APPENDIX G

Transportation Master Plan

Elk Grove Multi-Sport Complex & Grant Line Industrial Annexation Area

Transportation Master Plan

September 29, 2020

Prepared for

CITY OF ELK GROVE
PROUD HERITAGE. BRIGHT FUTURE.

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1.0 Executive Summary

Purpose

The purpose of this transportation master plan is to identify onsite circulation elements including onsite roadway alignments, identification of onsite typical sections and outline the proposed intersection improvements for the Elk Grove Multi-Sport Complex abd Grant Line Industrial Annexation Area. This report is part of an overall high-level infrastructure analysis for the plan area. This onsite transportation plan will be based on the Draft Transportation Impact Study prepared by Fehr & Peers, dated March 2017[(1)], which was included in the Draft Environmental Impact Report for the Multi-Sport Park Complex project [(2)] and the Fehr and Peers Memorandum titled Elk Grove Multi-Sports Complex VMT Analysis and Transportation Management Plan Review dated June 30, 2020 [(3)].

The Memorandum, found in appendix B, compares the land use scenarios analyzed in the original Transportation Impact Study with the City's final preferred land use plan included in this Transportation Master Plan.

Project Characteristics

The plan area encompasses approximately 570 acres and will include a varied mix of land uses from parks / open space to heavy industrial. In addition, this plan area fronts onto Grant Line Rd, part of the Capital Southeast Connector Project. The two fronting intersections at Waterman Rd / Grant Line Rd and Mosher Rd / Grant Line Rd have been analyzed in the Transportation Impact Study [(1)]. The Waterman Rd and Grant Line Rd intersection is planned to be the primary access to the plan area while the Mosher Rd / Grant Line Rd intersection will serve as the secondary point of access.

The proposed land uses in the plan area is expected to bring a wide range of users. The heavy industrial land use is anticipated to bring a high volume of tractor trailer trips while the multi-sport park complex is anticipated to bring pedestrian and cyclists from the neighborhoods to the north of the plan area.

Findings

The onsite circulation plan incorporates the recommendations of the Transportation Impact Study [(1)]. And the Fehr and Peers Memorandum [(3)]. Figure 1-1 below shows the proposed onsite circulation layout for the final preferred land use.

[1] See Transportation Impact Study for the Elk Grove Sphere of Influence Amendment and Multi-Sport Complex (March 2017) Prepared by Fehr and Peers – Appendix A

[2] See City of Elk Grove website for the Multi-Sport Complex Environmental Review section. https://www.elkgrovecity.org/city_hall/departments_divisions/public_works/capital_improvements/multi-_sport_park_complex

[3] See Fehr and Peers Memorandum titled Elk Grove Multi-Sports Complex VMT Analysis and Transportation Management Plan Review dated June 30, 2020 – Appendix B

