In Alternative 1, the existing bridge configuration presents a connectivity gap due to the east-side sidewalk terminating without a connection to the existing sidewalk at the south end of the bridge. To address this gap without structural modifications, access for people walking on the east sidewalk would be restricted through signage and a possible physical barrier.

Add Wayfinding for People Walking and Biking

Installing directional signage at key locations along the street such as bus stops and high-activity areas would direct people to destinations such as the American River Parkway shared use path (Class I). Alternative 1 would add additional wayfinding components at the connections to the American River Bridge and direct people walking to the functional west-side pathway while preventing access to the disconnected east sidewalk.

Based on site observations and community feedback, areas identified for enhanced wayfinding were primarily at the north and south sides of the American River Bridge and American River shared use path access points. This solution focuses on installing additional directional and informational signage to address connectivity challenges, particularly the east-side bridge sidewalk, which terminates without a connection to La Riviera Drive.

At the northern side of the University Avenue overpass, signage would restrict access to the sidewalk on the east side of the University Avenue overpass and bridge. Directional signage would also guide people walking along the east side to cross to the west side for bridge access or to use the shared use path for access to the American River Parkway shared use path

On the southern end, wayfinding elements would guide people walking from the west sidewalk to La Riviera Drive via existing connection points. Signage would clearly mark these transitions, which are currently not easily visible.

Community outreach efforts also identified navigation challenges for people walking on the west side of Howe Avenue trying to cross to access Power Inn Light Rail Station on the east side south of Folsom Boulevard. New directional signage would be installed at key decision points to direct people to the existing pedestrian overcrossing, increasing awareness of this designated crossing location.

Figure 4 shows the general cross section proposed for this alternative.

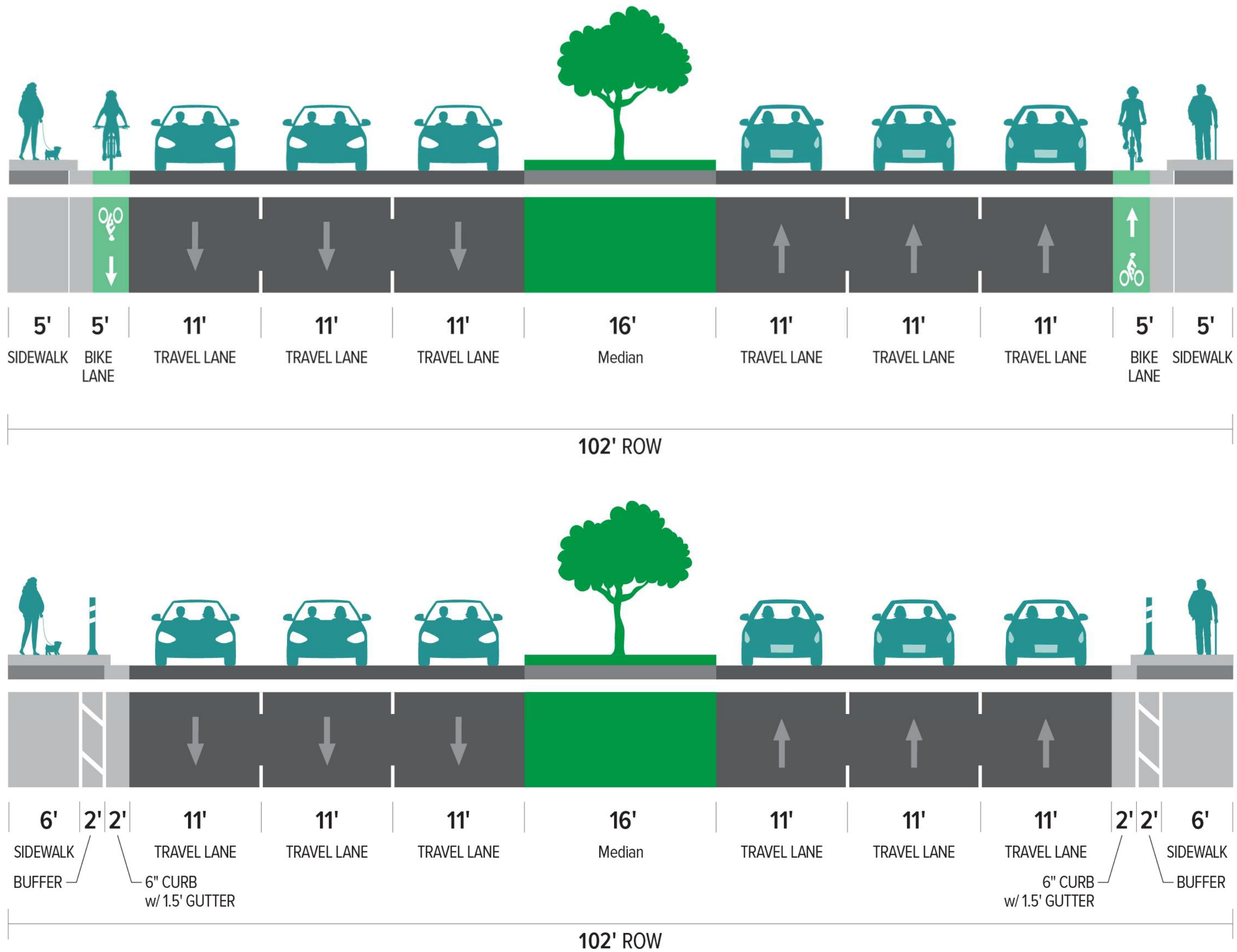

Figure 4: Existing Cross Section (Top) and Proposed Alternative 1 Cross-Section (Bottom)

Feasibility Analysis

Pedestrian Infrastructure Analysis

Alternative 1 reduces the level of traffic stress for people walking by adding a buffer between sidewalks and motor vehicle travel. By converting the existing bike lanes into buffered areas, the design provides a physical separation between people walking or rolling and adjacent high-speed traffic. This change, combined with signal upgrades such as Leading Pedestrian Intervals, high-visibility crosswalks, signalized crossings at the US 50 ramps, and the installation of wayfinding signage, addresses factors that contribute to stress for people walking or rolling along Howe Avenue.

Table 1 summarizes the PLTS scores for Alternative 1. The pedestrian level of traffic stress is illustrated in **Figure 5**. The PLTS scores are preliminary and represented by segments for the purposes of this analysis and do not reflect bi-directional conditions.

Table 1: Pedestrian Level of Traffic Stress – Alternative 1

	Fair Oaks Boulevard to Swarthmore Drive	Swarthmore Drive to University Avenue Overcrossing	University Avenue Overcrossing to La Riviera Drive	La Riviera Drive to Power Inn LRT Station
Street Width (Through Lanes per Direction)	3	3	2	3
Buffer Type	Vertical Delineation	Vertical Delineation	None	None
Total Buffer Width (ft)	5	5	0	0
Sidewalk Width (ft)	5	5	5	5
Speed Limit or Prevailing Speed [A] (MPH)	35	45	45	35
Existing PLTS Score [B]	4	4	4	4
Alternative 1 PLTS Score	2	2	4	3

Source: DKS Associates, 2025. ODOT Level of Traffic Stress Analysis Procedures.

A. Alternative 1 recommends speed limit reductions throughout the corridor. This analysis was conducted under the assumption that existing speed limits have been reduced by 5 mph.

B. Existing PLTS has variability in score for each segment as the analysis was done bi-directional. The Existing PLTS Score included in Table 4 is the highest existing score per segment for the purpose of this analysis.

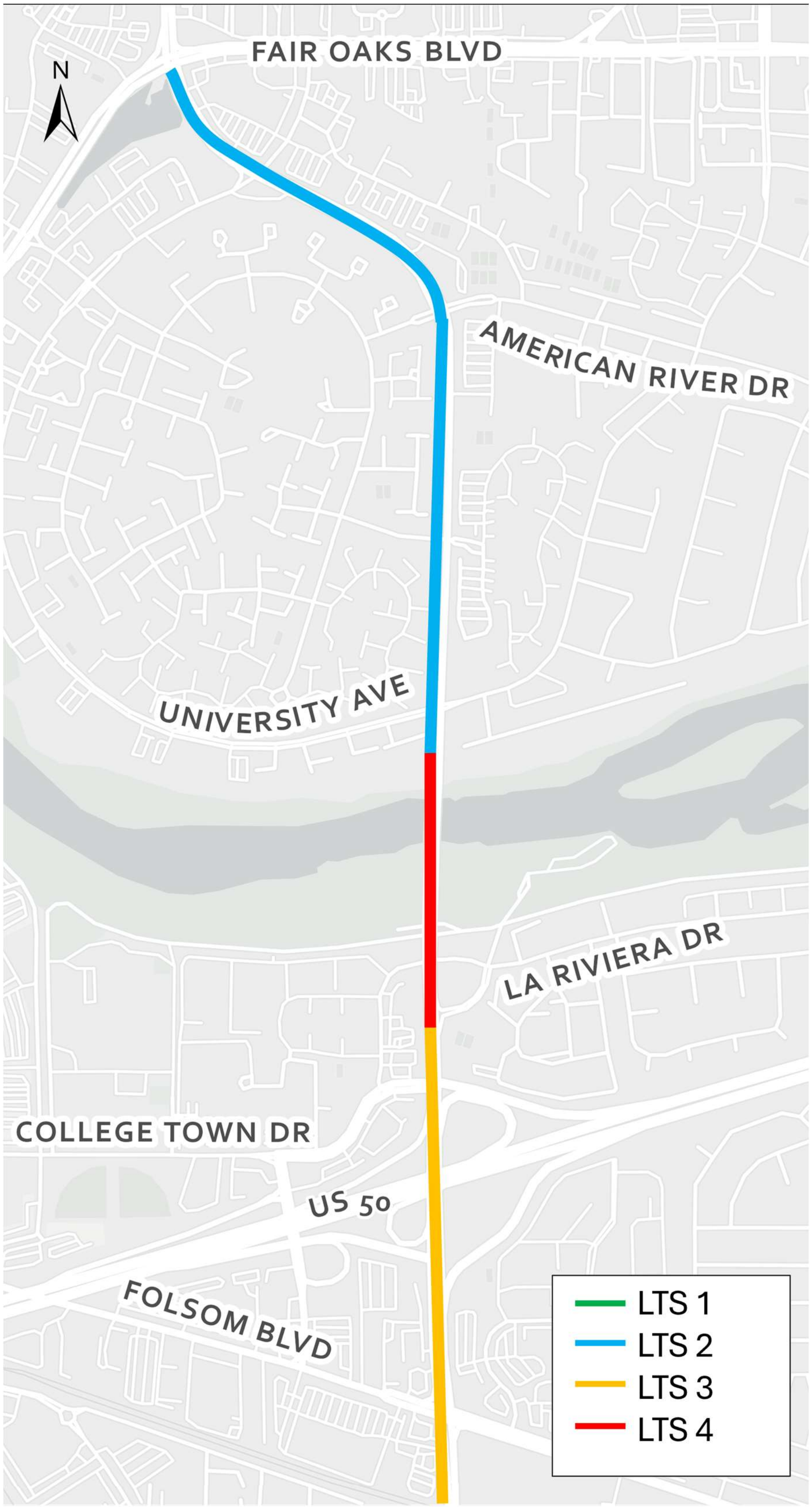

Figure 5: Pedestrian Level of Traffic Stress – Alternative 1

Bicycle Infrastructure Analysis

Alternative 1 redirects bicycle traffic from Howe Avenue to University Avenue, a parallel street with posted speed limits of 25 mph and lower motor vehicle volumes. This approach removes the existing bike lanes (Class II) on Howe Avenue and establishes an alternate route that meets all-ages-and-abilities design criteria. The alternative includes the installation of wayfinding signage to guide people biking to University Avenue and assist with navigation at key decision points, including near the American River Bridge and connections to the American River shared use path (Class I). Signal modifications throughout the corridor, including ADA-accessible signal upgrades and enhanced crossings at the US 50 ramps, would support people biking who need to cross Howe Avenue. Although this option results in a longer travel distance for people biking, it reduces exposure to higher-speed traffic by shifting bicycle traffic to a street with lower speeds and volumes.

