Appendix I

Transportation Impact Study

P21130

Natoma Senior Apartments Transportation Impact Study

Folsom, California

Prepared for:

City of Folsom

Helix Environmental, Inc.

FCC 50, LLC

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REVISION HISTORY

Date	Title	Comment
Feb 1, 2022	Draft TIS	
Feb 10, 2022	Final TIs	Clarified geometry for secondary driveway and added review of parking supply at 139 spaces and 144 spaces.
July 5, 2022	Revision	Proposed parking reduced to 136 spaces and revised site plan.

EXECUTIVE SUMMARY

This analysis describes the effect of the Natoma Senior Apartments project (the Project) on the motorized and unmotorized transportation systems in Folsom, California. This study has been prepared for the City of Folsom (City), Helix Environmental Inc., and FCC 50, LLC. A Planned Development Permit and Conditional Use Permit are requested by the applicant for the proposed 136 age-restricted affordable apartments.

Project Description

Figure ES-1 provides a Project vicinity map. The Project consists of 136 one- and two-bedroom affordable, age restricted, apartments located across from the main entrance to Folsom State Prison at 102 Natoma St, Folsom, CA 95630 (parcel 071-0320-042). Two access points to East Natoma St are planned: a full access driveway aligned with Prison Rd, and a right-in-right-out driveway near the eastern edge of the Project site. One hundred thirty-six parking stalls are included along the drive isle along the southern and eastern edges of the Project. A preliminary site plan is provided as **Figure ES-2**.

Accessible pathways are planned around the building to provide a walking path for residents. Sidewalks along the Project's East Natoma Street frontage are included from Prison Rd to the edge of the existing sidewalk at Cimmaron Circle. The existing multi-use trail connection from the Oak Parkway trail will be preserved, and a pedestrian connection will be added southernly from the Project to the Oak Parkway Trail.

The site is designated Professional-Office (PO) in the General Plan and zoned as Business Professional – Planned Development District (BP-PD). With the Planned Development Permit and Conditional Use Permit being requested the Project is consistent with the adopted General Plan and zoning.

Figure ES-1. Scholar Way Senior Housing Vicinity Map

Figure ES-2. Preliminary Site Plan

Analysis Scope

The analysis considers the traffic operations at intersections in Folsom that could potentially be impacted by project traffic. This TIS considers two study scenarios:

- Existing 2022 without Project condition
- Existing 2022 with Project condition

The two driveway intersections (shown in **Figure ES-2**) were evaluated for conformity to City policies and policies from the adopted Folsom General Plan**.** Internal circulation and sight lines, parking supply and fire access were all considered.

Table ES-1. Study Intersections

Location	Control
1. East Natoma St/Prison Rd	Signal
2. East Natoma St/Eastern Project Driveway	Side-Street-Stop-Control (SSSC)

Findings

Project impacts are anticipated to be less than significant. Ten project specific findings are made.

Finding 1 (Trip Generation): The Project is anticipated to generate 441 daily vehicle trips including 39 AM peak-hour vehicle trips, and 41 PM peak-hour vehicle trips. Fewer than 50 peak-hour project trips are projected to pass through any intersection.

Finding 2 (Level-of-Service): All study intersections are anticipated to operate at level-of-service B or better under all study scenarios. The Project is not projected to create new deficiencies or worsen existing traffic level-of-service, pursuant to General Plan Policy M4.1.3. Impacts to level-of-service are considered less than significant.

Finding 3 (Vehicle Miles Traveled): Per capita Project VMT is projected to be at least 15% less than regional per capita VMT. Project VMT impacts are considered less than significant.

Finding 4 (Parking): The proposed parking supply of 136 spaces (1.00 spaces per unit). The Project was found to be adequately parked.

Finding 5 (Minimum Required Throat Depth): The standards for driveway throat depths are met.

Finding 6 (Emergency Vehicle Access): Emergency vehicle access is adequate.

Finding 7 (Pedestrian and Bicycle): The Project does not result in impacts to pedestrian and bicycle facilities. Impacts to pedestrian and bicycle facilities are considered less than significant.

Finding 8 (Transit): The Project does not result in impacts to transit facilities. Impacts to transit facilities are considered less than significant.

Finding 9 (Driveway Geometry): Proposed geometry for access to East Natoma St is adequate. Either a raised median or right-turn channelization should be used to limit the secondary (eastern) driveway to right-in-right-out access. Note that the secondary (eastern) driveway was modeled assuming a shared eastbound through-right turn lane, without a right turn taper or deceleration lane. Anticipated eastbound right turning volume is less than 10 vehicles during the AM and PM peak-hours and neither a right tapper or deceleration lane is required per City of Folsom policy. However, the City reserves the right to require either a taper or pocket at the discretion of the City Engineer. **Finding 10 (Signal timing)**: With the addition of a fourth leg to the East Natoma St/Prison Rd intersection, the signal timing and lane geometry was assumed to be configured as follows, or an equivalent plan to the satisfaction of the City Engineer:

- Eastbound: An eastbound right turn pocket was assumed with 150-feet of storage and a 60-foot taper; for a total of one left, one through, and one right turn lane.
- Westbound: A westbound left turn lane with 100-foot pocket plus 60-foot taper for a total of one left and one shared Through-right lane.
- Southbound: The existing exclusive right-turn lane is assumed to be restriped as a through-right turn lane (for a total of one left and one shared through-right).
- Northbound: The northbound approach is assumed to provide one left and one shared through-right lane. The northbound through-right lane is assumed to be in a 70' turn pocket plus 60' taper.
- Timing: Eastbound and westbound protected left turn phasing, northbound and southbound split phasing. 150 second cycle length, with 34 second northbound southbound split phases and 20 second eastbound and westbound protected phases, and 62 second eastbound and westbound through phases. Crosswalks are assumed across all legs of the intersection with flashing don't walk phases set to 22 seconds to accommodate a 3 foot per seconding walking speed.

City staff have noted that the East Natoma St/Prison Rd intersection may be an excellent location for protected-permissive left-turn phasing (i.e., “a flashing yellow arrow” to allow left turns during the conflicting through phase). Such phasing would increase the intersection capacity and reduce queuing for the eastbound through movement. It is our professional judgement that novel phasing plans, such as protected-permissive phasing, have the potential to confuse elderly drivers and pedestrians, resulting in increased accident rates. Because protected-permissive phasing is not necessary to maintain the General Plan level-of-service goals we do not recommend it for the entrance to age-restricted housing. The project adds a fourth leg to the existing T-intersection, which requires upgrading the traffic signal hardware. At the discretion of the City Engineer, those upgrades may include video vehicle detection, connecting the signal into the City traffic management center, and traffic signal controller upgrades to the satisfaction of the City Engineer.

Conditions of approval can be limited to the City of Folsom Standard conditions plus a requirement to time the traffic signal at East Natoma St/Prison Rd to be consistent with finding 10 above, or a similar timing plan, to the satisfaction of the City Engineer.

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1. INTRODUCTION

This Transportation Impact Study (TIS) identifies impacts of the proposed Natoma Senior Apartments project (the Project) on the motorized and unmotorized transportation systems in Folsom, California. This study has been prepared for the City of Folsom (City), Helix Environmental Inc., and FCC 50, LLC. A Planned Development Permit and Conditional Use Permit are requested by the applicant.

1.1 Project Description

Figure 1 provides a Project vicinity map. The Project consists of 136 one- and two-bedroom affordable, age restricted, apartments located across from the main entrance to Folsom State Prison at 103 E. Natoma St, Folsom, CA 95630 (parcel 071-0320-042). Two access points to East Natoma St are planned: a full access driveway aligned with Prison Rd, and a right-in-right-out driveway near the eastern edge of the Project site. One hundred thirty-six parking stalls are included along the drive isle along the southern and eastern edges of the Project.

Accessible pathways are planned around the building to provide a walking path for residents. Sidewalks along the Project's East Natoma Street frontage are included from Prison Rd to the edge of the existing sidewalk at Cimmaron Circle. The existing multi-use trail connection from the Oak Parkway trail will be preserved, and a pedestrian connection will be added southernly from the Project to the Oak Parkway Trail.

The site is designated Professional-Office (PO) in the General Plan and zoned as Business Professional – Planned Development District (BP-PD). With the Planned Development Permit and Conditional Use Permit being requested the Project is consistent with the adopted General Plan and zoning.

1.2 Report Organization

This report includes the following sections: Introduction, Setting and Study Area (key roadways and intersections, regulatory setting, and analysis scenarios); Methodology (detailing the analysis procedures); analysis sections; discussion of other considerations, and findings and recommendations.

Figure 1. Natoma Senior Apartments Vicinity Map

Figure 2. Preliminary Site Plan

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2. SCENARIOS, SETTING AND STUDY AREA

The Project generates fewer than 50 peak-hour trips which is the City's threshold for requiring the evaluation of Project traffic on the level-of-service at potential affected intersections. Consequently, this TIS evaluates traffic operations at the two Project driveway intersections.

2.1 Study Scenarios

Four scenarios were identified for inclusion in this TIS through consultation with City staff. These study scenarios were used to evaluate Project impacts relevant to General Plan Policy M4.1.3 relative to level of service. This study determines the weekday AM peak-hour, PM peak-hour, and Sunday peak-hour level-of-service at study intersections under the following scenarios:

- Existing 2022 without Project condition
- Existing 2022 with Project condition

Analysis of the existing condition reflects the traffic volumes and roadway geometry at the time the study began. This scenario quantifies performance measures for the existing condition and serves as a known reference point for those familiar with the study area. These scenarios, with and without the Project, identify Project related impacts anticipated to occur if the Project opened in 2020.

2.2 Project Area Roadways

Brief descriptions of the key roadways serving the Project site are provided below.

Natoma St/East Natoma St is a two-lane minor arterial connecting from Folsom Blvd, past Folsom City Hall, and connecting through Green Valley Rd and onto Empire Ranch Rd. From Folsom Blvd to Fargo Way, just east of City Hall, there are sidewalks, curb, and gutter with striped class 2 bike lanes. From Fargo Way to the east, fronting the Project site and Folsom State Prison, there are dirt shoulders without sidewalks until Folsom Crossing Rd, where East Natoma Street becomes a four-lane arterial with sidewalk, curb, gutter, and striped class 2 bike lanes to Empire Ranch Rd. At Coloma Street, near City Hall, Natoma St caries about 11,000 vehicles per day. A volume which drops to about 10,000 vehicles per day near the Project Site.

Prison Rd is a two-lane north-south access road from East Natoma St to Folsom State Prison. It has unpaved shoulders without bike lanes or sidewalks. Prison Road is signed to prohibit stopping or turning within the prison's property.

2.3 Study Intersections

There are two study intersections (**Table 1**), which are the driveway intersections show in the site plan (**Figure 2**) shown previously. No segments were selected for analysis.

Table 1. Study Intersections and Control

Location	Control
1. East Natoma St/Prison Rd	Signal
2. East Natoma St/Eastern Project Driveway	Side-Street-Stop-Control (SSSC)

2.4 Transit

Folsom's public transportation includes bus and dial-a-ride service provided by the City through Folsom Stage Lines and light rail service provided by Sacramento Regional Transit District (SRTD). El Dorado County Transit (EDC Transit) also provides limited bus connections to El Dorado County.

Folsom Stage Lines and Dial-A-Ride

The Folsom Stage Line buses, operated by SRTD run Monday through Friday and there is no weekend service available. There are currently ten buses running on three routes. They are routes 10, 20 and 30 (**Figure 3**). Routes 10 and 20 intersect at Folsom Lake College. There is no charge to transfer from one Folsom Stage Line route to another.

- Route 10 - Serves Historic Folsom, E. Bidwell St., the Broadstone Market Place, Broadstone Plaza, Folsom Aquatics Center, Folsom Lake College, Intel, Kaiser Permanente, Folsom Premium Outlets, Mercy Hospital, Palladio Mall, and Century Theatres. It connects to light rail and with the RT bus service Line 24. Service with a one-hour headway starts at 5:25 AM with the last pickup at 7:25 PM.
- Route 20 - Serves Empire Ranch Road, East Natoma Street, Vista del Lago High School, Folsom Lake College and transfers to Route 10. There are one morning and two afternoon buses on Route 20.
- Route 30 - Serves Folsom State Prison, City Hall, and Woodmere Drive during peak-hours (6 a.m. – 8:10 a.m. and 2:35 p.m. – 4:55 p.m.) with four AM peak-period buses and five PM peak-period buses.

Dial-A-Ride is a curb-to-curb transportation service that operates within the Folsom city limits. It provides transportation to residents who have a physical, developmental, or mental disability. Senior citizens who are 55 years of age or older also qualify for this program.