Figure 1-1 Circulation Exhibit

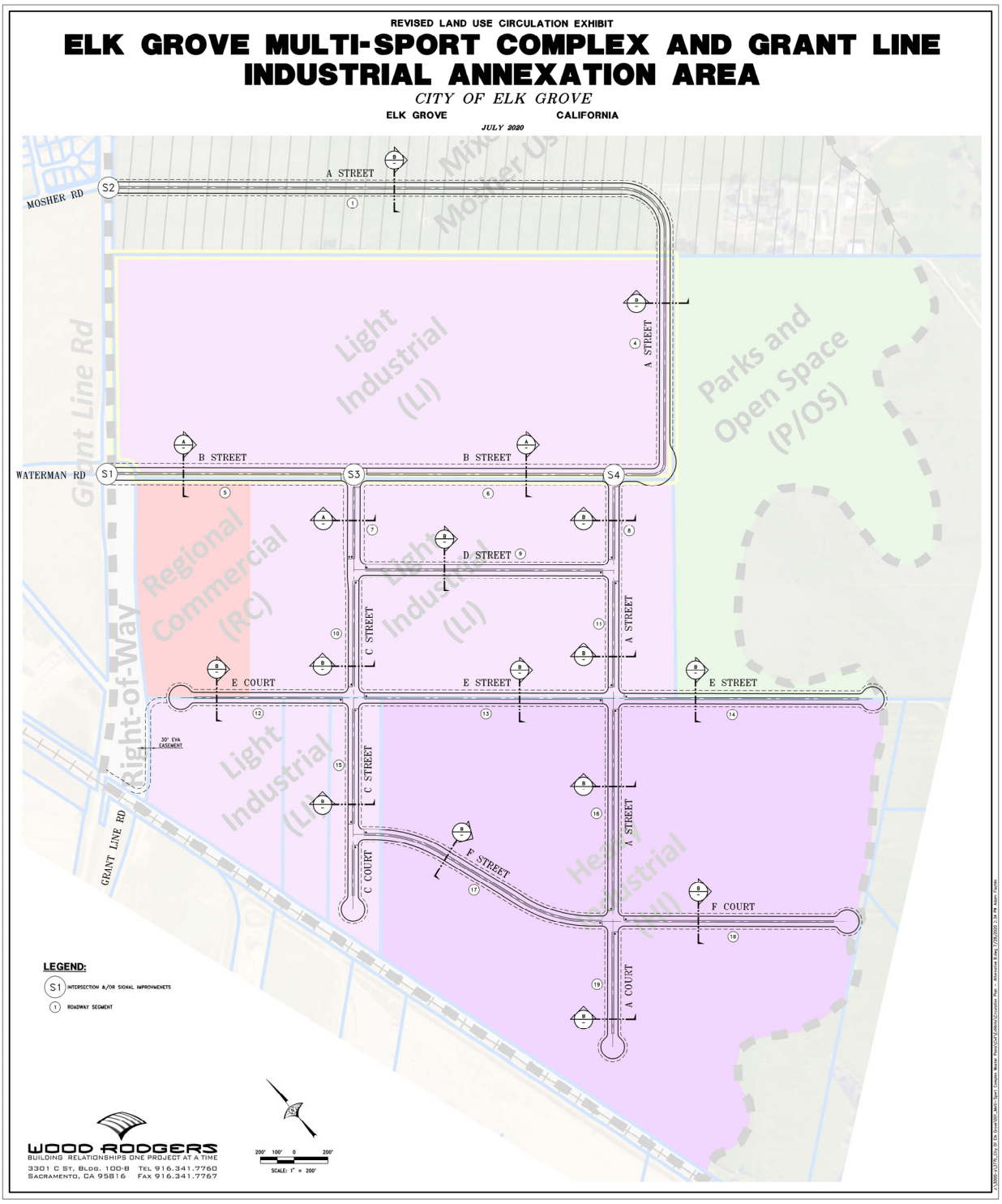


Figure 1-2 Typical Arterial Street Section (Section A)

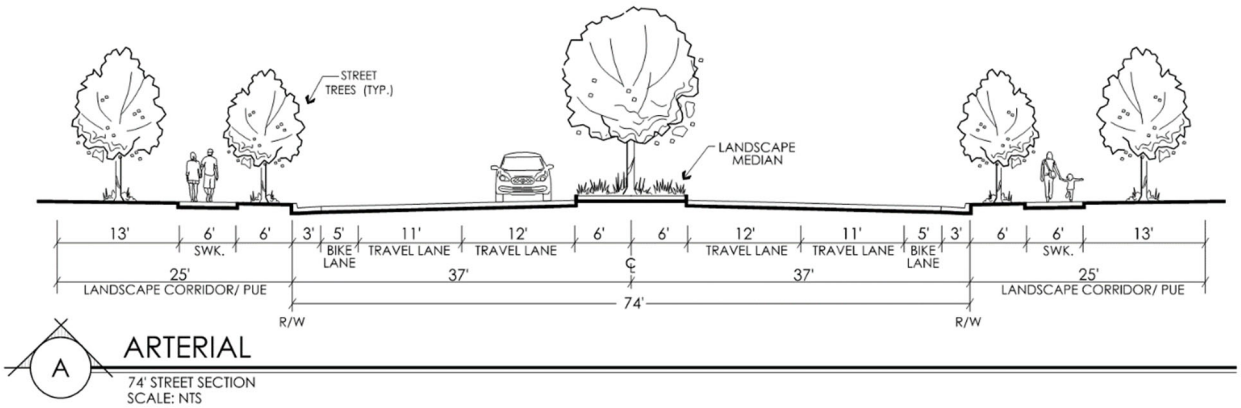
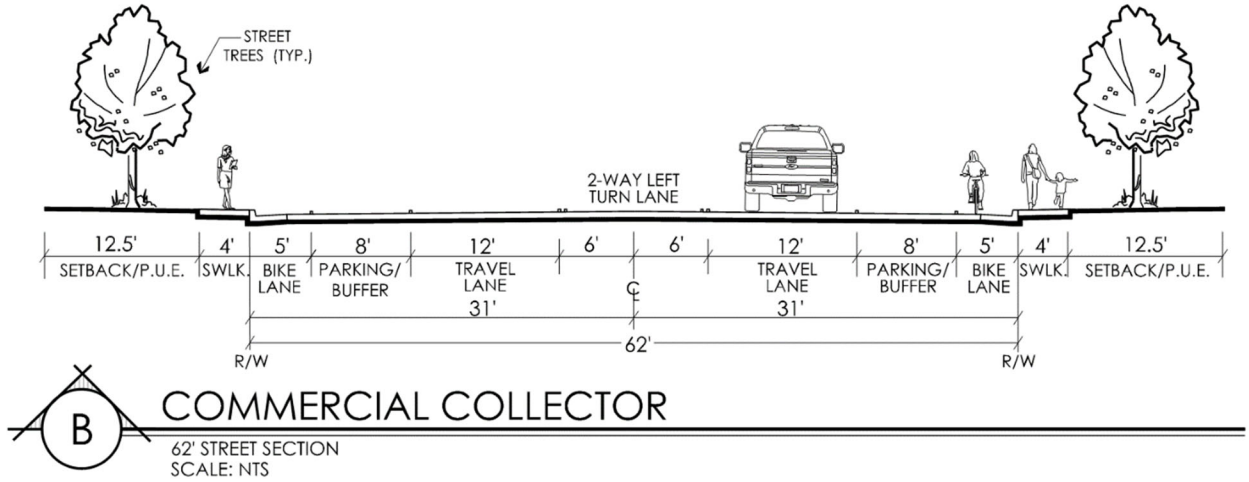