Table 2. Bicycle Level of Traffic Stress – Alternative 1

	Fair Oaks Boulevard to University Avenue Overpass *(University Avenue Alternate Route)*	University Avenue Overpass to La Riviera Drive	La Riviera Drive to Power Inn LRT Station
Street Width (Through Lanes per Direction)	1	2	3
Bike Lane Width (Inc. Bike Lane, Buffer Width, Gutter) (ft)	13	0	5
Speed Limit or Prevailing Speed [A] (MPH)	30	45	35
Physically Separated Bike Lane?	No	No	No
Existing BLTS Score [B]	4	4	4
Alternative 1 PLTS Score	3	4	3

Source: DKS Associates, 2025. Mineta Transportation Institute, Low Stress Bicycling and Network Connectivity.

A. Alternative 1 recommends speed limit reductions throughout the corridor. This analysis was conducted under the assumption that existing speed limits have been reduced by 5 mph.

B. Existing BLTS has variability in score for Segment 3 and Segment 4 as the analysis was done bi-directional. The Existing BLTS Score included in Table 7 is the highest existing score per segment for the purpose of this analysis.

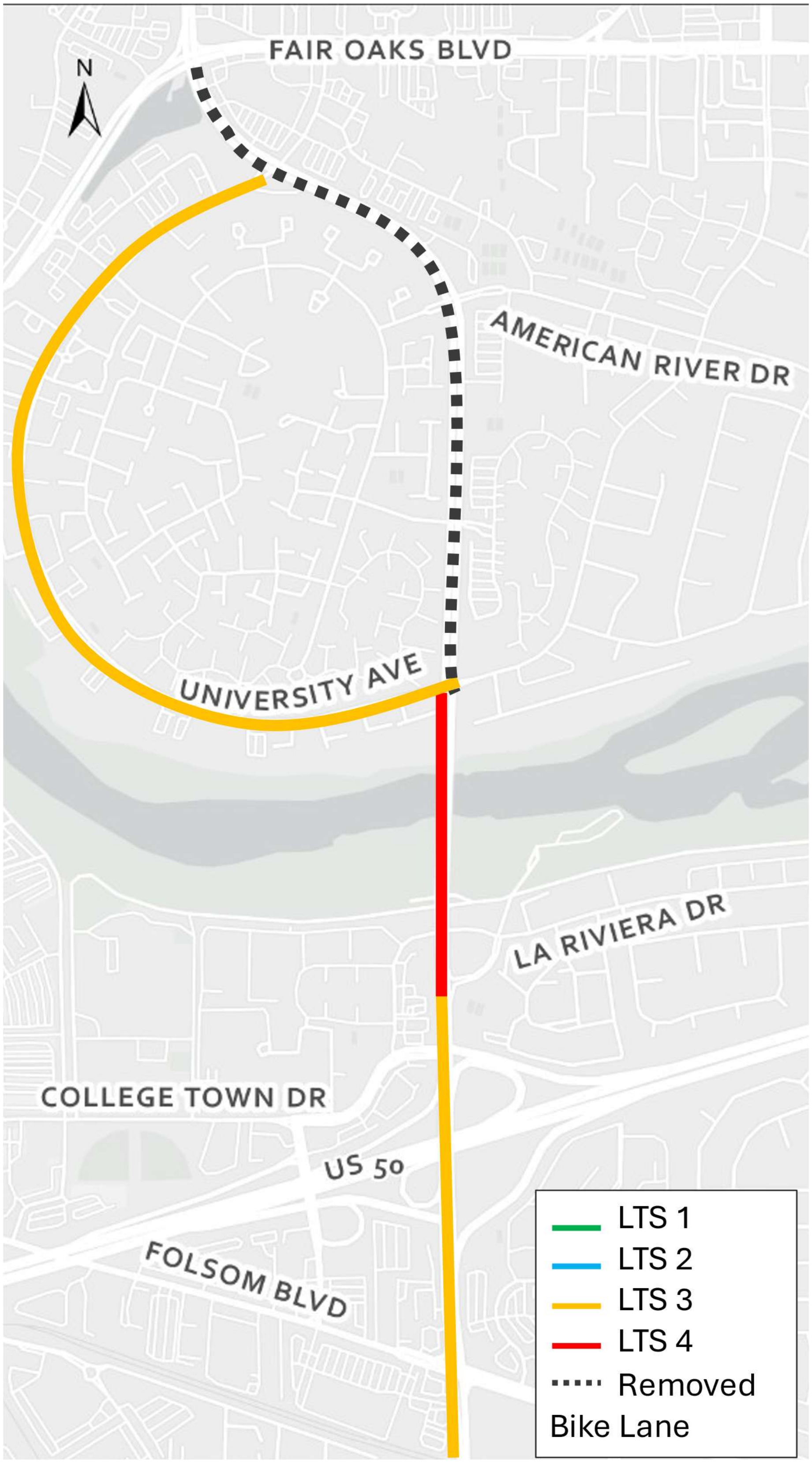

Figure 6: Bicycle Level of Traffic Stress – Alternative 1

Safety Benefit Assessment

Alternative 1 focuses on reducing conflicts between people walking or rolling and motor vehicles while maintaining current motor vehicle lane capacity on Howe Avenue. This alternative creates a buffer between sidewalks and high-speed traffic by repurposing the existing bike lane space, providing physical separation from vehicles traveling at 40–50 mph. Lowered speed limits, adjusted signal timing, and the addition of warning signs and visibility modifications on signal heads would partially address community comments and crash trends associated with rear-end and broadside crashes at intersections.

Signal modifications, including LPIs and high-visibility markings, increase visibility and provide dedicated crossing time at intersections. The proposed signalization of US 50 ramp crossings establishes clear right-of-way for people walking or rolling. Proposed installation of wayfinding signage guides users to routes with lower traffic volumes and fewer uncontrolled crossings, particularly at bridge approaches where direct access is currently limited.

For people biking, this alternative eliminates on-street bikeways and redirects cyclists to University Avenue, a parallel route with lower speeds (25 mph) and traffic volumes. While this rerouting reduces exposure to high-speed traffic, it requires longer trips with potential detours and additional crossings to access destinations on Howe Avenue.

Transit Assessment

Alternative 1 does not provide any change to existing transit facilities or connectivity.

Community Priority Alignment

In addition to the safety benefits described above, Alternative 1 includes direct connections to the American River Parkway shared use path with a pedestrian signal and sidewalk gap closer on the west side of Howe Avenue north of the University Avenue overpass and a shared use path connecting sidewalks on the east side of Howe Avenue through University Park to University Avenue. Alternative 1 provides a lower stress environment for people walking and accessing transit north of the American River Bridge by separating travel modes with a physical buffers.

The speed limit is reduced along the corridor, but more effective traffic calming measures are not implemented due to corridor constraints and forecasted traffic volumes.

Alternative 2

Description

Alternative 2 proposes Howe Avenue as a lower-stress street by adding wider landscape buffers and a continuous shared use path (Class I) along the east side. Compared to Alternative 1, it requires right-of-way acquisition but offers greater network connectivity and separation for people walking or rolling and biking.

A 10-foot-wide, ADA-accessible shared use path (Class I) would be constructed on the east side of Howe Avenue, buffered by a 8-foot planting strip with shade trees to separate users from motor vehicle traffic (40–50 mph). To support this, the design removes the existing 5-foot bike lanes and moves the curb closer to the travel lanes. This requires about 10 feet of right-of-way expansion between Fair Oaks Boulevard and Folsom Boulevard.

On the American River Bridge, a cantilevered structure would carry the shared use path, keeping it separate from vehicles. South of the bridge, an informal dirt path would be replaced with a paved path to La Riviera Drive. North of the bridge, access to the American River Parkway would be widened and upgraded.

New signalized crossings with pedestrian-activated or separate bike/walk phases would be added at US-50 on-ramps on both sides of Howe Avenue. Protected intersections and bicycle signal lead times would reduce turning conflicts.

Throughout the corridor, sidewalk-scale lighting and wayfinding signage would be installed, with signs placed at bridges, bus stops, and park connections to support visibility and navigation.

Figure 8 shows the general cross section proposed for Alternative 2. These proposed modifications are further described below.