Sacramento Regional Transit

SRTD light rail provides light rail service via the Gold Line connecting the Historic Folsom, Glenn, and Iron Point light rail stations to downtown Sacramento and points in between. Service is provided from 5 AM to 7 PM with 30-minute headways. There is also a connection to SRTD bus route 24 from Folsom Stage Lines route 10 at the Madison/Main stop. SRTD route 24 provides service to Sunrise Mall on an approximately hourly headway from 6 AM to 7 PM.

El Dorado County Transit

The EDC Transit route 50X (the 50 Express) operates every hour from 6 AM until 7 PM Monday through Friday, with service from the Missouri Flat Transfer Center in El Dorado County to the Folsom Iron Point light rail station, Folsom Lake College, and back.

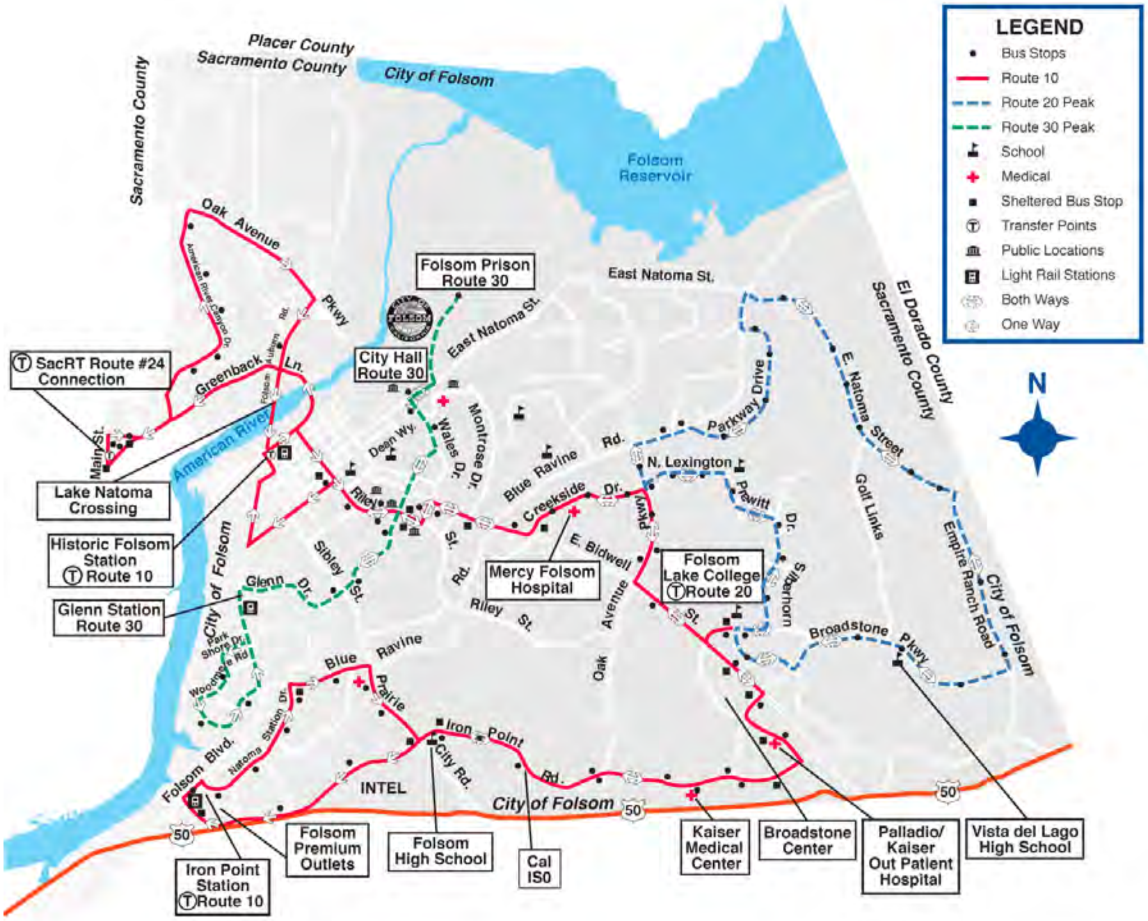

Figure 3. Folsom Stage Lines Routes 10, 20 and 30

2.5 Bicycle Facilities

Folsom is one of the most bike friendly settings in California, with an existing comprehensive bikeway system that is extensive and connects to a vast number of historical and recreational attractions. Existing and planned bicycle facilities within the Project area are described in the 2007

Folsom Bikeway Master Plan[1] which provides a framework for the design of a bikeway system that meets the California Street and Highway Code Section 890-894.2 - Bicycle Transportation Act and improves safety and convenience for all users. An updated bike plan is currently being prepared as part of the Folsom Active Transportation Plan. There are four types of bicycle facilities (Class 1, 2, 3, and 4) in Folsom.

Class 1 Bike Path:	A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way (**Figure 4**).
Class 2 Bike Lane:	Any portion of roadway designated for bicycle use and defined by pavement marking, curbs, signs, or other traffic-control devices (**Figure 4**).
Class 3 Bike Route:	A designated route through high demand corridors on existing streets and are usually shared with motor vehicles. Are indicated by periodic signs and do not require pavement markings (**Figure 4**). A variant on Class III bikeways, shared lanes, or "sharrow" lanes, are becoming more common. Sharrows are a form of Class III bikeways where the general-purpose lane is too narrow for a bicycle and a vehicle to travel safely side-by-side within the same lane. A sharrow symbol painted (**Figure 5**) on the roadway is used to indicate the likely lateral location of bikes in the lane to inform motor vehicles.
Class 4 Bikeway	(Separated Bikeway or "Cycle Track") The Protected Bikeways Act of 2014 (Assembly Bill 1193 - Ting, Chapter 495) established Class IV bikeways for California. Class IV bikeways provide a right-of-way designated exclusively for bicycle travel adjacent to a roadway and which are protected from vehicular traffic. Types of separation include, but are not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking. An example is shown in **Figure 6**.

Figure 7 provides a Folsom bike map. All road segments in the study area include Class 2 bike lanes. There are existing Class 1 trails paralleling the northern edge of East Natoma St (The Johnny Cash Trail, connecting Historic Folsom, Folsom Prison, and Folsom Lake). An existing Class 1 trail also follows underneath the high voltage line behind the Project site (the Oak Parkway Trail). Grade separated bike/pedestrian tunnels take these trails under Prison Road and East Natoma

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[1] Folsom (2007) Bikeway Master Plan, www.folsom.ca.us/city_hall/depts/parks/parks_n_trails/trails/bikeway_master_plan.asp.

Street. There is also a bike only left turn from eastbound East Natoma St onto the Johnny Cash Trail at the East Natoma St/Cimmaron Circle intersection.

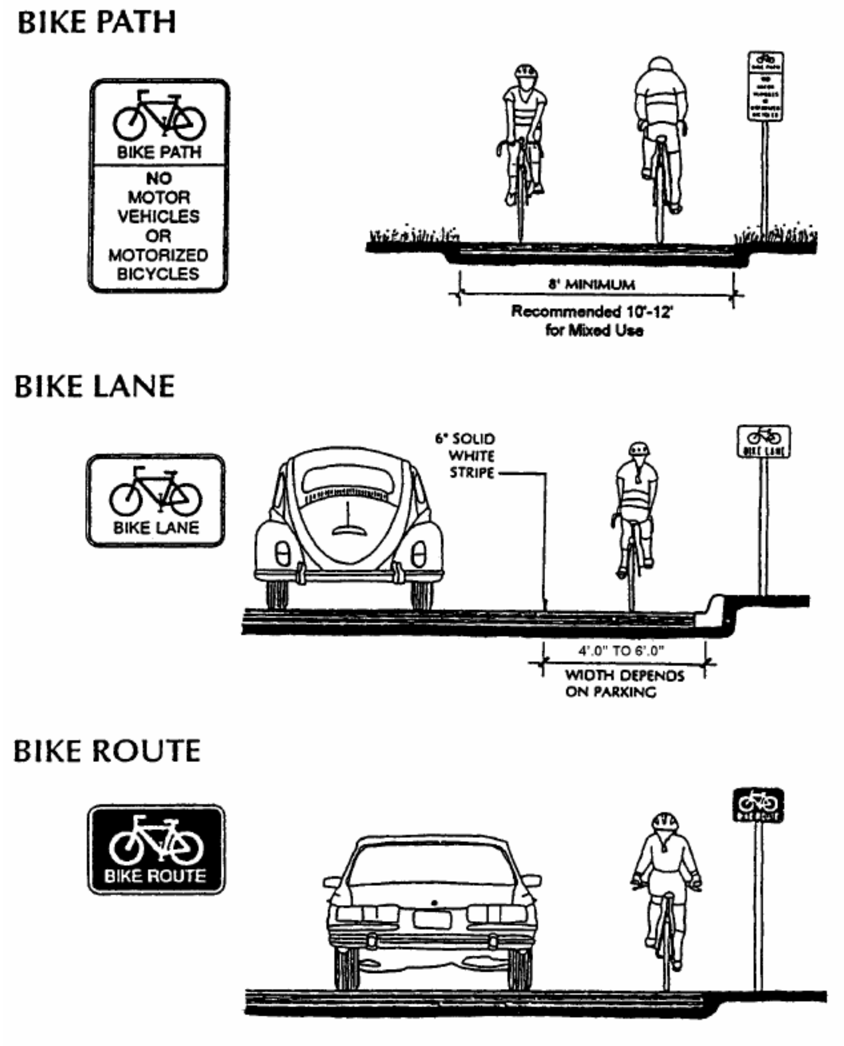

Figure 4. Bike Paths, Lanes, and Routes

Figure 5. Sharrow

Figure 6. Class IV Bikeway

(source: Gary Kavanagh image 1272: https://flic.kr/p/hxp5eL)

Figure 7. Folsom Bike Map

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3. METHODOLOGY

This section provides a process overview, describes traffic forecasting, and discusses the methods/criteria used to evaluate level-of-service. Discussion of significance criteria is included.

3.1 Process Overview

The overall analysis process was structured to identify potential adverse transportation effects related to the Project and evaluate consistency with General Plan Policy M4.1.3 relative to traffic level-of-service.

- Traffic volumes and turning movements for the Existing 2022 Condition were determined from observed traffic counts taken Tuesday December 7, 2021.
- Study intersection traffic operations were analyzed both with and without the proposed Project to identify any anticipated inconsistencies with General Plan Policy M4.1.3 relative to traffic level of service.
- California Environmental Quality Act (CEQA) impacts are based on qualitative vehicle miles of travel (VMT) analysis and significance criteria from the General Plan (Policy NCR 3.1.3), and CEQA guidance from the Governor’s Office of Planning and Research[2] [3].

3.2 Level-of-Service Methodology

Level-of-service (LOS) is a qualitative indication of the level of delay and congestion experienced by motorists using an intersection. Levels-of-service are designated by the letters A through F, with A being the best conditions and F being the worst (high delay and congestion). Calculation methodologies, measures of performance, and thresholds for each letter grade differ for road segments, signalized intersections, and unsignalized intersections.

Based on guidance from City staff, the following procedures described below for intersection traffic operations analysis were utilized for this TIS.

Intersection Traffic Operations Analysis

Signalized Intersections

The methodology from the Highway Capacity Manual (HCM) 6th Edition[4], are used to analyze signalized intersections. Level-of-service can be characterized for the entire intersection, each approach, or by lane group. Control delay alone (the weighted average delay for all vehicles entering the intersection) is used to characterize level-of-service for the entire intersection or an approach. Control delay and volume to capacity ratio are used to characterize level-of-service for lane groups. The average delay criteria used to determine the level-of-service at signalized

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[2] OPR (2018) Technical Advisory on Evaluating Transportation Impacts In CEQA, http://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf.

[3] OPR's webinar on SB 743 implementation, 4/16/2020.

[4] Transportation Research Board (2016) Highway Capacity Manual, Washington, D.C.

intersections is presented in **Table 2**. The HCM 2010 methodology is used as the primary method. HCM 2000 methods are only utilized where the signal phasing is incompatible with HCM 2010 methods.

Table 2. Level-of-Service Criteria for Signalized Intersections

Level -of-Service	Description	Average Delay[1] (Sec. /Vehicle.)
A	Very Low Delay: This level-of-service occurs when progression is extremely favorable, and most vehicles arrive during a green phase. Most vehicles do not stop at all.	$\leq$ 10.0
B	Minimal Delays: This level-of-service generally occurs with good progression, short cycle lengths, or both. More vehicles stop than at LOS A, causing higher levels of average delay.	10.1-20.0
C	Acceptable Delay: Delay increases due to only fair progression, longer cycle lengths, or both. Individual cycle failures (*to service all waiting vehicles*) may begin to appear at this level of service. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	20.1-35.0
D	Approaching Unstable/Tolerable Delays: The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	35.1-55.0
E	Unstable Operation/Significant Delays: This is considered by many agencies the upper limit of acceptable delays. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	55.1-80.0
F	Excessive Delays: This level, considered to be unacceptable to most drivers, often occurs with oversaturation (i.e., when arrival flow rates exceed the capacity of the intersection). It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such delay levels.	> 80.0 or v/c >1.0

Note 1: Weighted average of delay on all approaches. This is the measure used by the Highway Capacity Manual to determine level-of-service. Any movement with a volume-to-capacity ratio (v/c) greater than 1.0 is considered to be level-of-service F.