Figure 1-3 Typical Commercial Collector Street Section (Section B)



2.0 Introduction

The City of Elk Grove (City) has acquired two parcels totaling approximately 104-acres of property to develop a Multi-Sport Complex (MSC). The property is located just outside of the southern City limit and requires annexation into the City. The City has initiated the annexation process with the Local Agency Formation Commission (LAFCo). One of the LAFCo conditions to annex the 104-acre City-owned parcels is that adjacent properties also be annexed into the City's Sphere of Influence (SOI). The adjacent properties are located to the west and east of the City-owned parcels, with a total combined area of approximately 572-acres in size (Plan Area or Project). The 572-acre Plan Area, also known as the "Elk Grove Multi-Sport Complex and Grant Line Industrial Annexation Area" includes the 104-acre City-owned property.

Background Study

In 2014 The City acquired a 100 Acre parcel South of Grant Line Rd near the intersection of Waterman Rd. In 2015 the City began the process to annex the property into the City and prepared supporting studies and environmental documents required by the Sacramento Local Agency Formation Commission or LAFCo. Included in the environmental analysis is a detailed Transportation Impact Study that analyzed both onsite and offsite traffic related impacts caused by the proposed development. In 2020 due to some minor revision to the preferred land use within the plan area the City commissioned a Technical Memorandum to analyze any potential impacts these changes may have. See Appendix B for the Memorandum.

This Transportation Master Plan utilizes background information from the Transportation Impact Study and the Technical Memorandum to inform the onsite circulation needs at build out of the plan area. Figure 17 and Table 3 below are from the Technical Memorandum reflect the onsite build out traffic volumes by segment.

Figure 17 Site Access and Onsite Circulation

Figure 17
Site Access and On-Site Circulation

Table 3: On-site Roadway Capacity – Project Buildout

Segment	Lanes	Daily Capacity	DEIR			Proposed Project		
			Daily Volume	VC	Level of Service	Daily Volume	VC	Level of Service
1	2	18,000	9,400	0.52	A	8,900	0.49	A
2	2	18,000	5,200	0.29	A	4,900	0.27	A
3	2	18,000	11,100	0.62	B	10,500	0.58	A
4	2	18,000	10,900	0.61	B	10,300	0.57	A
5	4	36,000	31,000	0.86	D	29,300	0.81	D
6	4	36,000	8,200	0.23	A	7,800	0.22	A
7	4	36,000	22,700	0.63	B	21,500	0.60	A
8	2	18,000	8,500	0.47	A	8,000	0.44	A
9	2	18,000	5,200	0.29	A	4,900	0.27	A
10	2	18,000	8,500	0.47	A	8,000	0.44	A
11	2	18,000	6,400	0.36	A	6,100	0.34	A
12	2	18,000	2,300	0.13	A	2,200	0.12	A
13	2	18,000	4,100	0.23	A	3,900	0.22	A
14	2	18,000	4,800	0.27	A	4,500	0.25	A
15	2	18,000	2,400	0.13	A	2,300	0.13	A
16	2	18,000	2,000	0.11	A	1,900	0.11	A
17	2	18,000	2,900	0.16	A	2,700	0.15	A
18	2	18,000	1,000	0.06	A	1,000	0.06	A
19	2	18,000	2,700	0.15	A	2,600	0.14	A

[1]Both directions excluding center turn lanes or right-turn deceleration lanes.
[2]City of Elk Grove – *Traffic Impact Analysis Guidelines*, July 2000. Service volume for moderate access control arterial roadways.
[3]VC – Volume-to-Capacity Ratio
Shading – Identifies change from DEIR transportation analysis.
Source: Fehr & Peers, 2020

The City is currently working on Grant Line Rd widening project WTR002. This project will widen Grant Line Rd from Waterman Rd to the East across the entire plan area frontage. This Transportation Master Plan takes into account these future improvements.