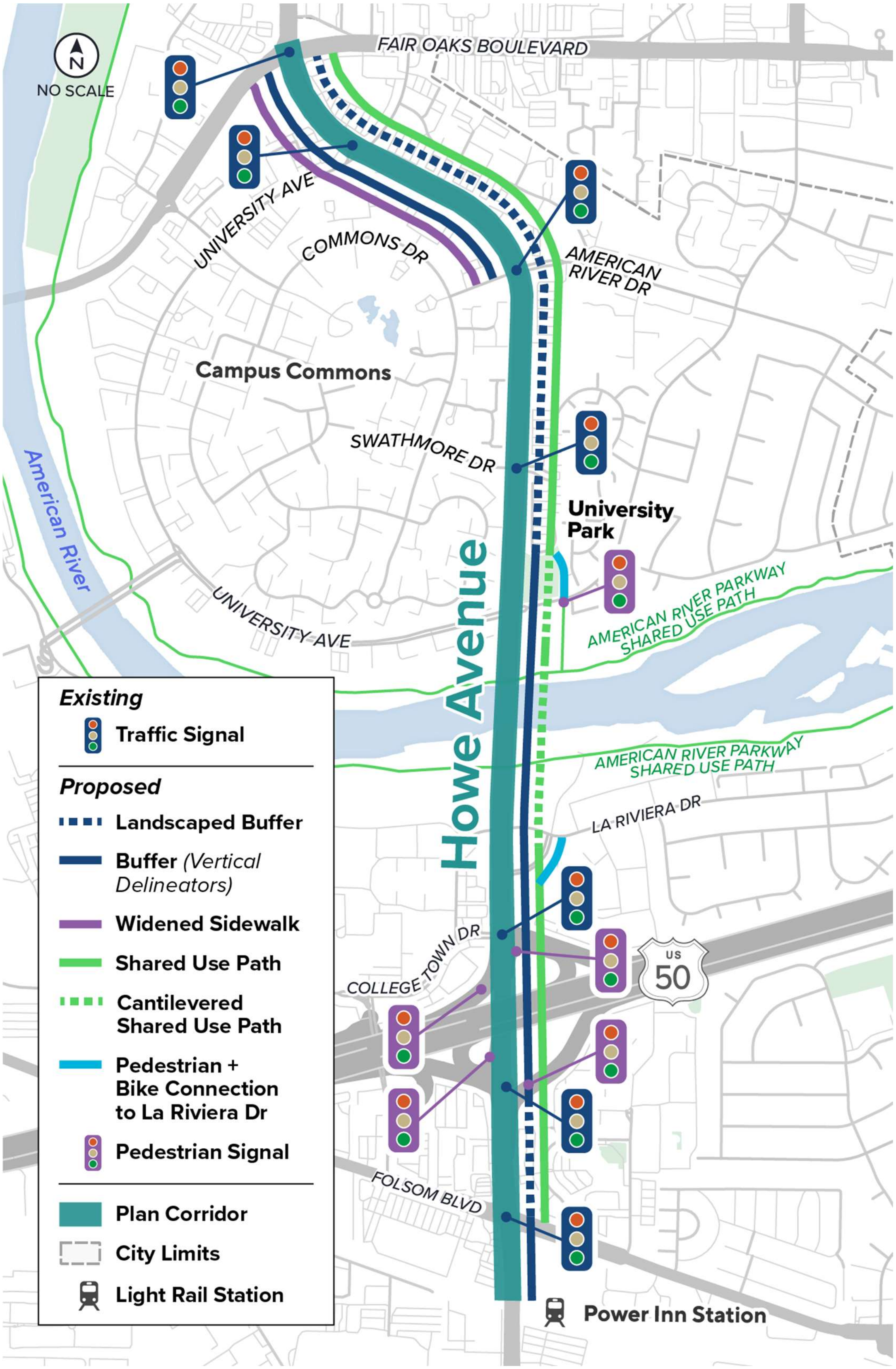

Figure 7: Alternative 2 Overview

Eastside Shared Use Path

The corridor right-of-way along the east side of Howe Avenue between Fair Oaks Avenue and the Power Inn Light Rail Station would be expanded by 10 feet to provide a new shared use path. This new facility would replace the existing bike lanes that are currently on Howe Avenue, which would be removed as part of this alternative. The shared use path would be at sidewalk level and be separated from vehicle traffic by a planted buffer along the full length of the street, including a new cantilever section of the American River Bridge.

Provide American River Bridge Connections

This alternative would modify connections for people walking or rolling and biking between Howe Avenue and the multimodal facilities at both ends of the American River Bridge, addressing existing infrastructure gaps. It would also expand ADA accessibility and general access between the American River Parkway shared use path (Class I) and University Park through a new facility constructed on the east side of Howe Avenue.

At the southern end of the bridge, the current informal dirt path connecting to La Riviera Drive would be replaced with a paved shared use path (Class I) that meets ADA slope and surface standards. This connection would include defined entry and exit points and consistent path surfacing for people walking, biking, or using mobility devices.

On the northern side, the project would establish more direct links between Howe Avenue and the American River Parkway. This alternative includes widened shared use paths (Class I), graded surface transitions, and removal of existing physical barriers. Wayfinding signage, including directional markers and trail maps, would support navigation between the street and shared use path system.

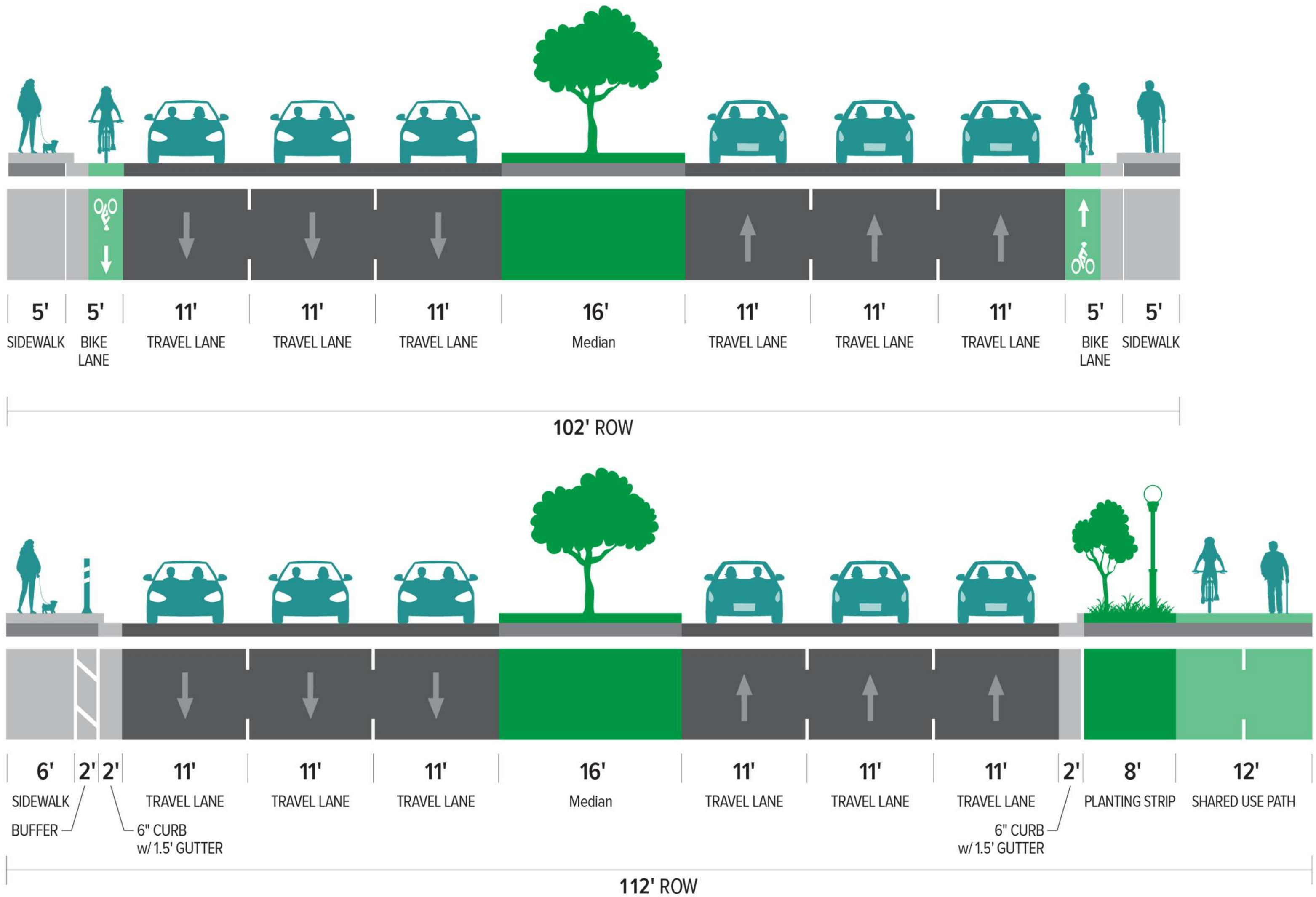

Figure 8: Existing Cross Section (Top) and Proposed Alternative 2 Cross Section (Bottom)

Feasibility Analysis

While Alternative 2 addresses many of the project goals, it does include several engineering challenges that must be addressed during later design stages and would include higher implementation costs. They include:

- Acquisition of right-of-way along the east side of Howe Avenue, which would include the removal of existing parking for adjacent commercial/office land uses and the removal of a tennis court for a residential community.
- Identifying an alignment along the east side of Howe Avenue that minimizes tree impacts and avoids the large electrical towers.
- Crossing double right-turn lanes at the WB US 50 off-ramp without causing queuing and safety concerns on the freeway.

Pedestrian Infrastructure Analysis

Alternative 2 is designed to provide a consistently low-stress (defined here as separated from traffic and suitable for users of all ages and abilities) walking environment along the entire Howe Avenue corridor by:

- Converting the former bike lane area into a landscaped buffer adjacent to the existing sidewalk (north of La Riviera Dr);
- Constructing a new 10-foot-wide, ADA-accessible shared use path (Class I) on the east side of the street from Fair Oaks Blvd. to the Power Inn light-rail station, separated from traffic by a 5-foot landscaped buffer (including a cantilevered section over the American River Bridge); and
- Enhancing bridge approaches and freeway-ramp crossings with high-visibility crosswalks, signals or beacons for people walking or rolling, leading pedestrian intervals (LPIs), and other treatments that reduce conflict points and improve visibility.

These changes reduce the exposure of people walking or rolling to motor vehicle traffic traveling at 40–50 mph, shorten perceived crossing distances, and create continuous, ADA-accessible connections to the American River Parkway, Power Inn station, and nearby neighborhoods.

Table 3 presents the preliminary PLTS scores for Alternative 2, segmented for analysis purposes. These scores, illustrated in Figure XX, represent unidirectional conditions.

Table 3: Pedestrian Level of Traffic Stress – Alternative 2

	Fair Oaks Boulevard to Swarthmore Drive	Swarthmore Drive to University Avenue Overcrossing	University Avenue Overcrossing to La Riviera Drive	La Riviera Drive to Power Inn LRT Station
Street Width (Through Lanes per Direction)	3	3	2	3
Buffer Type	Landscaped	Landscaped	Vertical Delineators	Vertical Delineators
Total Buffer Width (ft)	8	8	2	2
Sidewalk Width (ft)	6 (sidewalk) / 10 (shared-use path)	10 (shared-use path)	10 (shared-use path)	10 (shared-use path)
Speed Limit or Prevailing Speed [A] (MPH)	35	45	45	35
Existing PLTS Score [B]	4	4	4	4
Alternative 2 PLTS Score	1	1	1	1-3

Source: ODOT Level of Traffic Stress Analysis Procedures.

A. Alternative 2 recommends speed limit reductions throughout the corridor. This analysis was conducted under the assumption that existing speed limits have been reduced by 5 mph.

B. Existing PLTS has variability in score for each segment as the analysis was done bi-directional. The Existing PLTS Score included in Table 4 is the highest existing score per segment for the purpose of this analysis.

Figure 9: Pedestrian Level of Traffic Stress – Alternative 2

Bicycle Infrastructure Analysis

Alternative 2 replaces the on-street bike lanes with a continuous, two-way shared use path (Class I) on the east side of Howe Avenue. The path is raised to sidewalk level and buffered from traffic by an 8-foot landscaped buffer. It then cantilevers over the American River Bridge, maintaining physical separation across the river. Intersections incorporate protected intersection geometry or bike-specific signal phases to minimize conflicts and maintain separation through crossings.