Source: Transportation Research Board (2016) Highway Capacity Manual 6th Edition, Washington D.C.

Unsignalized Intersections

The methodology from HCM 6th Edition is used for the analysis of unsignalized intersections. At an unsignalized intersection, most of the main street traffic is un-delayed and, by definition, have acceptable conditions. The main street left-turn movements and the minor street movements are all susceptible to delay of varying degrees. Generally, the higher the main street traffic volumes, the higher the delay for the minor movements. Separate methods are utilized for Two-Way Stop-Controlled (TWSC) intersections and All-Way Stop-Controlled (AWSC) intersections.

- **TWSC:** The methodology for analysis of two-way stop-controlled intersections calculates an average total delay per vehicle for each minor street movement and for the major street left-turn movements, based on the availability of adequate gaps in the main street through traffic. A level-of-service designation is assigned to individual movements or combinations of movements (in the case of shared lanes) based upon delay, it is not defined for the intersection as a whole. Unsignalized intersection level-of-service is for each movement (or group of movements) based upon the respective average delay per vehicle. **Table 3** presents the average delay criteria used to determine the level-of-service at TWSC and AWSC intersections.
- **AWSC:** At all-way stop-controlled intersections, the level-of-service is determined by the weighted average delay for all vehicles entering the intersection. The methodologies for these types of intersections calculate a single weighted average delay and level-of-service for the intersection as a whole. The average delay criteria used to determine the level-of-service at all-way stop intersections is the same as that presented in **Table 3**. Level-of-service for specific movements can also be determined based on the TWSC methodology.

It is not unusual for some of the minor street movements at unsignalized intersections to have level-of-service D, E, or F conditions while the major street movements have level-of-service A, B, or C conditions. In such a case, the minor street traffic experiences delays that can be substantial for individual minor street vehicles, but the majority of vehicles using the intersection have very little delay. Usually in such cases, the minor street traffic volumes are relatively low. If the minor street volume is large enough, improvements to reduce the minor street delay may be justified, such as channelization, widening, or signalization.

Table 3. Level-of-Service Criteria for Unsignalized Intersections

Level of Service (LOS)	Description	TWSC[1] Average Delay by Movement (seconds / vehicle)	AWSC[2] Intersection Wide Average Delay (seconds / vehicle)
A	Little or no delay	< 10	< 10
B	Short traffic delay	> 10 and < 15	> 10 and < 15
C	Average traffic delays	> 15 and < 25	> 15 and < 25
D	Long traffic delays	> 25 and < 35	> 25 and < 35
E	Very long traffic delays	> 35 and < 50	> 35 and < 50
F	Extreme delays potentially affecting other traffic movements in the intersection	> 50 (or, v/c >1.0)	> 50

Note 1: Two-Way Stop-Control (TWSC) level-of-service is calculated separately for each minor street movement (or shared movement) as well as major street left turns using these criteria. Any movement with a volume to capacity ratio (v/c) greater than 1.0 is considered to be level-of-service F.

Note 2: All-Way Stop-Control (AWSC) assessment of level-of-service at the approach and intersection levels is based solely on control delay.

Source: Transportation Research Board (2016) Highway Capacity Manual 6th Edition, Washington D.C.

3.3 General Plan Thresholds

Level of Service

Consistency with General Plan level-of-service policies for the proposed Project were determined based on the methods described above and identified as either "conforming" or "non-conforming”. General Plan Policy M4.1.3 addresses level of service:

> *Strive to achieve at least traffic Level of Service “D” (or better) for local streets and roadways throughout the city. In designing transportation improvements, the City will prioritize use of smart technologies and innovative solutions that maximize efficiencies and safety while minimizing the physical footprint. During the course of Plan buildout, it may occur that temporally higher levels-of-service result where roadway improvements have not been adequately phased as development proceeds. However, this situation will be minimized based on annual traffic studies and monitoring programs. City Staff will report to the City Council at regular intervals via the Capital Improvement Program process for the Council to prioritize projects integral to achieving level-of-service D or better.*

The General Plan Environmental Impact Report (EIR) includes a criterion addressing potential impacts at locations that operate at level-of-service E or F under no-project conditions. Under this standard, a non-conforming situation would occur if the proposed project would:

> *Increase the average delay by five seconds or more at an intersection that currently operates (or is projected to operate) at an unacceptable level-of-service under "no-project" conditions.*

For the purposes of this analysis, level-of-service is considered potentially non-conforming if implementation of the Project would result in any of the following:

- Cause an intersection in Folsom that currently operates (or is projected to operate) at level-of-service D or better to degrade to level-of-service E, or worse;
- Increase the average delay by five seconds or more at an intersection in Folsom that currently operates (or is projected to operate) at an unacceptable level-of-service E or F.

Bicycle/Pedestrian/Transit Facilities

An impact is considered significant if implementation of the Project would:

- Inhibit the use of bicycle, pedestrian, or transit facilities;
- Eliminate existing bicycle, pedestrian, or transit facilities;
- Prevent the implementation of planned bicycle, pedestrian, or transit facilities.

3.4 Vehicle Miles Traveled Standards of Significance

Under State Law (SB 743), on July 1, 2020, vehicle miles traveled (VMT) will become the only metric for evaluating significant transportation impacts in environmental impact analyses required under the California Environmental Quality Act (CEQA). Without specific General Plan guidance for VMT thresholds, this analysis uses a qualitative screening against The Governors' Office of Planning and Research (OPR) guidance of a 15% per capita VMT reduction and utilizes OPR's suggested exemption for affordable housing projects.

Folsom General Plan policy NCR 3.1.3 addresses VMT, as stated below:

Policy NCR 3.1.3 "Encourage efforts to reduce the amount of vehicle miles traveled (VMT). These efforts could include encouraging mixed-use development promoting a jobs/housing balance, and encouraging alternative transportation such as walking, cycling, and public transit."

OPR has published guidance recommending a CEQA threshold for transportation impacts of land use projects of a 15% VMT reduction per capita, relative to either city or regional averages based on the California's Climate Scoping Plan[5]. Qualitative assessment of VMT reduction is acceptable to screen projects[6].

Based on these criteria, a project will be considered to have a potentially significant impact if:

- Per capita VMT from residential projects is anticipated to be greater than 85% of the regional average per capita VMT.
- The project is anticipated to inhibit implementation of planned pedestrian, bicycle, or transit improvements.

3.5 Analysis Tools

Level-of-Service

Control delays and level-of-service for study intersections were calculated using the Synchro 11[7] analysis software (Version 11.1, build 1, revision 6). Synchro implements the methodologies of the 6th Edition of the Highway Capacity Manual to model traffic controls and vehicle delay.

The software requires data on road characteristics (geometric), traffic counts, and the signal timing data for each analysis intersection. In general, default parameters were used, except in locations where specific field data are available. Heavy vehicle percentages of 2% were assumed during the peak hour.

VMT

To support jurisdictions' SB743 implementation, The Sacramento Area Council of Governments (SACOG) staff developed thresholds and screening maps for residential and office projects, using outputs from the 2016 base year travel demand model run for the 2020 Metropolitan Transportation Plan/Sustainable Communities Strategies (MTP/SCS). SACOG travel demand model is activity/tour based and is designed to estimate an individual's daily travel, accounting for land use, transportation and demographics that influence peoples' travel behaviors.

For residential projects, the threshold is defined as total household VMT per capita achieving 15% of reduction comparing to regional (or any appropriate sub-area) average. The SACOG screening map uses "hex" geography, with each hex being about 1000 feet on edge. Residential VMT per capita per hex is calculated by tallying all household VMTs, including VMT traveling outside the region, generated by the residents living at the hex and divided by the total population in the hex. Hexes are then color coded with green and blue hexes depicting neighborhoods with at least a 15% reduction in residential VMT relative to the SACOG region. Yellow, orange, pink and red hexes have less than a 15% VMT reduction.

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[5] OPR (2018) Technical Advisory on Evaluating Transportation Impacts In CEQA, http://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf.

[6] OPR's webinar on SB 743 implementation, 4/16/2020.

[7] https://www.trafficware.com/synchro-studio.html

4. EXISTING 2022 CONDITION

This section presents the Existing Condition. For purposes of this TIS, Existing Conditions represent typical midweek, non-holiday, traffic volumes in 2022[8]

4.1 Existing Condition

Data Sources

The analysis tools require a variety of data to generate the evaluation criteria. The following sections describe data collection procedures for Existing Conditions. There were three primary data elements (roadway characteristics, intersection turning movement counts, and traffic control data); and two supplementary elements (other recent studies, and field data) that comprised the data collection program for this traffic analysis.

Roadway Geometry and Usage Characteristics

The geometry and usage data for the analysis were collected through aerial photographs, field visits, and prior studies. Current intersection geometry was field validated. **Table 4** shows the key items included in the geometric data and the source for each item.

Table 4. Key Items and Sources for Geometry and Usage Data

Key Item	Source
Lane configurations and width	Aerial photographs and field visits
Lane utilization	Prior studies, aerial photographs, and field visits
Intersection spacing	Aerial photographs and field visits
Length of storage bays	Aerial photographs and field visits
Transit stops and routes	Transit schedules, aerial photographs, and field visits
Turn prohibitions or allowance	Aerial photographs and field visits

Lane configurations and width – These data specify the number of lanes and the width of the roadway in each direction, and the directional turns that are allowed from each lane.

Lane utilization – These data specify how lanes are used by drivers, such as traffic distribution between lanes on a multi-lane roadway.

Intersection spacing – These data refer to the distance (in feet) between intersections.

Length of storage bays – These data refer to the length (in feet) of available storage for left-turning or right-turning vehicles where exclusive turn lanes are available. It is collected for right-turn lanes when the parking lane is used as a right-turn lane.

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[8] Traffic Counts were collected on Tuesday December 7, 2021

Transit stops and routes – A transit stop is an area where passengers await, board, alight, and transfer between transit vehicles. A transit route is the roadway that transit vehicles operate on.

Turn prohibitions or allowance – These data specify if right turns on red (RTOR) are allowed on the roadway.

Intersection Turning Movement Counts

Existing morning and evening peak-period vehicle and pedestrian turning movement counts were collected at study intersections on Tuesday December 7, 2021. Traffic count data sheets are provided in **Appendix A** of this TIS. Peak-hour traffic counts were used to conduct the intersection level-of-service analysis. Turning movement counts at consecutive intersections were balanced and adjusted where appropriate to conservatively reflect existing traffic flows. Observed intersection peak hour factors (PHF) were applied. **Figure 8** provides a summary of the intersection lane geometry and peak-period turning movements under Existing Conditions As well as Project traffic and Existing Plus Project conditions).

Existing Condition Intersection and Segment Level-of-Service

Table 5 presents a summary of level-of-service results for the study intersections under Existing Conditions, along with 95% queue lengths for left turns. All study intersections operate at level-of-service A or better during the AM, PM, and Sunday peak hours. Calculation sheets for intersection delay and level-of-service are provided in **Appendix B**. Left turn queues are adequately accommodated by the existing left turn storage pockets.