Location

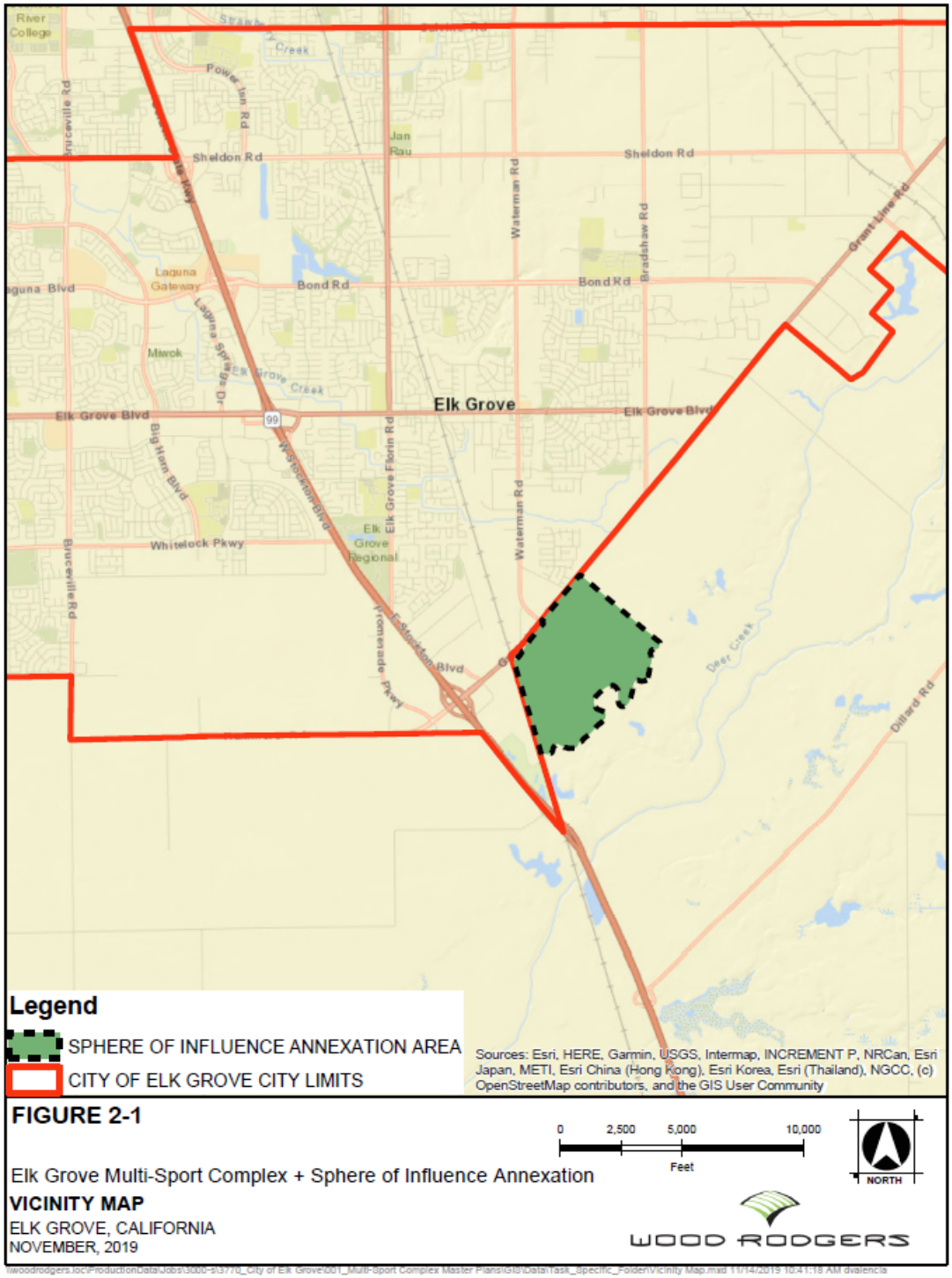
The Elk Grove Multi-Sport Complex and Grant Line Industrial Annexation Area encompasses approximately 570 acres and is located in the southeast portion of the City of Elk Grove. In general, the project area is located east of Interstate 99, south of Grant Line Rd, just outside the current city limits.

See Figure 2-1 for a vicinity map of the project site.

Topography

The site currently is deemed as mostly agriculture. The existing topography varies from 55 feet to 49 feet and falls east to west.