The design features full physical separation through an 8-foot buffer zone, curb, and elevation difference, exceeding CHDM guidance for Bicycle Level of Traffic Stress (BLTS) 1 facilities on arterial streets. A 10-foot-wide cantilevered segment removes a pinch point on the bridge and includes a concrete barrier to reduce stress levels even under high traffic volumes. At intersections, elements such as refuge islands, forward stop bars, and dedicated bicycle signal phases reduce right-turn conflicts and support BLTS 1 to 2 conditions.

Two-way operation is supported by centerline striping and advance signage, which help manage bidirectional flow and reduce passing-related stress under moderate people walking or rolling and micromobility volumes. The facility connects directly to the American River Parkway and terminates at Folsom Boulevard allowing most corridor trips to be completed entirely on infrastructure that meets low-stress design criteria.

Table 4. Bicycle Level of Traffic Stress – Alternative 2

	Fair Oaks Boulevard to University Avenue Overpass *(University Avenue Alternate Route)*	University Avenue Overpass to La Riviera Drive	La Riviera Drive to Power Inn LRT Station
Street Width (Through Lanes per Direction)	3	3	3
Bike Lane Width (Inc. Bike Lane, Buffer Width, Gutter) (ft)	13	0	5
Speed Limit or Prevailing Speed [A] (MPH)	30	45	35
Physically Separated Bike Lane?	Yes	Yes	Yes
Existing BLTS Score [B]	4	4	4
Alternative 1 PLTS Score	1	1	1-3

Source: DKS Associates, 2025. Mineta Transportation Institute, Low Stress Bicycling and Network Connectivity.

A. Alternative 2 recommends speed limit reductions throughout the corridor. This analysis was conducted under the assumption that existing speed limits have been reduced by 5 mph.

B. Existing BLTS has variability in score for Segment 3 and Segment 4 as the analysis was done bi-directional. The Existing BLTS Score included in Table 7 is the highest existing score per segment for the purpose of this analysis.

Figure 10: Bicycle Level of Traffic Stress – Alternative 2

Safety Benefit Assessment

Alternative 2 provides safety benefits through separation of travel modes, increased intersection visibility and a reduced speed limit on Howe Avenue. Signal modifications, including LPIs and high-visibility markings, increase visibility and provide dedicated crossing time at intersections. The proposed signalization of US 50 ramp crossings establishes clear right-of-way for people walking or rolling.

Lowered speed limits, adjusted signal timing, and the addition of warning signs and visibility modifications to signal heads would partially address community comments and crash trends associated with rear-end and broadside crashes at intersections.

The addition of a shared use path and a wide landscaping buffer would separate people walking and biking from vehicle traffic, improving the perception of the corridor as a safer route to walk and bike along.

Transit Assessment

Alternative 2 provides space for people riding bikes at the sidewalk level so conflicts between transit vehicles and people riding bikes is not a concern with this alternative. The wide landscaping strip would allow for stops to be designed where those boarding transit are not in conflict with people riding bikes. Shade trees would allow for improved protection from sun.

Community Priority Alignment

In addition to the safety benefits described above, Alternative 2 includes direct connections to the American River Parkway shared use path and to the Power Inn Light Rail Station, including the addition of signalized crosswalks at freeway ramps. Alternative 2 also provides a low stress environment for people walking, biking, and accessing transit along the entire corridor by reducing traffic speeds and separating travel modes with physical buffers and sidewalk-scale lighting, including a separated structure across the river and the freeway interchange.

The speed limit is reduced along the corridor, but more effective traffic calming measures are not implemented due to corridor constraints and forecasted traffic volumes.

Comparison of Alternative Analysis Results

Table 5 on the next page summarizes the findings of this report in regards to how the proposed alternatives perform on key metrics in comparison with each other. Each alternative is compared based on how it addresses mobility and safety along the corridor. Discussion with the community is still underway to better understand which alternative best aligns with local community values so no one alternative is recommended over another at this time.

Table 5: Comparison of Alternatives

Metric	No Build	Alt. 1	Alt. 2
Defining Characteristics	No Change	• Additional Crossing Opportunities • Widen existing sidewalk and add a physical buffer	• Shared use path • Landscaped buffers with shade trees • Cantilever path on the east side of the river bridge and interchange
Average Level of Traffic Stress			
Walking	4	3	1
Biking	4	3	1
Safety Modifications			
Added Crossing Opportunities	N/A	1	0
Traffic Calming Elements	N/A	• Speed Limit Reduction	• Speed Limit Reduction
Other Safety Enhancements	N/A	• Crossing Enhancements at US 50 Interchange • Vertical Buffer	• Crossing Enhancements at US 50 Interchange • Shared Use Path • Landscaped Buffers • Sidewalk Scale Lighting
Transit Enhancements	N/A	• Wider Sidewalks Increase Waiting Area	• Wider Sidewalks Increase Waiting Area

Corridor Concept Screening

Roundabout At Swarthmore Drive

A roundabout at the intersection of Howe Avenue and Swarthmore Dive was considered to serve as a gateway treatment between the US 50 interchange and the signal at American River Drive due to the observed high speeds and public feedback. The curved alignment requires drivers to slow down, making roundabouts an intuitive speed management tool. Additionally, they provide a visual transition between different street environments, influencing driver expectations and behavior.

NCHRP Report 672[11] provides guidance for the amount of daily traffic that a roundabout is designed to handle. The Sacramento 2040 General Plan[12] provides a forecast of over 50,000 AADT for the study corridor, which would require a roundabout with three lanes to handle. Based on the required footprint for such a roundabout not being available at Swarthmore without impacting existing structures, and lack of other similar roundabouts in the region, this was screened out as a potential modification to the corridor.

Reallocation of Right of Way between American River Bridge and Fair Oaks Boulevard

Reallocation of the existing right of way between the American River Bridge and Fair Oaks Boulevard to reduce the number of vehicle travel lanes to two lanes in each direction, consistent with existing bridge configuration was considered to provide additional space to allocate to wider sidewalks, bikeways, and landscaping buffers. It would also provide additional traffic calming and lower vehicle speeds due to reduced vehicle travel lanes.

The Sacramento 2040 General Plan provides a forecast of over 50,000 AADT for the study corridor, which would result in traffic volumes of 30% to 50% over the available capacity of the reduced travel lanes. As a result, this was screened out as a potential modification to the corridor.

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[11] NCHRP Report 672 Roundabouts: An Informational Guide Second Edition, https://accessmanagement.info/document/nchrp-report-672-roundabouts-informational-guide-second-edition/

[12] https://www.cityofsacramento.gov/community-development/planning/long-range/general-plan/2040-general-plan

Separated Bikeway (Class IV) between American River Bridge and Fair Oaks Boulevard

The addition of a separated bikeway on Howe Avenue would provide a low-stress space for people biking. Without reallocating space from existing vehicle travel lanes for a bikeway, the roadway would need to be widened to provide sufficient right of way to add a separated bikeway. Widening the roadway on either side would require the removal of a large number of trees, a large amount of earthwork to flatten the existing berm on either side of Howe Avenue and impact the large electric towers on the east side of Howe Avenue. As a result, this was screened out as a potential modification to the corridor.

Sidewalk Gap Closures on the west side of Howe Avenue

Currently, there are no sidewalks on the west side of Howe Avenue between American River Drive and the American River Bridge. Adding sidewalks along this segment would improve connectivity and provide more direct access along Howe Avenue from existing bus stops, the American River Parkway shared use path, University Park and other destinations on the corridor.

Without reallocating space from existing vehicle travel lanes for a sidewalk, additional right of way would need to be acquired to add a sidewalk. This would require the removal of a large number of trees and a large amount of earthwork to flatten the existing berm on the west side of Howe Avenue. As a result, this was screened out as a potential modification to the corridor.

Appendix

Section 1. Synchro Intersection Analysis Results

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	30	90	110	90	35	170	1230	230	30	735	85
Future Volume (veh/h)	25	30	90	110	90	35	170	1230	230	30	735	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	25	30	90	78	134	35	170	1230	230	30	735	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	162	170	142	163	264	67	198	2571	481	113	2806	
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.04	0.20	0.20	0.06	0.55	0.00
Sat Flow, veh/h	1781	1870	1562	1781	2881	729	1781	4321	808	1781	5274	0
Grp Volume(v), veh/h	25	30	90	78	85	84	170	969	491	30	735	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1562	1781	1870	1739	1781	1702	1725	1781	1702	0
Q Serve(g_s), s	1.6	1.8	6.7	5.0	5.2	5.5	11.4	30.3	30.3	1.9	9.1	0.0
Cycle Q Clear(g_c), s	1.6	1.8	6.7	5.0	5.2	5.5	11.4	30.3	30.3	1.9	9.1	0.0
Prop In Lane	1.00		1.00	1.00		0.42	1.00		0.47	1.00		0.00
Lane Grp Cap(c), veh/h	162	170	142	163	171	159	198	2026	1026	113	2806	
V/C Ratio(X)	0.15	0.18	0.63	0.48	0.50	0.52	0.86	0.48	0.48	0.27	0.26	
Avail Cap(c_a), veh/h	441	463	387	441	463	430	200	2026	1026	181	2806	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.87	0.00
Uniform Delay (d), s/veh	50.3	50.4	52.6	51.8	51.9	52.0	56.9	31.7	31.7	53.6	14.2	0.0
Incr Delay (d2), s/veh	0.3	0.4	3.4	1.6	1.7	2.0	27.6	0.8	1.6	0.4	0.2	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.9	2.8	2.3	2.5	2.5	6.9	14.0	14.4	0.9	3.4	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	50.6	50.8	56.1	53.4	53.5	54.0	84.5	32.5	33.3	54.0	14.4	0.0
LnGrp LOS	D	D	E	D	D	D	F	C	C	D	B	
Approach Vol, veh/h		145			247			1630			765	
Approach Delay, s/veh		54.0			53.6			38.2			16.0	
Approach LOS		D			D			D			B	

Timer - Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		15.2	12.4	77.1		15.3	17.8	71.6
Change Period (Y+Rc), s		4.3	4.8	5.7		4.3	4.5	5.7
Max Green Setting (Gmax), s		29.7	12.2	29.3		29.7	13.5	28.3
Max Q Clear Time (g_c+I1), s		8.7	3.9	32.3		7.5	13.4	11.1
Green Ext Time (p_c), s		0.6	0.0	0.0		0.9	0.0	3.0