Table 5. Existing 2022 Intersection Delay and Level-of-Service

Intersection	Control	No Project (Delay and Level-of-Service)	
		AM	PM
E Natoma St/Prison Rd	Signal	9.3 A	9.1 A
Eastern Project Driveway	SSSC *	n/a	n/a
Intersection	**Approach**	**No Project 95% Queues (Feet)**	
		AM	**PM**
E Natoma St/Prison Rd	EB Left	173'	30'
	WB Left	n/a	n/a
	SB Left	22'	49'
	NB Left	n/a	n/a
Eastern Project Driveway	NB	n/a	n/a

* SSSC = Side Street Stop Control

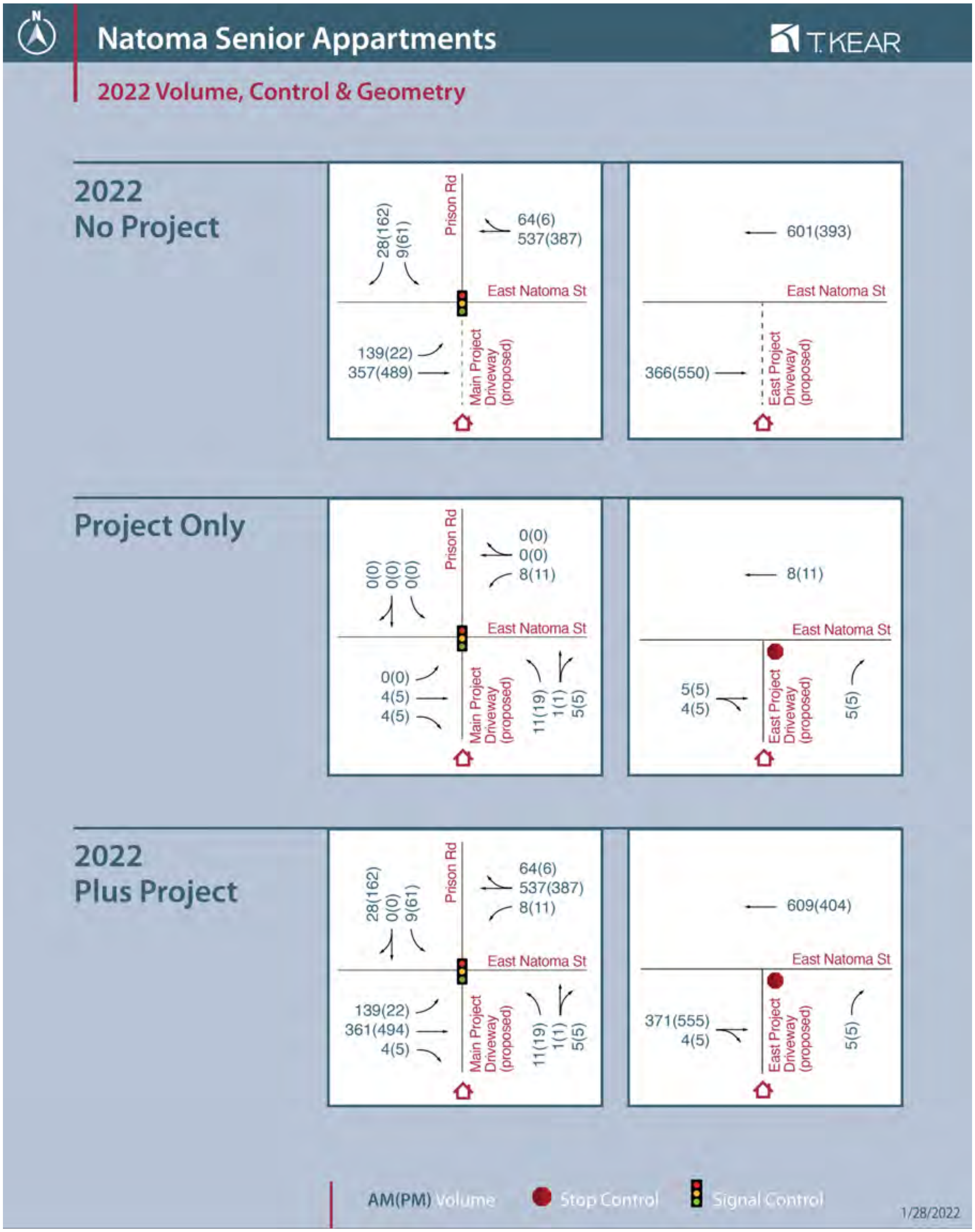

Figure 8. Existing Condition Turn Movements and Geometry

4.2 Assessment of Proposed Project

Trip Generation

Projected traffic generated by the proposed Project was calculated using trip generation factors from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition (2021), and is provided in **Table 6** below.

Table 6. Project Trip Generation

Land Use	ITE Category	Quantity	Data	Daily	AM Peak hour			PM Peak hour		
					Total	inbound	Outbound	Total	inbound	Outbound
Senior Adult Housing (Multifamily)	252	136 dwelling units	Rate	3.24	0.29	45%	55%	0.3	54%	46%
			Trips	441	39	17	22	41	22	19

Source: ITE (2021) Trip Generation Manual, Institute of Transportation Engineers, Washington DC. (Higher value of either the average rate or the fitted equation-based rate for peak hour of generator).

Trip Distribution

Trip distribution was based on observed traffic counts and select zone analysis within the travel demand model. New Project trips were distributed as follows:

- 48% to/from the west on East Natoma Street
- 48% to/from the east on East Natoma Street
- 4% to/from the north via Prison Road

Project trip assignment is shown in **Figure 9**.

Signal Timing and Geometry

With the addition of a fourth leg to the East Natoma St/Prison Rd intersection, the signal timing and lane geometry was assumed to be configured as follows:

- Eastbound: An eastbound right turn pocket was assumed with 150-feet of storage and a 60-foot taper; for a total of one left, one through, and one right turn lane.
- Westbound: A westbound left turn lane with 100-foot pocket plus 60-foot taper for a total of one left and one shared through-right lane.
- Southbound: The existing exclusive right-turn lane is assumed to be restriped as a through-right turn lane (for a total of one left and one shared through-right).
- Northbound: The northbound approach is assumed to provide one left and one shared through-right lane. The northbound through-right lane is assumed to be in a 70’ turn pocket plus 60’ taper.
- Timing: Eastbound and westbound protected left turn phasing, northbound and southbound split phasing. 150 second cycle length, with 34 second northbound southbound split phases and 20 second eastbound and westbound protected phases, and

62 second eastbound and westbound through phases. Crosswalks are assumed across all legs of the intersection with flashing don't walk phases set to 22 seconds to accommodate a 3 feet per seconding walking speed.

City staff have noted that the East Natoma St/Prison Rd intersection may be an excellent location for protected-permissive left-turn phasing (i.e., "a flashing yellow arrow" to allow left turns during the conflicting through phase). Such phasing would increase the intersection capacity and reduce queuing for the eastbound through movement. It is our professional judgement that novel phasing plans, such as protected-permissive phasing, have the potential to confuse elderly drivers and pedestrians, resulting in increased accident rates. Because protected-permissive phasing is not necessary to maintain the General Plan level-of-service goals we do not recommend it for the entrance to age-restricted housing. The project adds a fourth leg to the existing T-intersection, which requires upgrading the traffic signal hardware. At the discretion of the City Engineer, those upgrades may include video vehicle detection, connecting the signal into the City traffic management center, and traffic signal controller upgrades to the satisfaction of the City Engineer. The eastern Project driveway was assumed to be configured as right-in-right-out. Because there are fewer than ten peak-hour vehicle trips anticipated to enter the Project via the eastern driveway, no deceleration lane or taper is necessary.

4.3 Existing 2022 with Project Conditions

Project peak-hour traffic was added to the Existing 2022 turning volumes at each intersection. Delay and level-of-service were determined at the study intersections. **Figure 8** summarized the turning movements and lane configurations for the Existing with Project Condition. **Table 7** presents a summary of level-of-service results for the study intersections under Existing Conditions. All study intersections operate at level-of-service B or better during the AM, PM, and Sunday peak hours. Calculation sheets for intersection delay and level-of-service are provided in **Appendix B**. Left turn queues are adequately accommodated by the existing left turn storage pockets.

Figure 9. Project Trip Distribution

Table 7. Baseline 2022 Intersection Delay and Level-of-Service, with and without Project

Intersection	Control	No Project (Delay and Level-of-Service)		With Project (Delay and Level-of-Service)	
		AM	**PM**	**AM**	**PM**
E Natoma St/Prison Rd	Signal	9.3 A	9.1 A	15.9 B	16.7 B
Eastern Project Driveway	SSSC *	n/a	n/a	10.6 B (NB)	12.3 B (NB)
Intersection	**Approach**	**No Project 95% Queues (Feet)**		**With Project 95% Queues (Feet)**	
		AM	**PM**	**AM**	**PM**
E Natoma St/Prison Rd	EB Left	173'	30'	166'	37'
	WB Left	n/a	n/a	22'	23'
	SB Left	22'	49'	23'	73'
	NB Left	n/a	n/a	27'	21'
Eastern Project Driveway	NB	n/a	n/a	0	0

* SSSC = Side Street Stop Control

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5. PROJECT VMT IMPACTS AND GENERAL PLAN LEVEL-OF-SERVICE CONFORMITY

5.1 Vehicle Miles Traveled

Folsom General Plan policy NCR 3.1.3 addressed vehicle miles traveled (VMT) as shown below:

Policy NCR 3.1.3 "Encourage efforts to reduce the amount of vehicle miles traveled (VMT). These efforts could include encouraging mixed-use development promoting a jobs/housing balance, and, encouraging alternative transportation such as walking, cycling, and public transit."

The Governors' Office of Planning and Research (OPR) has published guidance recommending a CEQA threshold for transportation impacts of land use projects of a 15% VMT reduction per capita, relative to either city or regional averages, based on the California's Climate Scoping Plan[9]. Qualitative assessment of VMT reduction is acceptable to screen projects[10].

Under State Law (SB 743), VMT became the only CEQA threshold of significance for transportation impacts on July 1, 2020. Without specific General Plan guidance for VMT thresholds, this analysis uses qualitative screening against OPR's guidance of a 15% per capita VMT reduction.

To support jurisdictions' SB743 implementation, SACOG developed thresholds and screening maps (**Figure 10**) for residential projects[11], using outputs from the 2016 base year travel demand model run for the 2020 MTP/SCS. SACOG's travel demand model is activity/tour based and is designed to estimate an individual's daily travel, accounting for land use, transportation and demographics that influence peoples' travel behaviors. For residential projects, the threshold is defined as total household VMT per capita achieving 15% of reduction compared to regional (or any appropriate sub-area) average VMT. The map uses HEX geography. Residential VMT per capita per HEX is calculated by tallying all household VMTs, including VMT traveling outside the region, generated by the residents living at the HEX and divided by the total population in the HEX. Green hexagons denote areas where residential VMT is 50% to 85% of the regional average and yellow hexagons denote areas where residential VMT is 85% to 100% of the regional average.

The Project is located within one of the green hexagons with average residential VMT of 17 miles per capita (per day). The Project is anticipated to generate less than 82% of the regional

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[9] OPR (2018) Technical Advisory on Evaluating Transportation Impacts In CEQA, http://www.opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf.

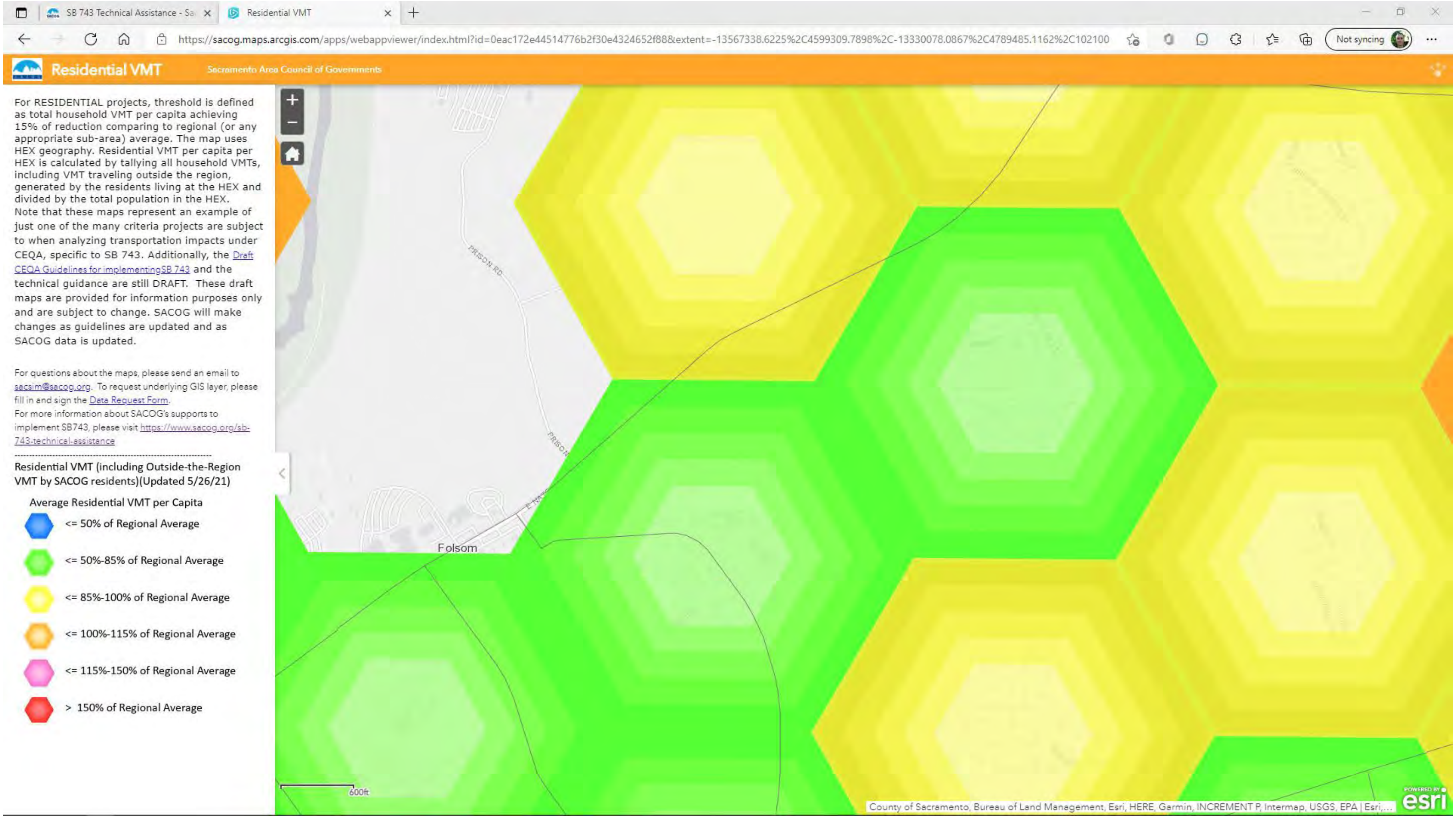
[10] OPR's webinar on SB 743 implementation, 4/16/2020.