Figure 2-1: Vicinity Map



Land Use and Zoning

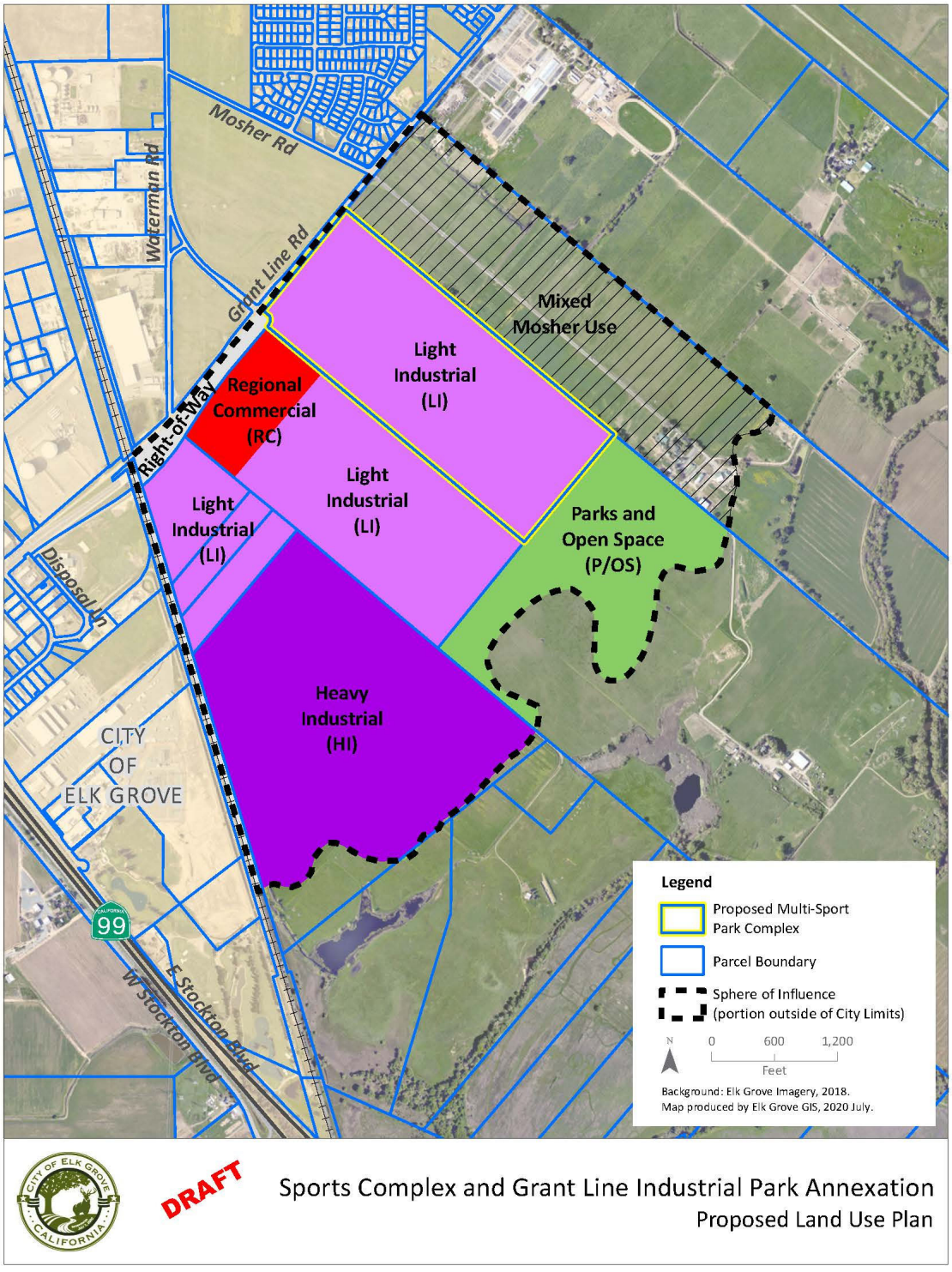
The project area is currently outside of the city's current border. The proposed land will consist of mixed use, parks and open space, regional commercial, light industrial, and heavy industrial. The proposed area is approximately 572 acres. See **Table 2.1: Proposed Project Land Use** for detailed land use areas and **Figure 2-2: Proposed Land Use Plan** for an exhibit showing the proposed land use in the project area.

Table 2-1: Preferred Land Use
Source: Land use spreadsheet provided by City of Elk Grove, July 22, 2020

Land Use		Area[1] (acres)
P//OS	Parks and Open Space	65.1
MU	Mixed Mosher Use	118.9
LI	Light Industrial	216.2
HI	Heavy Industrial	143.2
RC	Regional Commercial	20.0
ROW	Right-of-Way	8.2
Total		**571.6**

[1] Acreage values are approximate and reflect high-level master planning. Acreages are subject to change through subsequent development processing in keeping with the policies and procedures provided in the City's Special Planning Area document.