Intersection Summary	
HCM 7th Control Delay, s/veh	34.3
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	265	145	210	725	430	225	1020	230	395	1355	210
Future Volume (veh/h)	110	265	145	210	725	430	225	1020	230	395	1355	210
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	110	265	145	210	725	430	225	1020	0	395	1355	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	205	545	289	284	934	1248	300	1454		638	1943	
Arrive On Green	0.06	0.24	0.24	0.08	0.26	0.26	0.09	0.28	0.00	0.18	0.38	0.00
Sat Flow, veh/h	3456	2243	1190	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	110	208	202	210	725	430	225	1020	0	395	1355	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1656	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	3.0	9.6	10.1	5.7	18.1	1.8	6.1	17.1	0.0	10.1	21.5	0.0
Cycle Q Clear(g_c), s	3.0	9.6	10.1	5.7	18.1	1.8	6.1	17.1	0.0	10.1	21.5	0.0
Prop In Lane	1.00		0.72	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	205	432	402	284	934	1248	300	1454		638	1943	
V/C Ratio(X)	0.54	0.48	0.50	0.74	0.78	0.34	0.75	0.70		0.62	0.70	
Avail Cap(c_a), veh/h	1262	741	691	1273	1487	1682	1262	2663		2163	3196	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.8	31.1	31.3	43.0	32.7	7.0	42.8	30.6	0.0	36.0	25.0	0.0
Incr Delay (d2), s/veh	0.8	0.9	1.1	1.4	1.1	0.1	1.4	0.7	0.0	0.4	0.5	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	4.0	3.9	2.4	7.4	1.4	2.6	6.7	0.0	4.1	8.2	0.0
Unsig. Movement Delay, s/veh									38.00			28.50
LnGrp Delay(d), s/veh	44.6	32.0	32.3	44.4	33.8	7.1	44.2	31.3	38.0	36.3	25.5	28.5
LnGrp LOS	D	C	C	D	C	A	D	C	D	D	C	C
Approach Vol, veh/h		520			1365			1360			1855	
Approach Delay, s/veh		34.8			27.0			34.0			28.0	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	30.9	22.8	32.2	11.9	29.0	13.4	41.6
Change Period (Y+Rc), s	4.3	* 5.7	5.1	4.9	4.0	5.7	5.1	* 5.1
Max Green Setting (Gmax), s	35.0	* 40	60.0	50.0	35.3	40.0	35.0	* 60
Max Q Clear Time (g_c+I1), s	5.0	20.1	12.1	19.1	7.7	12.1	8.1	23.5
Green Ext Time (p_c), s	0.1	5.1	0.5	8.2	0.2	2.5	0.2	13.0

Intersection Summary	
HCM 7th Control Delay, s/veh	30.0
HCM 7th LOS	C

Notes
User approved pedestrian interval to be less than phase max green.
* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	600	45	45	890	180	265	955	35	270	880	565
Future Volume (vph)	275	600	45	45	890	180	265	955	35	270	880	565
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Lane Util. Factor	0.97	0.91	1.00	1.00	0.95	1.00	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	3539	1583	3433	5058		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	3539	1583	3433	5058		3433	5085	1583
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)	275	600	45	45	890	180	265	955	35	270	880	565
RTOR Reduction (vph)	0	0	31	0	0	127	0	3	0	0	0	0
Lane Group Flow (vph)	275	600	14	45	890	53	265	987	0	270	880	565
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		3!	8		7	4	14!
Permitted Phases			6			2						1
Actuated Green, G (s)	13.9	38.5	38.5	9.6	34.7	34.7	13.6	39.2		13.7	39.3	66.7
Effective Green, g (s)	13.9	38.5	38.5	9.6	34.7	34.7	13.6	39.2		13.7	39.3	66.7
Actuated g/C Ratio	0.12	0.32	0.32	0.08	0.29	0.29	0.11	0.33		0.11	0.33	0.56
Clearance Time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	397	1631	507	141	1023	457	389	1652		391	1665	928
v/s Ratio Prot	0.08	c0.12		0.03	c0.25		0.08	0.20		c0.08	0.17	c0.27
v/s Ratio Perm			0.01			0.03						0.09
v/c Ratio	0.69	0.37	0.03	0.32	0.87	0.12	0.68	0.60		0.69	0.53	0.61
Uniform Delay, d1	51.0	31.4	27.9	52.1	40.5	31.4	51.1	33.8		51.1	32.8	17.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.40	0.85		1.00	1.00	1.00
Incremental Delay, d2	4.2	0.1	0.0	0.5	7.8	0.0	3.4	1.4		4.2	1.2	0.8
Delay (s)	55.2	31.4	27.9	52.6	48.3	31.4	74.9	30.0		55.3	34.0	18.7
Level of Service	E	C	C	D	D	C	E	C		E	C	B
Approach Delay (s/veh)		38.4			45.7			39.5			32.3	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	275	600	45	45	890	180	265	990	270	880	565
v/c Ratio	0.69	0.37	0.08	0.25	0.89	0.31	0.68	0.58	0.69	0.52	0.57
Control Delay (s/veh)	60.6	32.4	0.2	54.0	53.2	6.2	79.6	30.1	60.7	34.4	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.6	32.4	0.2	54.0	53.2	6.2	79.6	30.1	60.7	34.4	17.3
Queue Length 50th (ft)	107	132	0	33	338	1	109	186	105	206	237
Queue Length 95th (ft)	151	167	0	71	#433	54	158	230	147	260	435
Internal Link Dist (ft)		794			572			911		448	
Turn Bay Length (ft)	530		100	300			260		205		270
Base Capacity (vph)	444	1643	599	228	1044	593	457	1697	457	1705	989
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.37	0.08	0.20	0.85	0.30	0.58	0.58	0.59	0.52	0.57

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	123	78	157	170	1460	30	820
v/c Ratio	0.11	0.28	0.39	0.37	0.74	0.53	0.17	0.35
Control Delay (s/veh)	44.9	16.2	52.2	40.7	69.3	21.6	66.6	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.9	16.2	52.2	40.7	69.3	21.6	66.6	8.9
Queue Length 50th (ft)	17	13	64	53	126	242	25	33
Queue Length 95th (ft)	39	37	101	75	#239	#571	m49	68
Internal Link Dist (ft)		594		409		1494		911
Turn Bay Length (ft)	90		140		230		100	
Base Capacity (vph)	398	806	398	823	235	2747	179	2344
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.15	0.20	0.19	0.72	0.53	0.17	0.35

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	110	410	210	725	430	225	1020	230	395	1355	210
v/c Ratio	0.49	0.42	0.64	0.66	0.27	0.65	0.71	0.45	0.61	0.72	0.32
Control Delay (s/veh)	68.9	37.5	67.5	44.3	2.5	67.2	45.3	26.3	53.7	37.7	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	68.9	37.5	67.5	44.3	2.5	67.2	45.3	26.3	53.7	37.7	14.9
Queue Length 50th (ft)	46	132	89	280	9	95	285	96	157	355	56
Queue Length 95th (ft)	87	217	144	417	36	153	360	185	236	441	124
Internal Link Dist (ft)		499		869			545			781	
Turn Bay Length (ft)	230		225		320	155		130	720		210
Base Capacity (vph)	931	1070	939	1099	1918	931	1970	667	1596	2959	967
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.38	0.22	0.66	0.22	0.24	0.52	0.34	0.25	0.46	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	75	250	305	45	105	40	1275	180	35	1300	40
Future Volume (veh/h)	125	75	250	305	45	105	40	1275	180	35	1300	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	125	75	250	305	45	105	40	1275	180	35	1300	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	320	336	285	408	57	133	126	2222	314	118	2504	
Arrive On Green	0.18	0.18	0.18	0.11	0.11	0.11	0.07	0.49	0.49	0.07	0.49	0.00
Sat Flow, veh/h	1781	1870	1585	3563	498	1163	1781	4513	637	1781	5274	0
Grp Volume(v), veh/h	125	75	250	305	0	150	40	962	493	35	1300	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1661	1781	1702	1746	1781	1702	0
Q Serve(g_s), s	8.0	4.5	20.0	10.8	0.0	11.4	2.8	26.0	26.0	2.4	22.6	0.0
Cycle Q Clear(g_c), s	8.0	4.5	20.0	10.8	0.0	11.4	2.8	26.0	26.0	2.4	22.6	0.0
Prop In Lane	1.00		1.00	1.00		0.70	1.00		0.36	1.00		0.00
Lane Grp Cap(c), veh/h	320	336	285	408	0	190	126	1676	860	118	2504	
V/C Ratio(X)	0.39	0.22	0.88	0.75	0.00	0.79	0.32	0.57	0.57	0.30	0.52	
Avail Cap(c_a), veh/h	434	456	387	869	0	405	171	1676	860	167	2504	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.69	0.69	0.00
Uniform Delay (d), s/veh	47.0	45.6	51.9	55.7	0.0	56.0	57.4	23.3	23.3	57.8	22.6	0.0
Incr Delay (d2), s/veh	0.6	0.2	14.5	2.0	0.0	5.3	0.5	1.4	2.8	0.4	0.5	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	2.1	9.1	5.0	0.0	5.1	1.3	10.4	11.0	1.1	8.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	47.6	45.8	66.4	57.8	0.0	61.3	58.0	24.8	26.1	58.2	23.2	0.0
LnGrp LOS	D	D	E	E		E	E	C	C	E	C	
Approach Vol, veh/h		450			455			1495			1335	
Approach Delay, s/veh		57.8			58.9			26.1			24.1	
Approach LOS		E			E			C			C	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		27.7	13.4	69.7		19.2	13.7	69.4				
Change Period (Y+Rc), s		4.3	4.8	5.7		4.3	4.5	5.7				
Max Green Setting (Gmax), s		31.7	12.2	35.3		31.7	12.5	35.3				
Max Q Clear Time (g_c+I1), s		22.0	4.4	28.0		13.4	4.8	24.6				
Green Ext Time (p_c), s		1.4	0.0	3.8		1.5	0.0	4.6				
Intersection Summary												
HCM 7th Control Delay, s/veh			33.2									
HCM 7th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	450	250	290	720	485	255	1410	235	480	1570	180
Future Volume (veh/h)	100	450	250	290	720	485	255	1410	235	480	1570	180
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	100	450	250	290	720	485	255	1410	0	480	1570	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	162	534	294	349	1042	1255	314	1743		542	2072	
Arrive On Green	0.05	0.24	0.24	0.10	0.29	0.29	0.09	0.34	0.00	0.16	0.41	0.00
Sat Flow, veh/h	3456	2210	1218	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	100	361	339	290	720	485	255	1410	0	480	1570	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1651	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	3.5	23.9	24.2	10.2	22.2	2.1	9.0	31.1	0.0	16.8	32.6	0.0
Cycle Q Clear(g_c), s	3.5	23.9	24.2	10.2	22.2	2.1	9.0	31.1	0.0	16.8	32.6	0.0
Prop In Lane	1.00		0.74	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	162	429	399	349	1042	1255	314	1743		542	2072	
V/C Ratio(X)	0.62	0.84	0.85	0.83	0.69	0.39	0.81	0.81		0.89	0.76	
Avail Cap(c_a), veh/h	978	575	534	986	1152	1342	978	2064		1676	2477	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	57.8	44.7	44.8	54.6	38.7	11.4	55.2	37.1	0.0	51.1	31.5	0.0
Incr Delay (d2), s/veh	1.4	8.6	9.8	2.0	1.4	0.1	1.9	2.2	0.0	2.0	1.2	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	11.2	10.7	4.4	9.6	2.9	3.9	12.7	0.0	7.3	13.1	0.0
Unsig. Movement Delay, s/veh									39.50			30.50
LnGrp Delay(d), s/veh	59.3	53.2	54.5	56.5	40.2	11.5	57.1	39.3	39.5	53.1	32.7	30.5
LnGrp LOS	E	D	D	E	D	B	E	D	D	D	C	C
Approach Vol, veh/h		800			1495			1780			2140	
Approach Delay, s/veh		54.5			34.0			41.8			37.2	
Approach LOS		D			C			D			D	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.1	42.0	24.5	47.1	16.5	35.6	16.3	55.3
Change Period (Y+Rc), s	4.3	* 5.7	5.1	4.9	4.0	5.7	5.1	* 5.1
Max Green Setting (Gmax), s	35.0	* 40	60.0	50.0	35.3	40.0	35.0	* 60
Max Q Clear Time (g_c+I1), s	5.5	24.2	18.8	33.1	12.2	26.2	11.0	34.6
Green Ext Time (p_c), s	0.1	4.9	0.6	9.1	0.3	3.7	0.3	13.4