[11] SACOG (2021) https://sb743-sacog.opendata.arcgis.com/

per capita residential daily VMT of 20.82 miles. **The Project is therefore anticipated to have a less-than-significant impact on VMT.**

5.2 Conformance with General Plan Level-of-Service Policy

All study intersections are anticipated to operate at level-of-service B or better under all study scenarios, both with and without the addition of Project traffic. The Project is not anticipated to create new level-of-service deficiencies, or to or worsen any existing deficiencies, based on General Plan Policy M4.1.3.



For RESIDENTIAL projects, threshold is defined as total household VMT per capita achieving 15% of reduction comparing to regional (or any appropriate sub-area) average. The map uses HEX geography. Residential VMT per capita per HEX is calculated by tallying all household VMTs, including VMT traveling outside the region, generated by the residents living at the HEX and divided by the total population in the HEX.
Note that these maps represent an example of just one of the many criteria projects are subject to when analyzing transportation impacts under CEQA, specific to SB 743. Additionally, the Draft CEQA Guidelines for implementingSB 743 and the technical guidance are still DRAFT. These draft maps are provided for information purposes only and are subject to change. SACOG will make changes as guidelines are updated and as SACOG data is updated.

For questions about the maps, please send an email to sacsim@sacog.org. To request underlying GIS layer, please fill in and sign the Data Request Form.
For more information about SACOG's supports to implement SB743, please visit https://www.sacog.org/sb-743-technical-assistance

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Residential VMT (including Outside-the-Region VMT by SACOG residents)(Updated 5/26/21)

Average Residential VMT per Capita

- 🟦 <= 50% of Regional Average
- 🟩 <= 50%-85% of Regional Average
- 🟨 <= 85%-100% of Regional Average
- 🟧 <= 100%-115% of Regional Average
- 🟪 <= 115%-150% of Regional Average
- 🟥 > 150% of Regional Average

Figure 10. SACOG SB 743 Regional VMT Screening Map

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6. OTHER CONSIDERATIONS

6.1 Internal Circulation and Site Plan Review

This section reviews parking, driveway throat-depth, and emergency vehicle access shown on the preliminary site plan shown in **Figure 2** (page 3).

Parking Requirements

The City does not have an adopted parking standard for age-restricted (senior) multi-family housing or affordable age-restricted multi-family housing. With a Planned Development (PD), parking supply is established through the PD permit process.

Proposed Project Parking: Proposed Parking consists of 136 spaces (1.00 parking spaces per unit). This exceeds that of many other recently approved age restricted multi-family projects in and around Folsom. The 136 spaces include 8 accessible spaces (i.e., with the adjacent space striped out to provide vehicle access for wheelchairs and/or mobility scooters) and 14 spaces with electric vehicle charging.

Parking Demand: The ITE Parking Generation Manual[12] lists an average peak parking demand of 0.59 vehicles per dwelling unit for Land Use 252 (Senior Adult Housing-Attached), with a standard deviation of 0.12. The ITE sample size is small (three observations), yet the proposed parking ratio of 1.00 is more than 3.5 standard deviations greater than the mean parking demand. Consequently, the proposed parking for the Project is sufficient to meet the anticipated parking demand with a parking ratio of 1.00.

For comparison, Revel Senior Living, a similar project approved by Folsom in 2018 had a parking ratio of 0.81 spaces per dwelling unit. The Revel project conducted a parking survey of six similar Sacramento area facilities. All six facilities were found to use less than 0.60 spaces per dwelling unit during peak parking demand hours (consistent with the ITE parking demand data referenced above.)

Finding: The proposed parking supply of 136 spaces is adequate for the 136 multi-family units proposed in the Project.

Minimum Required Throat-Depth

Minimum Required Throat-Depth (MRTD): For an 81-160 unit apartment complex, the standard for the MRTD is 50 feet[13]. This 50-foot length represents vehicle storage equivalents, which means the total required length may be achieved by summing the throat depths for several access points if more than one access point is to serve the site.

Throat-Depth Provided: As shown on the preliminary site plan in **Figure 2** (page 3), the throat depths for the primary and second driveways exceed 50 feet and 25 feet, respectively.

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[12] ITE (2010) Parking Generation 4th Edition, Institute of Transportation Engineers, Washington DC.

[13] Folsom (2020) Design and Procedures Manual and Improvement Standards, site access Table 12-1, https://www.folsom.ca.us/civicax/filebank/blobdload.aspx?t=66183.89&BlobID=38340.

Finding: The MRTD of the Project driveways meet the standard because the primary driveway throat depth meets the minimum standard of 50 feet.

Emergency Vehicle Access

The Project's internal drive isles are designed with minimum 25-foot inner and 50-foot turning radii to accommodate fire department access.

Finding: Emergency vehicle access is designed consistent with standards and is adequate.

6.2 Bicycle/Pedestrian/Transit Facilities

The Project does not inhibit the use of bicycle or pedestrian facilities; eliminate existing bicycle, or pedestrian facilities; or prevent the implementation of planned bicycle, or pedestrian facilities. The Project includes accessible pathways around the building to provide a walking path for residents. Path connections are planned to paths internal to the Project site, south to the Oak Parkway Trail, and west to the East Natoma St underpass to the Johnny Cash Trail.

Finding: The Project has a **less-than-significant** impact on pedestrians and bicycles. With relocation of the effected bus stop, transit impacts will be less-than-significant.

6.3 Queueing

Anticipated 95th-percentile left turn queue lengths were reviewed and are anticipated to be less than the supplied storage lengths in the turn bays.

Finding: Existing turn pockets are adequate.

6.4 Driveway Geometry

City standards requires a 60-foot right turn taper in conditions with ten or more peak-hour right turns into a driveway, and a 150-foot pocket plus 60-foot taper, with 50 or more peak-hour right turns. Neither project driveway is anticipated to have ten or more right turning vehicles into the Project during the AM or PM peak-hours. The main driveway at the signalized East Natoma Street/Prison Rd intersection includes an eastbound right turn pocket and a westbound left turn pocket accessing the Project, these are adequate to safely accommodate Project traffic without hindering existing traffic.

The secondary (eastern) driveway is restricted to right-in-right-out movements and is anticipated to only have fewer than ten eastbound right-turns into the Project during either the AM or PM peak hours. No turn pockets are necessary. The eastern driveway should be channelized to restrict left turns from entering or existing the Project via the eastern driveway. Such channelization may be accomplished by either a triangular island located within the driveway, or by extending the raised median at the East Natoma St/Cimmaron Cir intersection west-word across the eastern Project driveway.

Finding: Driveway geometry has been determined to be adequate, left turns at the eastern Project driveway should be restricted through the use of channelization.

6.5 Fire Lane and Internal Geometry

The Project proposes two access points connected by a fire lane which circles the back of the Proposed apartments. All internal radii have at least a 25' inner radius and 50'outer radius per City requirements.

6.6 Accident History

Potential geometric constraints and safety issues were evaluated, including driveway spacing, sight triangles, and Statewide Integrated Traffic Records System (SWITRS) collision data. Driveway spacing, throat depth, and corner sight distance are all adequate. In the last five years, there have been three accidents proximate to the Project site including:

- One eastbound rear-end collection at the existing traffic light,
- Two driving under the influence (DUI) accidents (one a sideswipe, and the other a single vehicle overturn.)

These are not accident varieties that would be anticipated to be worsened by the Project, and the project does not require any project specific traffic safety treatments.

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7. FINDINGS, MITIGATION, AND RECOMMENDED CONDITIONS

Finding 1 (Trip Generation): The Project is anticipated to generate 441 daily vehicle trips including 39 AM peak-hour vehicle trips, and 41 PM peak-hour vehicle trips. Fewer than 50 peak-hour project trips are projected to pass through any intersection.

Finding 2 (Level-of-Service): All study intersections are anticipated to operate at level-of-service B or better under all study scenarios. The Project is not projected to create new deficiencies or worsen existing traffic level-of-service, pursuant to General Plan Policy M4.1.3. Impacts to level-of-service are considered less than significant.

Finding 3 (Vehicle Miles Traveled): Per capita Project VMT is projected to be at least 15% less than regional per capita VMT. Project VMT impacts are considered less than significant.

Finding 4 (Parking): The proposed parking supply of 136 spaces (1.00 spaces per unit). The Project was found to be adequately parked with either parking ratio.

Finding 5 (Minimum Required Throat Depth): The standards for driveway throat depths are met.

Finding 6 (Emergency Vehicle Access): Emergency vehicle access is adequate.

Finding 7 (Pedestrian and Bicycle): The Project does not result in impacts to pedestrian and bicycle facilities. Impacts to pedestrian and bicycle facilities are considered less than significant.

Finding 8 (Transit): The Project does not result in impacts to transit facilities. Impacts to transit facilities are considered less than significant.

Finding 9 (Driveway Geometry): Proposed geometry for access to East Natoma St is adequate. Either a raised median or right-turn channelization should be used to limit the secondary (eastern) driveway to right-in-right-out access. Note that the secondary (eastern) driveway was modeled assuming a shared eastbound through-right turn lane, without a right turn taper or deceleration lane. Anticipated eastbound right turning volume is less than 10 vehicles during the AM and PM peak-hours and neither a right tapper or deceleration lane is required per City of Folsom policy. However, the City reserves the right to require either a taper or pocket at the discretion of the City Engineer.

Finding 10 (Signal Timing): With the addition of a fourth leg to the East Natoma St/Prison Rd intersection, the signal timing and lane geometry was assumed to be configured as follows:

- Eastbound: An eastbound right turn pocket was assumed with 150-feet of storage and a 60-foot taper; for a total of one left, one through, and one right turn lane.
- Westbound: A westbound left turn lane with 100-foot pocket plus 60-foot taper for a total of one left and one shared through-right lane.
- Southbound: The existing exclusive right-turn lane is assumed to be restriped as a through-right turn lane (for a total of one left and one shared through-right).

- Northbound: The northbound approach is assumed to provide one left and one shared through-right lane. The northbound through-right lane is assumed to be in a 70’ turn pocket plus 60’ taper.
- Timing: Eastbound and westbound protected left turn phasing, northbound and southbound split phasing. 150 second cycle length, with 34 second northbound southbound split phases and 20 second eastbound and westbound protected phases, and 62 second eastbound and westbound through phases. Crosswalks are assumed across all legs of the intersection with flashing don’t walk phases set to 22 seconds to accommodate a 3 feet per seconding walking speed.

City staff have noted that the East Natoma St/Prison Rd intersection may be an excellent location for protected-permissive left-turn phasing (i.e., “a flashing yellow arrow” to allow left turns during the conflicting through phase). Such phasing would increase the intersection capacity and reduce queuing for the eastbound through movement. It is our professional judgement that novel phasing plans, such as protected-permissive phasing, have the potential to confuse elderly drivers and pedestrians, resulting in increased accident rates. Because protected-permissive phasing is not necessary to maintain the General Plan level-of-service goals we do not recommend it for the entrance to age-restricted housing. The project adds a fourth leg to the existing T-intersection, which requires upgrading the traffic signal hardware. At the discretion of the City Engineer, those upgrades may include video vehicle detection, connecting the signal into the City traffic management center, and traffic signal controller upgrades to the satisfaction of the City Engineer.