Figure 2-2: Land Use Alternative A



3.0 Onsite Circulation

Onsite circulation generally follows Figure 17 from the Transportation Impact Study. The onsite roadway segments are laid out to provide necessary access to individual underlying property owners as well as discrete land uses. The onsite circulation utilizes two main intersections to access the plan area. The first is Waterman Rd and Grant Line Rd and the second access point is Mosher Rd and Grant Line Rd. Non-vehicular circulation includes class 2 bikeway facilities throughout the plan area and a proposed trail connection to the North West that will utilize the existing Grant Line Rd overcrossing at the Rail Road tracks to allow for pedestrian and bike connections to pass below Grant Line Rd.

3.1 Typical Sections

The Transportation Impact Study and Technical Memorandum indicates that there are a few onsite segments that warrant an Arterial class facility based on projected buildout traffic volumes. See Figure 3-1 for Typical Arterial Section. The average daily volume that an arterial section can accommodate is 36,000 vehicles per day. This section is planned for roadway segments 5, 6 and 7. The balance of the plan area will be served by a Typical Commercial Collector Section – See Figure 3-2. A commercial collector can accommodate 18,000 vehicles per day. This section includes a two-way left turn lane throughout to better facilitate future driveway locations. Both the sections include Class II Bikeway facilities and separated and attached sidewalks for non-vehicular circulation.

Figure 3-1 Typical Arterial Section

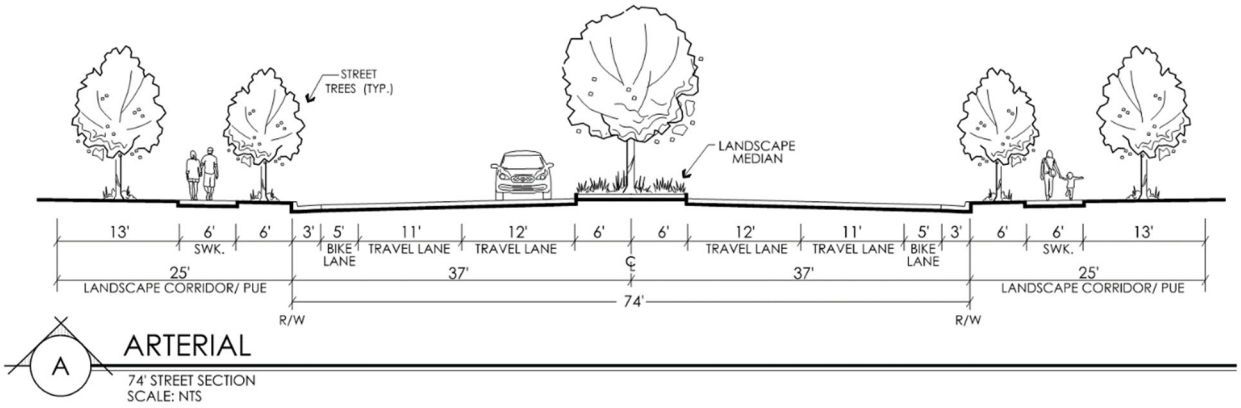
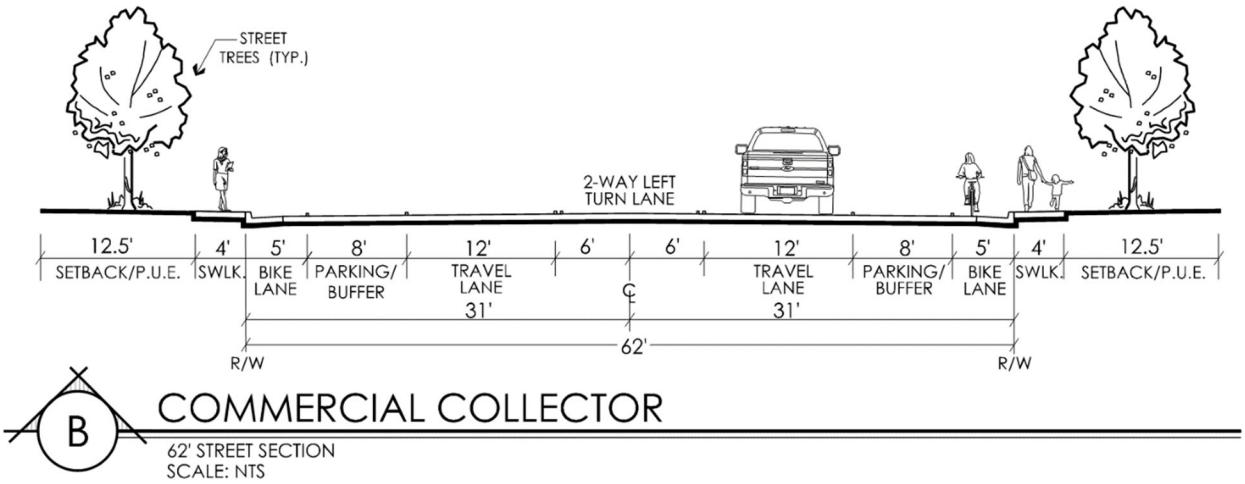