Intersection Summary	
HCM 7th Control Delay, s/veh	40.0
HCM 7th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	580	1050	115	105	900	160	240	1250	70	295	1185	520
Future Volume (vph)	580	1050	115	105	900	160	240	1250	70	295	1185	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Lane Util. Factor	0.97	0.91	1.00	1.00	0.95	1.00	0.97	0.91		0.97	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	3539	1583	3433	5045		3433	5085	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	3539	1583	3433	5045		3433	5085	1583
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)	580	1050	115	105	900	160	240	1250	70	295	1185	520
RTOR Reduction (vph)	0	0	77	0	0	122	0	5	0	0	0	0
Lane Group Flow (vph)	580	1050	38	105	900	38	240	1315	0	295	1185	520
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		3!	8		7	4	14!
Permitted Phases			6			2						1
Actuated Green, G (s)	26.4	42.7	42.7	13.1	29.9	29.9	13.4	40.7		14.5	41.8	81.5
Effective Green, g (s)	26.4	42.7	42.7	13.1	29.9	29.9	13.4	40.7		14.5	41.8	81.5
Actuated g/C Ratio	0.20	0.33	0.33	0.10	0.23	0.23	0.10	0.31		0.11	0.32	0.63
Clearance Time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	697	1670	519	178	813	364	353	1579		382	1635	1037
v/s Ratio Prot	c0.17	0.21		0.06	c0.25		0.07	c0.26		c0.09	0.23	c0.21
v/s Ratio Perm			0.02			0.02						0.12
v/c Ratio	0.83	0.63	0.07	0.59	1.11	0.11	0.68	0.83		0.77	0.72	0.50
Uniform Delay, d1	49.7	36.9	30.0	55.9	50.1	39.5	56.2	41.5		56.1	39.0	13.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.11	0.75		1.00	1.00	1.00
Incremental Delay, d2	8.0	0.5	0.0	3.2	65.1	0.0	3.6	4.7		8.6	2.8	0.1
Delay (s)	57.7	37.5	30.1	59.1	115.1	39.5	66.2	36.0		64.7	41.8	13.3
Level of Service	E	D	C	E	F	D	E	D		E	D	B
Approach Delay (s/veh)		43.7			99.7			40.6			37.8	
Approach LOS		D			F			D			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	51.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	580	1050	115	105	900	160	240	1320	295	1185	520
v/c Ratio	0.83	0.63	0.19	0.59	1.11	0.33	0.68	0.83	0.77	0.73	0.48
Control Delay (s/veh)	60.3	39.9	6.3	69.5	111.0	9.4	71.3	35.8	70.3	41.9	11.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	60.3	39.9	6.3	69.5	111.0	9.4	71.3	35.8	70.3	41.9	11.0
Queue Length 50th (ft)	243	273	0	87	~467	1	79	397	125	319	170
Queue Length 95th (ft)	293	349	43	146	#710	64	156	260	175	372	263
Internal Link Dist (ft)		794			572			911		448	
Turn Bay Length (ft)	530		100	300			260		205		270
Base Capacity (vph)	937	1669	600	211	813	485	422	1673	422	1689	1084
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.63	0.19	0.50	1.11	0.33	0.57	0.79	0.70	0.70	0.48

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	112	338	156	299	40	1455	35	1340
v/c Ratio	0.55	0.56	0.68	0.59	0.25	0.54	0.21	0.51
Control Delay (s/veh)	61.8	17.3	66.2	44.3	59.0	24.0	47.5	51.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	61.8	17.3	66.2	44.3	59.0	24.0	47.5	51.5
Queue Length 50th (ft)	101	37	140	103	32	291	29	359
Queue Length 95th (ft)	150	77	202	139	70	#520	m48	454
Internal Link Dist (ft)		594		409		1494		911
Turn Bay Length (ft)	90		140		230		100	
Base Capacity (vph)	392	922	392	813	170	2705	166	2622
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.37	0.40	0.37	0.24	0.54	0.21	0.51

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	100	700	290	720	485	255	1410	235	480	1570	180
v/c Ratio	0.52	0.77	0.76	0.64	0.31	0.73	0.84	0.42	0.84	0.78	0.27
Control Delay (s/veh)	81.1	55.6	79.7	48.5	3.2	80.2	53.8	31.9	75.3	44.3	18.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	81.1	55.6	79.7	48.5	3.2	80.2	53.8	31.9	75.3	44.3	18.4
Queue Length 50th (ft)	50	318	146	323	19	128	476	129	240	496	62
Queue Length 95th (ft)	88	439	208	432	43	187	606	235	317	619	134
Internal Link Dist (ft)		499		869			545			781	
Turn Bay Length (ft)	230		225		320	155		130	720		210
Base Capacity (vph)	790	914	797	1121	1843	790	1672	565	1355	2512	823
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.77	0.36	0.64	0.26	0.32	0.84	0.42	0.35	0.63	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	35	85	75	80	25	175	1040	220	30	645	95
Future Volume (veh/h)	25	35	85	75	80	25	175	1040	220	30	645	95
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	25	35	85	60	101	25	175	1040	220	30	645	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	162	170	142	163	267	64	200	1738	367	113	1949	
Arrive On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.04	0.20	0.20	0.06	0.55	0.00
Sat Flow, veh/h	1781	1870	1562	1781	2917	698	1781	2920	616	1781	3647	0
Grp Volume(v), veh/h	25	35	85	60	64	62	175	631	629	30	645	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1562	1781	1870	1745	1781	1777	1760	1781	1777	0
Q Serve(g_s), s	1.6	2.1	6.3	3.8	3.8	4.0	11.7	38.8	39.1	1.9	12.0	0.0
Cycle Q Clear(g_c), s	1.6	2.1	6.3	3.8	3.8	4.0	11.7	38.8	39.1	1.9	12.0	0.0
Prop In Lane	1.00		1.00	1.00		0.40	1.00		0.35	1.00		0.00
Lane Grp Cap(c), veh/h	162	170	142	163	171	160	200	1058	1047	113	1949	
V/C Ratio(X)	0.15	0.21	0.60	0.37	0.37	0.39	0.87	0.60	0.60	0.27	0.33	
Avail Cap(c_a), veh/h	441	463	387	441	463	432	200	1058	1047	181	1949	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.74	0.74	0.00
Uniform Delay (d), s/veh	50.3	50.5	52.4	51.3	51.3	51.4	56.9	35.1	35.2	53.6	14.9	0.0
Incr Delay (d2), s/veh	0.3	0.4	3.0	1.0	1.0	1.2	30.8	2.5	2.5	0.3	0.3	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	1.0	2.6	1.7	1.8	1.8	7.3	19.1	19.0	0.9	4.7	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	50.6	51.0	55.4	52.3	52.3	52.5	87.7	37.6	37.8	53.9	15.3	0.0
LnGrp LOS	D	D	E	D	D	D	F	D	D	D	B	
Approach Vol, veh/h		145			186			1435			675	
Approach Delay, s/veh		53.5			52.4			43.8			17.0	
Approach LOS		D			D			D			B	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		15.2	12.4	77.1		15.3	18.0	71.5				
Change Period (Y+Rc), s		4.3	4.8	5.7		4.3	4.5	5.7				
Max Green Setting (Gmax), s		29.7	12.2	29.3		29.7	13.5	28.3				
Max Q Clear Time (g_c+I1), s		8.3	3.9	41.1		6.0	13.7	14.0				
Green Ext Time (p_c), s		0.6	0.0	0.0		0.6	0.0	2.4				
Intersection Summary												
HCM 7th Control Delay, s/veh			37.6									
HCM 7th LOS			D									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	260	145	205	730	420	230	1005	230	395	1345	210
Future Volume (veh/h)	110	260	145	205	730	420	230	1005	230	395	1345	210
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	110	260	145	205	730	420	230	1005	0	395	1345	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	205	547	295	279	938	1259	305	1434		647	1929	
Arrive On Green	0.06	0.25	0.25	0.08	0.26	0.26	0.09	0.28	0.00	0.19	0.38	0.00
Sat Flow, veh/h	3456	2227	1203	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	110	206	199	205	730	420	230	1005	0	395	1345	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1654	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	3.0	9.5	9.9	5.6	18.2	1.8	6.2	16.9	0.0	10.1	21.3	0.0
Cycle Q Clear(g_c), s	3.0	9.5	9.9	5.6	18.2	1.8	6.2	16.9	0.0	10.1	21.3	0.0
Prop In Lane	1.00		0.73	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	205	436	406	279	938	1259	305	1434		647	1929	
V/C Ratio(X)	0.54	0.47	0.49	0.73	0.78	0.33	0.75	0.70		0.61	0.70	
Avail Cap(c_a), veh/h	1262	741	690	1272	1486	1689	1262	2663		2163	3196	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	43.8	30.9	31.0	43.1	32.7	6.8	42.7	30.9	0.0	35.8	25.2	0.0
Incr Delay (d2), s/veh	0.8	0.9	1.0	1.4	1.1	0.1	1.4	0.7	0.0	0.3	0.5	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	4.0	3.9	2.3	7.5	1.4	2.6	6.6	0.0	4.1	8.1	0.0
Unsig. Movement Delay, s/veh									38.70			28.60
LnGrp Delay(d), s/veh	44.6	31.7	32.0	44.5	33.8	6.9	44.1	31.5	38.7	36.1	25.7	28.6
LnGrp LOS	D	C	C	D	C	A	D	C	D	D	C	C
Approach Vol, veh/h		515			1355			1350			1845	
Approach Delay, s/veh		34.6			27.1			34.3			28.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	31.0	23.1	31.8	11.7	29.2	13.6	41.3
Change Period (Y+Rc), s	4.3	* 5.7	5.1	4.9	4.0	5.7	5.1	* 5.1
Max Green Setting (Gmax), s	35.0	* 40	60.0	50.0	35.3	40.0	35.0	* 60
Max Q Clear Time (g_c+I1), s	5.0	20.2	12.1	18.9	7.6	11.9	8.2	23.3
Green Ext Time (p_c), s	0.1	5.1	0.5	8.0	0.2	2.5	0.2	12.9