Appendix A Counts and Signal Timing

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Prepared by National Data & Surveying Services

Prison Rd & E Natoma St

Peak Hour Turning Movement Count

ID: 21-070204-001
City: Folsom

Day: Tuesday
Date: 12/7/2021

PEAK HOURS		COUNT PERIODS
AM	07:30 AM - 08:30 AM	6:30 AM - 09:30 AM
NOON	NONE	NONE
PM	04:00 PM - 05:00 PM	4:00 PM - 07:00 PM

Prison Rd

SOUTHBOUND

	↲	↓	↳	⮌	⇧	
AM	28	0	9	0	203	AM
NOON	0	0	0	0	0	NOON
PM	162	0	61	0	28	PM
	1	0	1	0		

E Natoma St

EASTBOUND

	AM	NOON	PM	
⇦	565	0	549	
⮍	0	0	0	0
↱	139	0	22	1
→	357	0	489	1
↴	0	0	0	0
	AM	NOON	PM	

CONTROL

Signalized

	AM	NOON	PM
TEV	1134	0	1127
PHF	0.88		0.85

E Natoma St

WESTBOUND

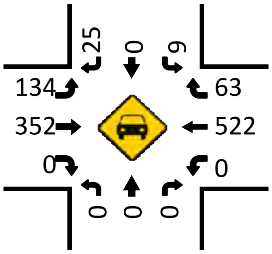
		PM	NOON	AM
0	⮤	6	0	64
1	←	387	0	537
0	↙	0	0	0
0	⮎	0	0	0
	⇨	550	0	366
		PM	NOON	AM

NORTHBOUND

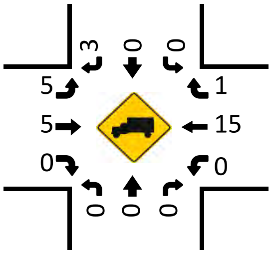
Prison Rd

		⮏	↰	↑	↱	
		0	0	0	0	
	⇩					
PM	0	0	0	0	0	PM
NOON	0	0	0	0	0	NOON
AM	0	0	0	0	0	AM

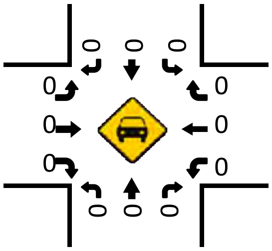
Cars (AM)



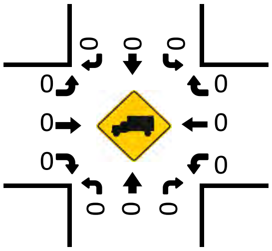
HT (AM)



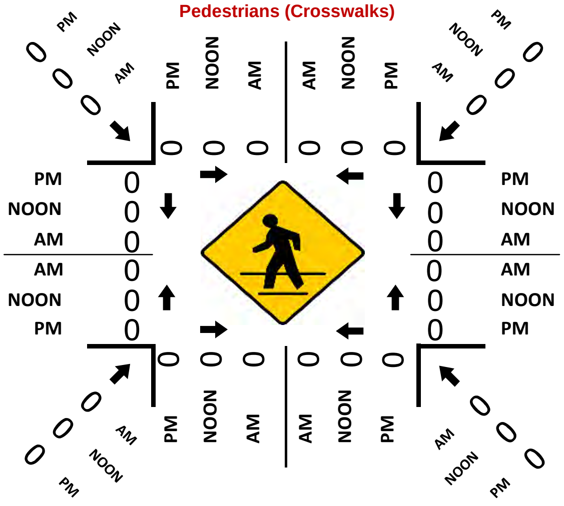
Cars (NOON)



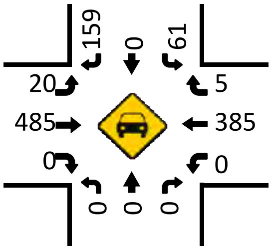
HT (NOON)



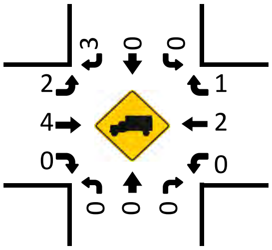
Pedestrians (Crosswalks)



Cars (PM)



HT (PM)



APPENDIX 2

TIMING SHEETS FOR THE 820A CONTROLLER

Intersection: NATOMA ST. AND FOLSOM PRISION

By: G.M.

Date: 10-13-99
4-2-2009

Notes:

COMMAND

COMMAND	Free
MAN FREE PLAN NO.	1
MAN COOR PLAN NO.	1

SET UP

1. XSECT PHASING	
ALLOWABLE PHASES	2456
PED PHASES	4
FLASHING WALK	
DENSITY PHASES	26
YELLOW ARROW OMIT	

2. PHASE FEATURES	
EXCL PED	
NON-ACTUATED I	
NON-ACTUATED II	
SIMULTANEOUS GAP	1-8
SIMULTANEOUS MAX	
LAST CAR PASSAGE	
MIN YELLOW TIME	3.5
RED REVERT TIME	2.0

3. SOFT FLASH	
PRE-FLASH PHASES	—
FLASH RED	
FLASH YELLOW	
FLASH OVLP RED	
FLASH OVLP YEL	
FLASH PED DW	
FLASH PED CLEAR	
MIN FLASH TIME	
POST FLASH YEL	
POST FLASH RED	
POST FLASH PHASES	

4. START UP	
START IN	FLASH
START UP TIME	4.0
START UP PHASES	26
START IN	yellow
START VEH CALLS	1-8
START PED CALLS	—

5. OVERLAPS								
ENTRIES	1	2	3	4	5	6	7	8
PARENT PHASES	4 5							
TIMING METHOD	INDependent							
GREEN EXT*	0.1							
YELLOW CHANGE*	3.5							
RED CLEARANCE*	1.0							
OVERLAP type	RigHt							

*THESE ENTRIES ARE NOT AVAILABLE IF TIMING METHOD IS SELECTED AS FOLLOW PARENT

FORCE OUT	NO
FLASH OVLP GRN	NO
FLASH OVLP YeL	NO
FLASH OVLP Red	NO

6. LCD SET UP	
XSECT SHAPE	QUAd
SOUTH THRU	4
SOUTH TURN	4
WEST THRU	6
WEST TURN	—
NORTH THRU	—
NORTH TURN	—
EAST THRU	2
EAST TURN	5
SOUTH PED	4
WEST PED	—
NORTH PED	—
EAST PED	—

7. DETECTORS

OVERIDE MIN RECL	—
OVERIDE MAX RECL	—
OVERIDE PED RECL	—

DETECTOR INPUTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PRI DET ASSOC	1	2	3	4	5	6	7	8	5	2	6					
DET LOCKING	NO	Yes	NO	NO	NO	Yes	NO	NO	NO	Yes	Yes					
	—	EB	SB	—	E→N	WB	—	—	ØB OUT S→W	Ø2 CALL	Ø6 CALL					

35 = 51 FPS

FREE PARAM

65'

25 mph

35 mph

1. PHASE PARAMETER

35 mph

ENTRIES	1	2	3	4	5	6	7	8
PED WALK 0-255				7				
PED CLEAR 0-255				12				
SEC/ACTUATION 0-25.5		2.6				2.6		
MIN GREEN 0-255		7		1	1	7		
MAX INITIAL 0-255		26				26		
PASSAGE 0-25.5		4.7		1.0	1.0	4.7		
MIN GAP 0-25.5		2.8				2.8		
BEFORE REDUCE 0-255		18				18		
TIME TO REDUCE 0-255		25				25		
MAX GREEN 0-255	—	69		40	25	69	—	—
MAX II GREEN 0-255	—	24		18	12	24	—	—
MAX STEP 0-255								
MAX LIMIT 0-255								
YELLOW CHANGE 0-25.5	3.5	4.5	3.5	3.5	3.5	4.5	3.5	3.5
RED CLEAR ANCE 0-25.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	—	EB	SB	←	E→N	WB 243'	—	—

	2. FREE PLAN NUMBER 1							
ENTRIES								
RING 1 SEQ.	24							
RING 2 SEQ.	560							
MIN RECALLS								
MAX RECALLS								
PED RECALLS								
SOFT RECALLS	26							
NO SKIP								
COND. SERVICE								
NONACT PHASES								
DUAL ENTRY								
RED REST								
MAX II								
PED RECYCLE								
ACT REST-IN-WALK								
DET PLAN	1							
PROT ONLY ENA								

3. DETECTOR PLAN 1

ENTRIES	DETECTOR INPUTS															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DELAY TIME									8							
INHIBIT DELAY									5,							
STRETCH																
DET TYPE		CALL COUNT EXT	~~CALL~~ ~~EXT~~	CALL EXT	CALL EXT	CALL COUNT EXT			CALL EXT	CALL	CALL					
SWITCHING																
ALT ASSOC																
REVERT GRN																
REVERT QDET																
.Q PRESCENCE																
TRAP TYPE																
LOOP LNGTH																
VEH LNGTH																
DIS. TO LP 2																
2ND LOOP NO.																
	—	EB	SB	—	E→N	WB			S→W Delay	ø2 CALL	ø6 CALL					

FREE
PARAMS

4. DETECTOR DIAGNOSTICS

DET INPUTS	1	2	3	4	5	6	7	8
No Activity								
Constant Call								
Erratic Output								
Recalls	—	—	—	—	—	—	—	—
Green Ext. Time								

4. DETECTOR DIAGNOSTICS (Continued)

DET INPUTS	9	10	11	12	13	14	15	16
No Activity								
Constant Call								
Erratic Output								
Recalls	—	—	—	—	—	—	—	—
Green Ext. Time								

4. DETECTOR DIAGNOSTICS (Continued)

DET INPUTS	17	18	19	20	21	22	23	24
No Activity								
Constant Call								
Erratic Output								
Recalls	—	—	—	—	—	—	—	—
Green Ext. Time								

MISC

1. BEEP	
KEYBOARD BEEP	YES

2. SET SECURITY	
SET PASSWORD	—
ENABLE SECURITY	—
LOCK	—

3. SET SFC

ENTRIES/SFC	1	2	3	4
POLARITY				
SFC TYPE				
SFC MODE				

4. SET DIMMING	
DIM GREENS	—
DIM YELLOWS	—
DIM REDS	—
DIM WALKS	—
DIM PED CLEAR	—
DIM DONT WALKS	—
DIM OVERLAP GREENS	—
DIM OVERLAP YELLOWS	—
DIM OVERLAP REDS	—
DISABLE AOR MON	—

5. SET TIME	
DATE	
TIME	
ENTER	

6. SET DAYLIGHT SAVINGS TIME	
DAYLIGHT SAVINGS	
SPRING - DAY OF WEEK	
SPRING -OCCUR OF DAY	
SPRING - MONTH	
SPRING - HOUR	
FALL - DAY OF WEEK	
FALL - OCCUR OF DAY	
FALL - MONTH	
FALL - HOUR	

8. HARDWARE CONFIGURATION	
CAB FLASH MONITOR	
RTS-CTS DELAY	
TEST-A	
test-B	
system PORT	

1. PREEMPTS

ENTRIES	1	2	3	4	5
PREEMPT TYPE					
INPUT SENSE					
INPUT LATCH					
ABT RED REVERT					
FLASH PRIORITY					
MAN CTL/INTADV					
PREEMPT OUTPUT					
OVERRIDE MIN TIME					
OVERRIDE WLK TIME					
OVERRIDE FDW TIME					
DELAY TIME					
HOLD TIME					
CLEAR PHASES 1					
OVERLAP RED 1					
CLEAR GREEN TIME 1					
CLEAR PHASES 2					
OVERLAP RED 2					
CLEAR GREEN TIME 2					
PREEMPT PHASES					
INT 5 FLASH					
INT 5 OVLP RED/FYL					
INT 5 MIN TIME					
INT 5 MAX TIME					
INT 6 YELLOW					
INT 7 RED					
RETURN PHASES					
RETURN VEH CALLS					
RETURN PED CALLS					

PREEMPT

PREEMPT PLAN					
ENTRIES	1	2	3	4	5
PREEMPT TYPE					
DELAY OUTPUT					
ABORT MINS					
ABORT WALKS					
ABORT FDW					
DELAY TIME					
HOLD TIME					
CLEAR PHASE 1					
OVLP RED 1					
CLEAR GRN TIM 1					
CLEAR PHASE 2					
OVLP RED 2					
CLEAR GRN TIM 2					
PREEMPT PHASES					
INT 5 FLASH					
I5 OVLP RED/FYL					
INT 5 MIN TIME					
INT 5 MAX TIME					
INT 6 YELLOW					
INT 7 RED					
RETURN PHASES					
RET VEH CALLS					
RET PED CALLS					

COORD

1. COORD CONSTANTS	
T0 REFERENCE	
OFFSET REFERENCE	
EXT COORD TYPE	
CYCLES OF NOSYNC	
DET ACCUM INTVL	
CYCLES DET ACCUM	
MINUTES DET ACCUM	
COORD DUAL ENTRY	