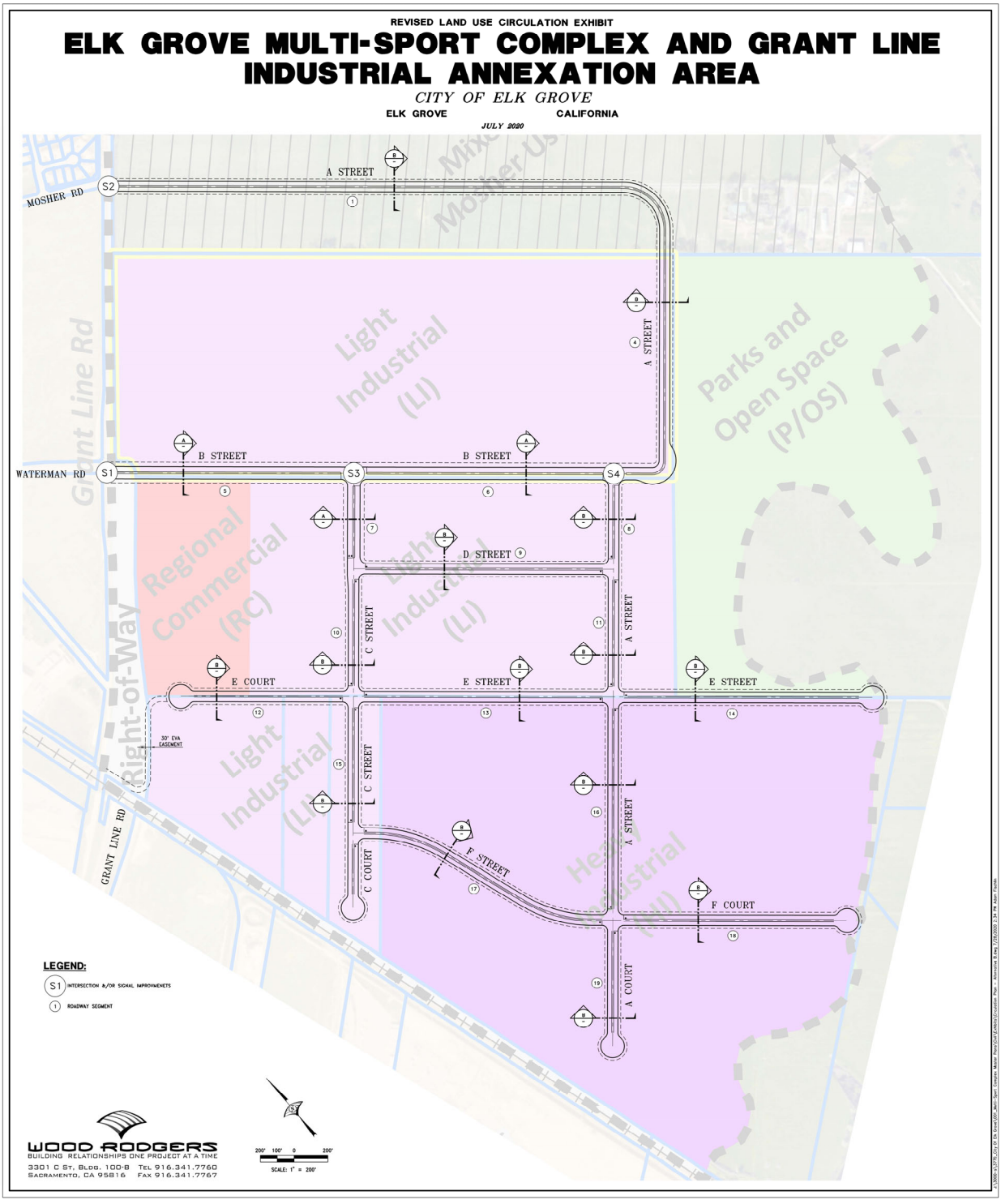
Figure 3-2 Typical Commercial Collector Section



3.2 Proposed Land Use Exhibits

Following the Transportation Impact Study and the Technical Memorandum, the onsite circulation and segment configuration has been laid out for the proposed land use plan. Figure 3-3 shows the proposed land uses, unique segment identifiers, cross sections for each segment and the location of the proposed Intersection and signal improvements.

Figure 3-3 Proposed Land Use Circulation Exhibit



4.0 Intersections / Signalization Configuration

Interim Facilities

As depicted in Figure 3-3 there is an existing signalized intersection at Waterman Rd and Grant Line Rd (S1) and a proposed signalized intersection at Mosher Rd and Grant Line Rd (S2). The Transportation Impact Study and Technical Memorandum identifies interim improvements at each of these intersections necessary to accommodate the full onsite buildout of the plans area. Those Interim facilities are detailed below. Typical with City policy it is assumed that as development occurs within the plan area these intersections will be analyzed to determine the appropriate level of improvement necessary.