Intersection Summary	
HCM 7th Control Delay, s/veh	30.1
HCM 7th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	305	600	50	40	885	170	240	815	25	240	810	595
Future Volume (vph)	305	600	50	40	885	170	240	815	25	240	810	595
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Lane Util. Factor	0.97	0.91	1.00	1.00	0.95	1.00	0.97	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	3539	1583	3433	3523		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	3539	1583	3433	3523		3433	3539	1583
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)	305	600	50	40	885	170	240	815	25	240	810	595
RTOR Reduction (vph)	0	0	33	0	0	120	0	2	0	0	0	0
Lane Group Flow (vph)	305	600	17	40	885	50	240	838	0	240	810	595
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		3!	8		7	4	14!
Permitted Phases			6			2						1
Actuated Green, G (s)	14.2	41.9	41.9	7.2	35.4	35.4	13.0	38.9		13.0	38.9	66.0
Effective Green, g (s)	14.2	41.9	41.9	7.2	35.4	35.4	13.0	38.9		13.0	38.9	66.0
Actuated g/C Ratio	0.12	0.35	0.35	0.06	0.30	0.30	0.11	0.32		0.11	0.32	0.55
Clearance Time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	406	1775	552	106	1044	466	371	1142		371	1147	919
v/s Ratio Prot	c0.09	0.12		0.02	c0.25		c0.07	c0.24		0.07	0.23	c0.28
v/s Ratio Perm			0.01			0.03						0.10
v/c Ratio	0.75	0.34	0.03	0.38	0.85	0.11	0.65	0.73		0.65	0.71	0.65
Uniform Delay, d1	51.2	28.8	25.7	54.2	39.8	30.8	51.3	36.0		51.3	35.5	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.38	0.84		1.00	1.00	1.00
Incremental Delay, d2	6.8	0.0	0.0	0.8	6.3	0.0	2.3	3.3		2.9	3.7	1.2
Delay (s)	58.0	28.9	25.7	55.1	46.0	30.8	73.1	33.5		54.2	39.2	20.1
Level of Service	E	C	C	E	D	C	E	C		D	D	C
Approach Delay (s/veh)		38.0			44.0			42.3			34.5	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
! Phase conflict between lane groups.			
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	305	600	50	40	885	170	240	840	240	810	595
v/c Ratio	0.75	0.34	0.08	0.23	0.89	0.30	0.64	0.70	0.64	0.68	0.60
Control Delay (s/veh)	63.2	30.2	0.2	53.3	53.8	6.2	77.0	32.8	59.4	38.5	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	63.2	30.2	0.2	53.3	53.8	6.2	77.0	32.8	59.4	38.5	17.9
Queue Length 50th (ft)	118	131	0	29	336	0	98	225	93	292	256
Queue Length 95th (ft)	167	167	0	65	#427	51	146	292	133	380	473
Internal Link Dist (ft)		794			572			911		448	
Turn Bay Length (ft)	530		100	300			260		205		270
Base Capacity (vph)	443	1775	637	228	1037	584	457	1196	457	1199	993
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.34	0.08	0.18	0.85	0.29	0.53	0.70	0.53	0.68	0.60

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	123	60	120	175	1260	30	740
v/c Ratio	0.11	0.28	0.31	0.29	0.74	0.66	0.17	0.46
Control Delay (s/veh)	44.9	17.7	50.1	38.3	69.0	24.2	62.1	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	44.9	17.7	50.1	38.3	69.0	24.2	62.1	16.8
Queue Length 50th (ft)	17	15	49	39	130	336	25	46
Queue Length 95th (ft)	39	39	81	59	#250	#824	m39	#368
Internal Link Dist (ft)		594		409		1494		911
Turn Bay Length (ft)	90		140		230		100	
Base Capacity (vph)	398	808	398	826	240	1916	179	1626
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.15	0.15	0.15	0.73	0.66	0.17	0.46

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	110	405	205	730	420	230	1005	230	395	1345	210
v/c Ratio	0.49	0.41	0.63	0.66	0.26	0.66	0.72	0.46	0.59	0.72	0.32
Control Delay (s/veh)	68.9	36.9	67.5	44.4	2.3	67.1	46.2	26.8	52.3	37.7	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	68.9	36.9	67.5	44.4	2.3	67.1	46.2	26.8	52.3	37.7	14.8
Queue Length 50th (ft)	46	129	87	283	7	97	284	97	155	353	56
Queue Length 95th (ft)	87	213	142	422	32	157	360	187	232	438	123
Internal Link Dist (ft)		499		869			545			781	
Turn Bay Length (ft)	230		225		320	155		130	720		210
Base Capacity (vph)	931	1070	939	1099	1935	931	1970	668	1596	2959	967
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.38	0.22	0.66	0.22	0.25	0.51	0.34	0.25	0.45	0.22

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	135	65	250	260	45	100	35	1115	120	25	1105	35
Future Volume (veh/h)	135	65	250	260	45	100	35	1115	120	25	1105	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	135	65	250	260	45	100	35	1115	120	25	1105	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	320	336	285	394	57	127	118	1642	176	98	1773	
Arrive On Green	0.18	0.18	0.18	0.11	0.11	0.11	0.07	0.51	0.51	0.05	0.50	0.00
Sat Flow, veh/h	1781	1870	1585	3563	516	1147	1781	3232	347	1781	3647	0
Grp Volume(v), veh/h	135	65	250	260	0	145	35	612	623	25	1105	0
Grp Sat Flow(s),veh/h/ln	1781	1870	1585	1781	0	1664	1781	1777	1802	1781	1777	0
Q Serve(g_s), s	8.7	3.8	20.0	9.1	0.0	11.0	2.4	33.6	33.8	1.7	29.4	0.0
Cycle Q Clear(g_c), s	8.7	3.8	20.0	9.1	0.0	11.0	2.4	33.6	33.8	1.7	29.4	0.0
Prop In Lane	1.00		1.00	1.00		0.69	1.00		0.19	1.00		0.00
Lane Grp Cap(c), veh/h	320	336	285	394	0	184	118	903	916	98	1773	
V/C Ratio(X)	0.42	0.19	0.88	0.66	0.00	0.79	0.30	0.68	0.68	0.26	0.62	
Avail Cap(c_a), veh/h	434	456	387	869	0	406	171	903	916	167	1773	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.56	0.56	0.00
Uniform Delay (d), s/veh	47.3	45.3	51.9	55.5	0.0	56.3	57.8	24.0	24.0	58.9	23.7	0.0
Incr Delay (d2), s/veh	0.7	0.2	14.6	1.4	0.0	5.5	0.5	4.1	4.1	0.3	0.9	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	1.8	9.1	4.2	0.0	4.9	1.1	14.5	14.8	0.8	12.1	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	48.0	45.5	66.5	56.9	0.0	61.9	58.3	28.1	28.1	59.2	24.6	0.0
LnGrp LOS	D	D	E	E		E	E	C	C	E	C	
Approach Vol, veh/h		450			405			1270			1130	
Approach Delay, s/veh		57.9			58.7			28.9			25.4	
Approach LOS		E			E			C			C	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		27.7	11.9	71.7		18.7	13.1	70.6				
Change Period (Y+Rc), s		4.3	4.8	5.7		4.3	4.5	5.7				
Max Green Setting (Gmax), s		31.7	12.2	35.3		31.7	12.5	35.3				
Max Q Clear Time (g_c+I1), s		22.0	3.7	35.8		13.0	4.4	31.4				
Green Ext Time (p_c), s		1.4	0.0	0.0		1.3	0.0	1.9				

Intersection Summary		
HCM 7th Control Delay, s/veh		35.4
HCM 7th LOS		D

Notes
User approved volume balancing among the lanes for turning movement.
Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	425	230	285	705	490	250	1405	240	490	1565	180
Future Volume (veh/h)	90	425	230	285	705	490	250	1405	240	490	1565	180
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	90	425	230	285	705	490	250	1405	0	490	1565	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	164	514	276	346	996	1229	311	1762		554	2112	
Arrive On Green	0.05	0.23	0.23	0.10	0.28	0.28	0.09	0.34	0.00	0.16	0.41	0.00
Sat Flow, veh/h	3456	2234	1197	3456	3554	2790	3456	5106	1585	3456	5106	1585
Grp Volume(v), veh/h	90	337	318	285	705	490	250	1405	0	490	1565	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1655	1728	1777	1395	1728	1702	1585	1728	1702	1585
Q Serve(g_s), s	3.0	21.6	21.9	9.7	21.3	2.1	8.5	29.8	0.0	16.6	31.0	0.0
Cycle Q Clear(g_c), s	3.0	21.6	21.9	9.7	21.3	2.1	8.5	29.8	0.0	16.6	31.0	0.0
Prop In Lane	1.00		0.72	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	164	409	381	346	996	1229	311	1762		554	2112	
V/C Ratio(X)	0.55	0.82	0.83	0.82	0.71	0.40	0.80	0.80		0.88	0.74	
Avail Cap(c_a), veh/h	1010	594	553	1019	1190	1381	1010	2132		1732	2558	
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	55.8	43.8	43.9	52.8	38.7	11.3	53.5	35.4	0.0	49.2	29.7	0.0
Incr Delay (d2), s/veh	1.1	6.5	7.6	1.9	1.4	0.2	1.9	1.9	0.0	1.9	1.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	9.9	9.5	4.2	9.1	2.8	3.7	12.1	0.0	7.2	12.3	0.0
Unsig. Movement Delay, s/veh									37.80			27.60
LnGrp Delay(d), s/veh	56.8	50.3	51.5	54.7	40.1	11.5	55.3	37.3	37.8	51.1	30.7	27.6
LnGrp LOS	E	D	D	D	D	B	E	D	D	D	C	C
Approach Vol, veh/h		745			1480			1775			2145	
Approach Delay, s/veh		51.6			33.4			39.9			35.2	
Approach LOS		D			C			D			D	
Timer - Assigned Phs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**				
Phs Duration (G+Y+Rc), s	10.0	39.2	24.3	46.2	16.0	33.3	15.9	54.6				
Change Period (Y+Rc), s	4.3	* 5.7	5.1	4.9	4.0	5.7	5.1	* 5.1				
Max Green Setting (Gmax), s	35.0	* 40	60.0	50.0	35.3	40.0	35.0	* 60				
Max Q Clear Time (g_c+I1), s	5.0	23.3	18.6	31.8	11.7	23.9	10.5	33.0				
Green Ext Time (p_c), s	0.1	4.9	0.6	9.5	0.3	3.6	0.3	13.8				
Intersection Summary												
HCM 7th Control Delay, s/veh			38.1									
HCM 7th LOS			D									