2. LOW PRIORITY

ENTRIES	1	2	3	4	5
LOW PRI ENB					
LOW PRI PHASE					
MAX HOLD TIME					
MAX QUEUE TIME					
QUEUE CLEAR TIME					

2. COORDINATION PLANS - PER PLAN DATA

ENTRIES	1	2	3	4	5
PERM STRATEGY					
OMIT STRATEGY					
TO LOCATION					
3% WINDOW					
STRTCH 3% BY					
GBP OMITS					
EARLY RETURN					
ONCE AROUND					
CYCLE LENGTH					
MIN CYCLE LENGTH					
MAX CYCLE LENGTH					
OFFSET					
EXT SYNC					
ACTIVE SFC					
DET PLAN #					
PROT ONLY ENB					
CALC WALK					
REST IN WALK					
NO SKIP					
RING 1 SEQ					
RING 2 SEQ					

2. COORD PLANS - PLAN PER STEP ENTRIES

PLAN NO.	ENTRIES	RING 1										RING 2									
		STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7	STEP 8	STEP 9	STEP 10
	ST PRM																				
	AC SPL																				
	OPTION																				
	SPLIT																				
	RESERV																				
	PED																				
	ST PRM																				
	AC SPL																				
	OPTION																				
	SPLIT																				
	RESERV																				
	PED																				
	ST PRM																				
	AC SPL																				
	OPTION																				
	SPLIT																				
	RESERV																				
	PED																				
	ST PRM																				
	AC SPL																				
	OPTION																				
	SPLIT																				
	RESERV																				
	PED																				

TIC

1. EVENTS

EVENT NO.	TIME	CONTROL	CONTROL DATA
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			

CONTROL

OVRD FREE PLAN. B/U FREE PLAN
OVRD COORD PLAN. B/U COORD PLAN
TURN ON SFC
TURN OFF SFC
MAX II
OVRD SOFT FLASH. B/U SOFT FLASH. OVRD CAB FLASH. B/U CAB FLASH.
ONRD H/W FLASH. B/U H/W FLASH. START DIMMIMG. STOP DIMMING. CLEAR OVRD

CONTROL DATA

-FREE PLN #
-COOR PLN #
-SFC ON
-SFC OFF
-MAX II PHAS
-NONE

2. DAY PLANS

DAY PLAN NUMBER ____											
EVENT	EVENTS SELECTED										EVENT
1-10	1	2	3	4	5	6	7	8	9	0	1-10
11-20											11-20
21-30											21-30
31-40											31-40
41-50											41-50
51-60											51-60
61-70											61-70
71-80											71-80
81-90											81-90
91-100											91-100
101-110											101-110
111-120											111-120
121-130											121-130
131-140											131-140
141-150											141-150
151-160											151-160
161-170											161-170
171-180											171-180
181-190											181-190
191-200											191-200

DAY PLAN NUMBER ____											
EVENT	EVENTS SELECTED										EVENT
1-10	1	2	3	4	5	6	7	8	9	0	1-10
11-20											11-20
21-30											21-30
31-40											31-40
41-50											41-50
51-60											51-60
61-70											61-70
71-80											71-80
81-90											81-90
91-100											91-100
101-110											101-110
111-120											111-120
121-130											121-130
131-140											131-140
141-150											141-150
151-160											151-160
161-170											161-170
171-180											171-180
181-190											181-190
191-200											191-200

3. WEEK PLANS

WEEK PLAN	ASSIGNED DAY PLANS - DAY OF WEEK						
	SUN	MON	TUES	WED	THURS	FRI	SAT
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

4. YEAR PLAN

WEEK OF YR	WEEK PLAN
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	

YEAR PLAN (CONT)

WEEK OF YR	WEEK PLAN
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	

YEAR PLAN (CONT)

WEEK OF YR	WEEK PLAN
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	

5. EXCEPTION PLANS

PLAN #	CALENDAR DATE	DAY PLAN #	PLAN #	CALENDAR DATE	PLAN #
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

6. HOLIDAYS	DAY PLAN #	6. HOLIDAYS	DAY PLAN #
NEW YEARS DAY		COLUMBUS DAY	
ML KING DAY		VETERANS DAY	
PRESIDENT DAY		THANKSGIVING	
GOOD FRIDAY		DAY AFTER THX	
EASTER MONDAY		CHRISTMAS EVE	
MEMORIAL DAY		CHRISTMAS	
INDPNDNCE DAY		DAY AFTER XMAS	
LABOR DAY		NEW YEARS EVE	

S.S.D CONFLICT MONITOR LCD-12P TIMING

SERIAL NUMBER 990502-008

FRONT PANEL

Minimum flash 6

Plus enable channels 1-12

Disable 7

Enable ~~1-12~~ 1-6 & 8-12

Short yellow ~~3.0~~ yes

Latch 24v yes

Latch prog. Ajar yes

Log cvm faults yes

Latch cvm faults NO

MAIN MENU

Review faults

Power history

Permissives 2-5 2-6 2-7 4-7 5-7 4-11

Set clock

Setup menu

Default setup

Clear flt. Data

Clear power data

Yellow timing

Set up yellow time 3.0

Yellow channels ALL

Communications

Comm. Setup

Rate= 2400

Protocol= no comm.

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Appendix B Calculation Sheets

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Queues

3:

01/26/2022

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	158	406	683	10	32
v/c Ratio	0.49	0.24	0.65	0.05	0.08
Control Delay	34.1	2.4	15.4	34.7	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	2.4	15.4	34.7	8.2
Queue Length 50th (ft)	36	0	109	3	0
Queue Length 95th (ft)	173	116	482	22	20
Internal Link Dist (ft)		549	393	714	
Turn Bay Length (ft)	260			100	
Base Capacity (vph)	764	1795	1665	1213	778
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.21	0.23	0.41	0.01	0.04

Intersection Summary

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		↰	↱
Traffic Volume (veh/h)	139	357	537	64	9	28
Future Volume (veh/h)	139	357	537	64	9	28
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1870
Adj Flow Rate, veh/h	158	406	610	73	10	32
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	3	3	3	3	3	2
Cap, veh/h	201	1395	888	106	78	251
Arrive On Green	0.11	0.75	0.55	0.55	0.04	0.04
Sat Flow, veh/h	1767	1856	1626	195	1767	1585
Grp Volume(v), veh/h	158	406	0	683	10	32
Grp Sat Flow(s),veh/h/ln	1767	1856	0	1821	1767	1585
Q Serve(g_s), s	4.3	3.4	0.0	13.4	0.3	0.9
Cycle Q Clear(g_c), s	4.3	3.4	0.0	13.4	0.3	0.9
Prop In Lane	1.00			0.11	1.00	1.00
Lane Grp Cap(c), veh/h	201	1395	0	994	78	251
V/C Ratio(X)	0.78	0.29	0.00	0.69	0.13	0.13
Avail Cap(c_a), veh/h	919	3764	0	2580	1459	1490
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	1.9	0.0	8.1	22.5	17.7
Incr Delay (d2), s/veh	2.5	0.2	0.0	1.6	0.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.3	0.0	4.0	0.1	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	23.7	2.1	0.0	9.7	22.8	17.8
LnGrp LOS	C	A	A	A	C	B
Approach Vol, veh/h		564	683		42	
Approach Delay, s/veh		8.2	9.7		19.0	
Approach LOS		A	A		B	

Timer - Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		42.4			10.1	32.3		6.7
Change Period (Y+Rc), s		5.5			4.5	5.5		4.5
Max Green Setting (Gmax), s		99.5			25.5	69.5		40.5
Max Q Clear Time (g_c+I1), s		5.4			6.3	15.4		2.9
Green Ext Time (p_c), s		5.5			0.1	11.4		0.0

Intersection Summary			
HCM 6th Ctrl Delay			9.3
HCM 6th LOS			A

	↗	→	←	↘	↙
Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	26	575	462	72	191
v/c Ratio	0.13	0.45	0.56	0.25	0.36
Control Delay	25.6	6.8	14.4	20.7	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	6.8	14.4	20.7	4.4
Queue Length 50th (ft)	6	57	83	17	0
Queue Length 95th (ft)	30	194	214	49	28
Internal Link Dist (ft)		549	393	714	
Turn Bay Length (ft)	260			100	
Base Capacity (vph)	1002	1845	1841	1519	1157
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.03	0.31	0.25	0.05	0.17

Intersection Summary

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↱		↰	↱
Traffic Volume (veh/h)	22	489	387	6	61	162
Future Volume (veh/h)	22	489	387	6	61	162
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	26	575	455	7	72	191
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	56	1063	766	12	279	298
Arrive On Green	0.03	0.57	0.42	0.42	0.16	0.16
Sat Flow, veh/h	1767	1856	1822	28	1767	1572
Grp Volume(v), veh/h	26	575	0	462	72	191
Grp Sat Flow(s),veh/h/ln	1767	1856	0	1850	1767	1572
Q Serve(g_s), s	0.5	7.1	0.0	7.2	1.3	4.2
Cycle Q Clear(g_c), s	0.5	7.1	0.0	7.2	1.3	4.2
Prop In Lane	1.00			0.02	1.00	1.00
Lane Grp Cap(c), veh/h	56	1063	0	778	279	298
V/C Ratio(X)	0.46	0.54	0.00	0.59	0.26	0.64
Avail Cap(c_a), veh/h	1214	4973	0	3464	1928	1765
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	4.9	0.0	8.3	13.7	13.9
Incr Delay (d2), s/veh	2.2	0.8	0.0	1.4	0.2	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	1.5	0.0	2.2	0.4	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.9	5.7	0.0	9.7	13.9	14.8
LnGrp LOS	B	A	A	A	B	B
Approach Vol, veh/h		601	462		263	
Approach Delay, s/veh		6.3	9.7		14.5	
Approach LOS		A	A		B	

Timer - Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		26.8			5.7	21.1		10.4
Change Period (Y+Rc), s		5.5			4.5	5.5		4.5
Max Green Setting (Gmax), s		99.5			25.5	69.5		40.5
Max Q Clear Time (g_c+I1), s		9.1			2.5	9.2		6.2
Green Ext Time (p_c), s		8.9			0.0	6.4		0.1

Intersection Summary	
HCM 6th Ctrl Delay	9.1
HCM 6th LOS	A

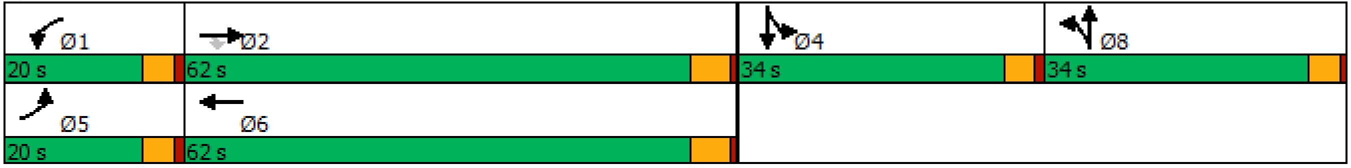
Timing Report, Sorted By Phase
3: E. Natoma St & Prison Rd

01/26/2022

Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBT	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize	Yes	Yes				
Recall Mode	None	Min	None	None	Min	None
Maximum Split (s)	20	62	34	20	62	34
Maximum Split (%)	13.3%	41.3%	22.7%	13.3%	41.3%	22.7%
Minimum Split (s)	10	12	12	10	12	12
Yellow Time (s)	3.5	4.5	3.5	3.5	4.5	3.5
All-Red Time (s)	1	1	1	1	1	1
Minimum Initial (s)	5	6.5	7	5	6.5	7
Vehicle Extension (s)	3	4.7	3	1	4.7	3
Minimum Gap (s)	3	2.8	3	1	2.8	3
Time Before Reduce (s)	0	18	0	0	18	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	7		7	7
Flash Dont Walk (s)		22	22		22	22
Dual Entry	No	Yes	No	No	Yes	No
Inhibit Max	No	No	No	No	No	No
Start Time (s)	0	20	82	0	20	116
End Time (s)	20	82	116	20	82	0
Yield/Force Off (s)	15.5	76.5	111.5	15.5	76.5	145.5
Yield/Force Off 170(s)	15.5	76.5	89.5	15.5	76.5	123.5
Local Start Time (s)	130	0	62	130	0	96
Local Yield (s)	145.5	56.5	91.5	145.5	56.5	125.5
Local Yield 170(s)	145.5	56.5	69.5	145.5	56.5	103.5

Intersection Summary	
Cycle Length	150
Control Type	Actuated-Uncoordinated
Natural Cycle	70