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 7th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	610	1055	105	80	880	150	235	1135	60	285	1050	570
Future Volume (vph)	610	1055	105	80	880	150	235	1135	60	285	1050	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Lane Util. Factor	0.97	0.91	1.00	1.00	0.95	1.00	0.97	0.95		0.97	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	3539	1583	3433	3513		3433	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	3539	1583	3433	3513		3433	3539	1583
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)	610	1055	105	80	880	150	235	1135	60	285	1050	570
RTOR Reduction (vph)	0	0	70	0	0	120	0	3	0	0	0	0
Lane Group Flow (vph)	610	1055	35	80	880	30	235	1192	0	285	1050	570
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	custom
Protected Phases	1	6		5	2		3!	8		7	4	14!
Permitted Phases			6			2						1
Actuated Green, G (s)	27.5	42.8	42.8	10.1	25.9	25.9	13.3	43.8		14.3	44.8	85.5
Effective Green, g (s)	27.5	42.8	42.8	10.1	25.9	25.9	13.3	43.8		14.3	44.8	85.5
Actuated g/C Ratio	0.21	0.33	0.33	0.08	0.20	0.20	0.10	0.34		0.11	0.34	0.66
Clearance Time (s)	4.5	5.5	5.5	4.5	5.0	5.0	4.0	5.0		4.0	5.0	3.7
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lane Grp Cap (vph)	726	1674	521	137	705	315	351	1183		377	1219	1086
v/s Ratio Prot	c0.18	0.21		0.05	c0.25		0.07	c0.34		c0.08	0.30	c0.23
v/s Ratio Perm			0.02			0.02						0.13
v/c Ratio	0.84	0.63	0.07	0.58	1.25	0.09	0.67	1.01		0.76	0.86	0.52
Uniform Delay, d1	49.1	36.9	29.9	57.9	52.1	42.5	56.2	43.1		56.2	39.7	11.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.16	0.83		1.00	1.00	1.00
Incremental Delay, d2	8.3	0.6	0.0	4.0	123.3	0.0	3.1	25.9		7.5	8.1	0.2
Delay (s)	57.5	37.5	29.9	62.0	175.4	42.5	68.3	61.9		63.6	47.8	11.8
Level of Service	E	D	C	E	F	D	E	E		E	D	B
Approach Delay (s/veh)		43.9			149.3			62.9			39.4	
Approach LOS		D			F			E			D	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	65.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	610	1055	105	80	880	150	235	1195	285	1050	570
v/c Ratio	0.84	0.63	0.17	0.47	1.30	0.35	0.67	0.99	0.76	0.85	0.50
Control Delay (s/veh)	59.9	40.0	4.9	65.0	185.7	8.8	73.1	57.0	69.3	46.7	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	59.9	40.0	4.9	65.0	185.7	8.8	73.1	57.0	69.3	46.7	9.7
Queue Length 50th (ft)	256	284	0	65	~498	0	85	~566	121	426	171
Queue Length 95th (ft)	306	346	34	116	#705	55	153	#722	169	#564	292
Internal Link Dist (ft)		794			572			911		448	
Turn Bay Length (ft)	530		100	300			260		205		270
Base Capacity (vph)	937	1673	601	211	679	431	422	1210	422	1242	1143
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.65	0.63	0.17	0.38	1.30	0.35	0.56	0.99	0.68	0.85	0.50

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	121	329	138	267	35	1235	25	1140
v/c Ratio	0.58	0.54	0.63	0.54	0.21	0.65	0.15	0.59
Control Delay (s/veh)	62.6	16.0	65.0	39.9	58.3	26.6	44.0	49.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	62.6	16.0	65.0	39.9	58.3	26.6	44.0	49.7
Queue Length 50th (ft)	108	34	124	82	28	387	21	457
Queue Length 95th (ft)	160	72	181	116	63	#770	m30	#656
Internal Link Dist (ft)		594		409		1494		911
Turn Bay Length (ft)	90		140		230		100	
Base Capacity (vph)	392	920	392	822	170	1906	166	1930
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.36	0.35	0.32	0.21	0.65	0.15	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	90	655	285	705	490	250	1405	240	490	1565	180
v/c Ratio	0.48	0.77	0.74	0.66	0.32	0.72	0.82	0.42	0.82	0.75	0.26
Control Delay (s/veh)	79.4	56.4	77.4	49.5	2.6	78.0	51.1	31.3	72.2	41.3	17.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	79.4	56.4	77.4	49.5	2.6	78.0	51.1	31.3	72.2	41.3	17.7
Queue Length 50th (ft)	44	294	140	314	13	123	460	129	240	474	60
Queue Length 95th (ft)	81	407	206	421	37	184	606	241	323	614	133
Internal Link Dist (ft)		499		869			545			781	
Turn Bay Length (ft)	230		225		320	155		130	720		210
Base Capacity (vph)	811	937	818	1076	1831	811	1716	578	1390	2578	843
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.70	0.35	0.66	0.27	0.31	0.82	0.42	0.35	0.61	0.21

Intersection Summary

Section 2. Sidra Intersection Analysis Results

MOVEMENT SUMMARY

Site: 1 [Howe/Swarthmore - AM (Site Folder: Road Diet Option)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Howe Ave & Swarthmore Dr
Site Category: Future Conditions 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Howe Ave															
3	L2	All MCs	60	2.0	60	2.0	0.597	9.4	LOS A	4.9	125.0	0.42	0.18	0.42	27.3
8	T1	All MCs	1435	2.0	1435	2.0	0.597	9.4	LOS A	4.9	125.0	0.42	0.18	0.42	35.8
18	R2	All MCs	25	2.0	25	2.0	0.597	9.4	LOS A	4.9	125.0	0.42	0.18	0.42	24.4
Approach			1520	2.0	1520	2.0	0.597	9.4	LOS A	4.9	125.0	0.42	0.18	0.42	35.1
East: University Park Dr															
1	L2	All MCs	25	2.0	25	2.0	0.163	13.5	LOS B	0.5	12.2	0.77	0.77	0.77	22.8
6	T1	All MCs	5	2.0	5	2.0	0.163	13.5	LOS B	0.5	12.2	0.77	0.77	0.77	19.3
16	R2	All MCs	25	2.0	25	2.0	0.163	13.5	LOS B	0.5	12.2	0.77	0.77	0.77	22.9
Approach			55	2.0	55	2.0	0.163	13.5	LOS B	0.5	12.2	0.77	0.77	0.77	22.5
North: Howe Ave															
7	L2	All MCs	25	2.0	25	2.0	0.350	5.9	LOS A	1.9	48.7	0.28	0.12	0.28	25.2
4	T1	All MCs	805	2.0	805	2.0	0.350	5.9	LOS A	1.9	48.7	0.28	0.12	0.28	37.8
14	R2	All MCs	60	2.0	60	2.0	0.350	5.9	LOS A	1.9	48.7	0.28	0.12	0.28	28.7
Approach			890	2.0	890	2.0	0.350	5.9	LOS A	1.9	48.7	0.28	0.12	0.28	36.5
West: Swarthmore Dr															
5	L2	All MCs	60	2.0	60	2.0	0.179	7.7	LOS A	0.6	15.7	0.60	0.57	0.60	27.0
2	T1	All MCs	5	2.0	5	2.0	0.179	7.7	LOS A	0.6	15.7	0.60	0.57	0.60	20.2
12	R2	All MCs	50	2.0	50	2.0	0.179	7.7	LOS A	0.6	15.7	0.60	0.57	0.60	27.3
Approach			115	2.0	115	2.0	0.179	7.7	LOS A	0.6	15.7	0.60	0.57	0.60	26.7
All Vehicles			2580	2.0	2580	2.0	0.597	8.2	LOS A	4.9	125.0	0.39	0.19	0.39	34.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Organisation: DKS ASSOCIATES | Licence: NETWORK / FLOATING | Processed: Wednesday, March 26, 2025 2:22:45 PM
Project: L:\All-DKS\SAC\P\24000\600s\24692-000 Howe Avenue Transportation & Vision Zero\06 Analysis\Sidra\Future Conditions - Howe & Swarthmore.sip9

MOVEMENT SUMMARY

Site: 1 [Howe/Swarthmore - PM (Site Folder: Road Diet Option)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Howe Ave & Swarthmore Dr
Site Category: Future Conditions 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] ft	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Howe Ave															
3	L2	All MCs	60	2.0	60	2.0	0.532	8.3	LOS A	3.9	98.4	0.37	0.16	0.37	27.6
8	T1	All MCs	1270	2.0	1270	2.0	0.532	8.3	LOS A	3.9	98.4	0.37	0.16	0.37	36.4
18	R2	All MCs	25	2.0	25	2.0	0.532	8.3	LOS A	3.9	98.4	0.37	0.16	0.37	24.7
Approach			1355	2.0	1355	2.0	0.532	8.3	LOS A	3.9	98.4	0.37	0.16	0.37	35.6
East: University Park Dr															
1	L2	All MCs	25	2.0	25	2.0	0.140	11.3	LOS B	0.4	10.7	0.73	0.73	0.73	23.3
6	T1	All MCs	5	2.0	5	2.0	0.140	11.3	LOS B	0.4	10.7	0.73	0.73	0.73	19.7
16	R2	All MCs	25	2.0	25	2.0	0.140	11.3	LOS B	0.4	10.7	0.73	0.73	0.73	23.4
Approach			55	2.0	55	2.0	0.140	11.3	LOS B	0.4	10.7	0.73	0.73	0.73	23.0
North: Howe Ave															
7	L2	All MCs	25	2.0	25	2.0	0.662	10.8	LOS B	6.3	159.9	0.48	0.20	0.48	24.0
4	T1	All MCs	1600	2.0	1600	2.0	0.662	10.8	LOS B	6.3	159.9	0.48	0.20	0.48	35.1
14	R2	All MCs	60	2.0	60	2.0	0.662	10.8	LOS B	6.3	159.9	0.48	0.20	0.48	27.1
Approach			1685	2.0	1685	2.0	0.662	10.8	LOS B	6.3	159.9	0.48	0.20	0.48	34.5
West: Swarthmore Dr															
5	L2	All MCs	60	2.0	60	2.0	0.374	20.2	LOS C	1.2	31.5	0.84	0.92	1.07	23.5
2	T1	All MCs	5	2.0	5	2.0	0.374	20.2	LOS C	1.2	31.5	0.84	0.92	1.07	18.2
12	R2	All MCs	50	2.0	50	2.0	0.374	20.2	LOS C	1.2	31.5	0.84	0.92	1.07	23.8
Approach			115	2.0	115	2.0	0.374	20.2	LOS C	1.2	31.5	0.84	0.92	1.07	23.3
All Vehicles			3210	2.0	3210	2.0	0.662	10.1	LOS B	6.3	159.9	0.45	0.22	0.46	34.0

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