Splits and Phases: 3: E. Natoma St & Prison Rd



Queues
3: E. Natoma St & Prison Rd

01/26/2022

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	158	410	4	9	683	12	6	10	32
v/c Ratio	0.57	0.27	0.00	0.07	0.63	0.08	0.04	0.06	0.05
Control Delay	44.1	5.4	0.0	44.6	17.2	44.0	29.8	44.0	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	5.4	0.0	44.6	17.2	44.0	29.8	44.0	0.1
Queue Length 50th (ft)	70	40	0	4	219	5	0	5	0
Queue Length 95th (ft)	166	180	0	22	447	27	14	23	0
Internal Link Dist (ft)		549			551		368		714
Turn Bay Length (ft)	260		160	160				100	
Base Capacity (vph)	343	1488	1292	347	1299	660	611	654	905
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.28	0.00	0.03	0.53	0.02	0.01	0.02	0.04

Intersection Summary

HCM 6th Signalized Intersection Summary
3: E. Natoma St & Prison Rd

01/26/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑↱		↰	↑↱		↰	↑↱	
Traffic Volume (veh/h)	139	357	0	0	537	64	0	0	0	9	0	28
Future Volume (veh/h)	139	361	4	8	537	64	11	1	5	9	0	28
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1870	1870	1856	1856	1870	1870	1870	1856	1870	1870
Adj Flow Rate, veh/h	158	410	4	9	610	73	12	1	5	10	0	32
Peak Hour Factor	0.88	0.88	0.92	0.92	0.88	0.88	0.92	0.92	0.92	0.88	0.92	0.88
Percent Heavy Veh, %	3	3	2	2	3	3	2	2	2	3	2	2
Cap, veh/h	197	1099	939	21	800	96	53	8	40	132	0	116
Arrive On Green	0.11	0.59	0.59	0.01	0.49	0.49	0.03	0.03	0.03	0.07	0.00	0.07
Sat Flow, veh/h	1767	1856	1585	1781	1626	195	1781	271	1355	1767	0	1548
Grp Volume(v), veh/h	158	410	4	9	0	683	12	0	6	10	0	32
Grp Sat Flow(s),veh/h/ln	1767	1856	1585	1781	0	1821	1781	0	1626	1767	0	1548
Q Serve(g_s), s	5.7	7.5	0.1	0.3	0.0	19.9	0.4	0.0	0.2	0.3	0.0	1.3
Cycle Q Clear(g_c), s	5.7	7.5	0.1	0.3	0.0	19.9	0.4	0.0	0.2	0.3	0.0	1.3
Prop In Lane	1.00		1.00	1.00		0.11	1.00		0.83	1.00		1.00
Lane Grp Cap(c), veh/h	197	1099	939	21	0	896	53	0	49	132	0	116
V/C Ratio(X)	0.80	0.37	0.00	0.44	0.00	0.76	0.23	0.00	0.12	0.08	0.00	0.28
Avail Cap(c_a), veh/h	420	1609	1374	424	0	1579	806	0	736	800	0	701
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	28.2	7.0	5.4	32.0	0.0	13.5	30.9	0.0	30.8	28.1	0.0	28.5
Incr Delay (d2), s/veh	2.8	0.4	0.0	14.0	0.0	2.5	2.1	0.0	1.1	0.2	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	2.5	0.0	0.2	0.0	7.5	0.2	0.0	0.1	0.1	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.1	7.3	5.4	46.0	0.0	16.0	33.0	0.0	31.9	28.3	0.0	29.8
LnGrp LOS	C	A	A	D	A	B	C	A	C	C	A	C
Approach Vol, veh/h		572			692			18			42	
Approach Delay, s/veh		13.9			16.4			32.6			29.4	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.3	44.1		9.4	11.8	37.6		6.4
Change Period (Y+Rc), s	4.5	5.5		4.5	4.5	5.5		4.5
Max Green Setting (Gmax), s	15.5	56.5		29.5	15.5	56.5		29.5
Max Q Clear Time (g_c+I1), s	2.3	9.5		3.3	7.7	21.9		2.4
Green Ext Time (p_c), s	0.0	5.4		0.1	0.0	10.2		0.0

Intersection Summary	
HCM 6th Ctrl Delay	15.9
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↱			↑		↱
Traffic Vol, veh/h	366	0	0	601	0	0
Future Vol, veh/h	371	4	0	609	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	403	4	0	662	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	405
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	-	0	646
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	646
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	646	-	-	-
HCM Lane V/C Ratio	0.008	-	-	-
HCM Control Delay (s)	10.6	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

Queues

3: E. Natoma St & Prison Rd

	↗	→	↘	↙	←	↖	↑	↘	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	26	581	5	12	462	10	6	72	191
v/c Ratio	0.14	0.59	0.01	0.06	0.50	0.04	0.03	0.24	0.25
Control Delay	33.3	13.8	0.0	32.1	13.9	31.9	23.5	28.0	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.3	13.8	0.0	32.1	13.9	31.9	23.5	28.0	0.8
Queue Length 50th (ft)	5	73	0	2	53	2	0	14	0
Queue Length 95th (ft)	37	320	0	23	235	21	13	73	0
Internal Link Dist (ft)		549			551		368		714
Turn Bay Length (ft)	260		160	160				100	
Base Capacity (vph)	556	1641	1417	562	1638	1070	988	1059	1150
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.35	0.00	0.02	0.28	0.01	0.01	0.07	0.17

Intersection Summary

HCM 6th Signalized Intersection Summary
3: E. Natoma St & Prison Rd

01/26/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↱		↰	↱		↰	↱	
Traffic Volume (veh/h)	22	489	0	0	387	6	0	0	0	61	0	162
Future Volume (veh/h)	22	494	5	11	387	6	9	1	5	61	0	162
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1870	1870	1856	1856	1870	1870	1870	1856	1870	1856
Adj Flow Rate, veh/h	26	581	5	12	455	7	10	1	5	72	0	191
Peak Hour Factor	0.85	0.85	0.92	0.92	0.85	0.85	0.92	0.92	0.92	0.85	0.92	0.85
Percent Heavy Veh, %	3	3	2	2	3	3	2	2	2	3	2	3
Cap, veh/h	53	819	699	27	778	12	49	7	37	309	0	273
Arrive On Green	0.03	0.44	0.44	0.02	0.43	0.43	0.03	0.03	0.03	0.17	0.00	0.17
Sat Flow, veh/h	1767	1856	1585	1781	1822	28	1781	271	1355	1767	0	1562
Grp Volume(v), veh/h	26	581	5	12	0	462	10	0	6	72	0	191
Grp Sat Flow(s),veh/h/ln	1767	1856	1585	1781	0	1850	1781	0	1626	1767	0	1562
Q Serve(g_s), s	0.8	14.2	0.1	0.4	0.0	10.6	0.3	0.0	0.2	2.0	0.0	6.4
Cycle Q Clear(g_c), s	0.8	14.2	0.1	0.4	0.0	10.6	0.3	0.0	0.2	2.0	0.0	6.4
Prop In Lane	1.00		1.00	1.00		0.02	1.00		0.83	1.00		1.00
Lane Grp Cap(c), veh/h	53	819	699	27	0	790	49	0	45	309	0	273
V/C Ratio(X)	0.49	0.71	0.01	0.44	0.00	0.59	0.20	0.00	0.13	0.23	0.00	0.70
Avail Cap(c_a), veh/h	492	1883	1608	496	0	1877	944	0	862	936	0	828
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.6	12.7	8.7	27.2	0.0	12.2	26.5	0.0	26.4	19.8	0.0	21.6
Incr Delay (d2), s/veh	2.7	2.1	0.0	10.9	0.0	1.3	2.0	0.0	1.3	0.4	0.0	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	5.4	0.0	0.2	0.0	4.0	0.1	0.0	0.1	0.8	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	14.8	8.7	38.1	0.0	13.5	28.5	0.0	27.8	20.1	0.0	24.8
LnGrp LOS	C	B	A	D	A	B	C	A	C	C	A	C
Approach Vol, veh/h		612			474			16			263	
Approach Delay, s/veh		15.4			14.1			28.2			23.5	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	5.3	30.1		14.2	6.2	29.3		6.0
Change Period (Y+Rc), s	4.5	5.5		4.5	4.5	5.5		4.5
Max Green Setting (Gmax), s	15.5	56.5		29.5	15.5	56.5		29.5
Max Q Clear Time (g_c+I1), s	2.4	16.2		8.4	2.8	12.6		2.3
Green Ext Time (p_c), s	0.0	8.4		0.7	0.0	6.2		0.0

Intersection Summary	
HCM 6th Ctrl Delay	16.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱			↑		↱
Traffic Vol, veh/h	550	0	0	393	0	0
Future Vol, veh/h	555	5	0	404	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	603	5	0	439	0	5

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	606
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.318
Pot Cap-1 Maneuver	-	-	0	-	0	497
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	497
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB		WB		NB
HCM Control Delay, s	0		0		12.3
HCM LOS					B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	497	-	-	-
HCM Lane V/C Ratio	0.011	-	-	-
HCM Control Delay (s)	12.3	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0	-	-	-

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Appendix C Travel Demand Model Forecasting

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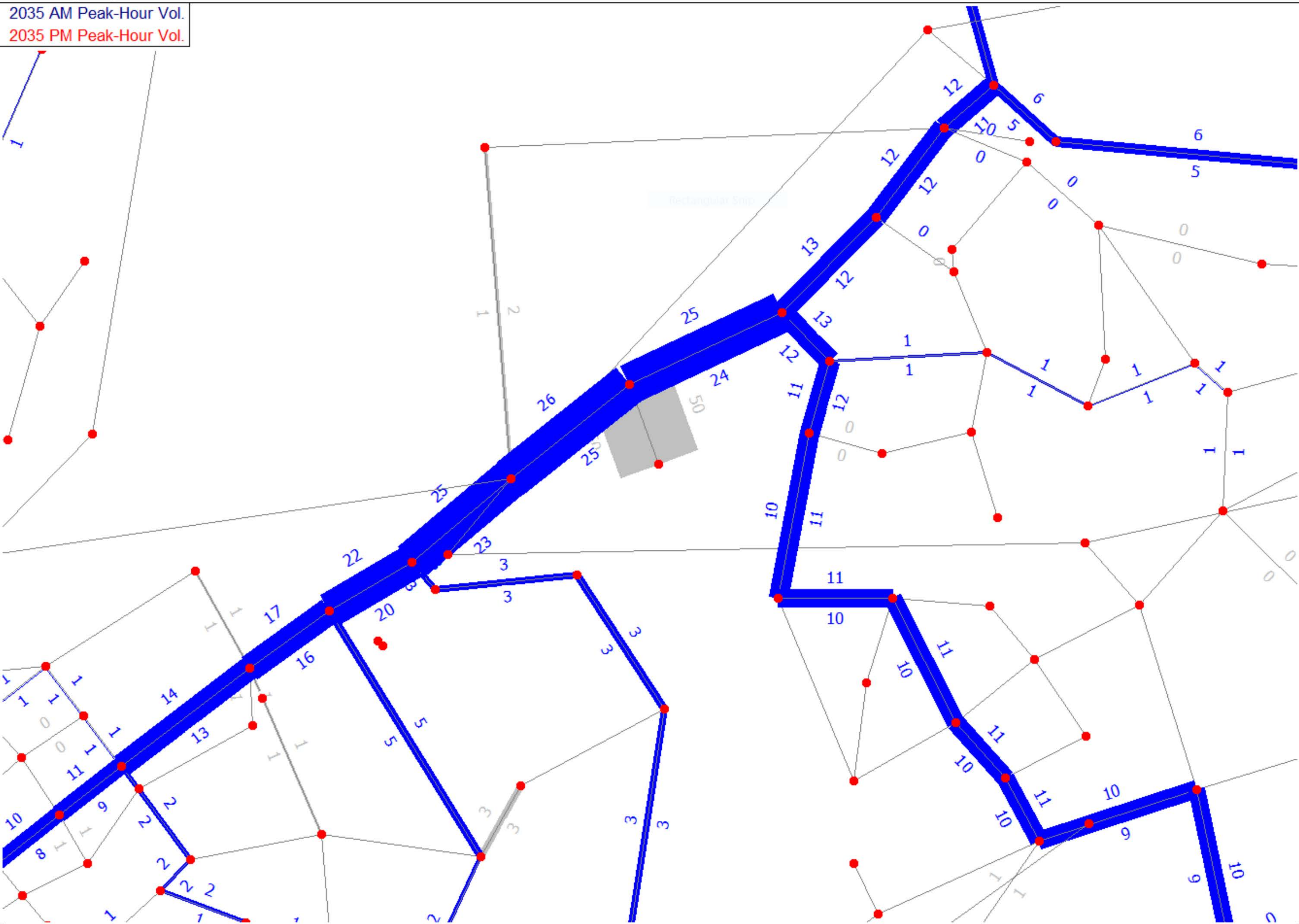
TAZ 1698 Trip Dist
Percentages by Direction



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