S1 – Waterman Rd / Grant Line Rd Interim Intersection Configuration

- Three left-turn lanes, one through lane, and one right-turn lane on the northbound approach.
- Two left-turn lane, one through lane, and one right-turn lanes on the southbound approach.
- Two left-turn lanes, four through lanes, and two right-turn lanes on the eastbound approach.
- Two left-turn lanes, four through lanes, and one right-turn lane on the westbound approach.

S2 – Mosher Rd / Grant Line Rd Interim Intersection Configuration

- One left-turn lane, one through lane, and one right-turn lane on the northbound approach.
- One left-turn lane, one through lane, and one right-turn lane on the southbound approach.
- One left-turn lane, two through lanes, and one right-turn lane on the eastbound approach.
- One left-turn lane, two through lanes, and one right-turn lane on the westbound approach.

The City is currently working on Grant Line Rd widening project, WTR002, that is proposing to build some of the eastbound and west bound Grant Line Rd improvements identified above. Figures 4-1 and 4-2 show the proposed improvements being constructed by the City of Elk Grove at the Waterman Rd / Grant Line Rd and Mosher Rd / Grant Line Rd intersections.

Figure 4-1 Waterman Rd / Grant Line Rd Interim Improvement

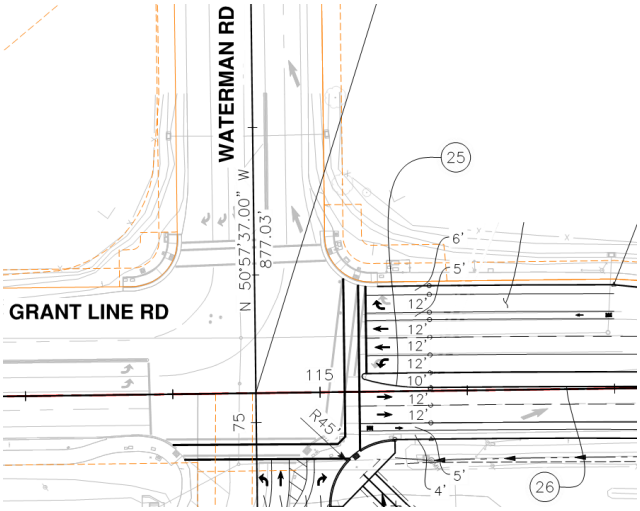
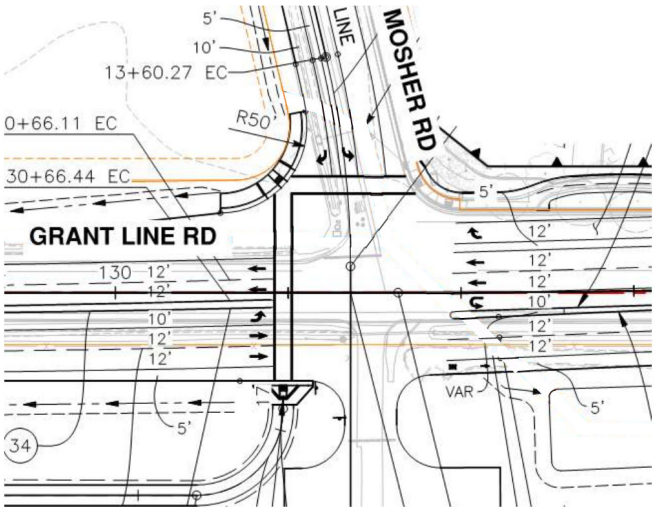


Figure 4-2 Mosher Rd / Grant Line Rd Interim Improvement



Ultimate Facilities

The Transportation Impact Study and the Technical Memorandum identifies the ultimate intersection configuration needed to support the build out of the plan area and includes build out levels in the City of Elk Grove in the 2036 forecast year. As mentioned above, and consistent with City policy, it is anticipated that these ultimate intersection improvements may be phased to meet the increased traffic volumes and associated impacts as the plan area builds out.

S1 – Waterman Rd / Grant Line Rd Ultimate Intersection Configuration

- Three left-turn lanes, one through lane, and one right-turn lane on the northbound approach.
- Two left-turn lanes, one through lane, and one right-turn lane on the southbound approach.
- Two left-turn lanes, four through lanes, and two right-turn lanes on the eastbound approach.
- Two left-turn lane, four through lanes, and one right-turn lane on the westbound approach.

S2 – Mosher Rd / Grant Line Rd Ultimate Intersection Configuration

- One left-turn lane, one through lane, and one right-turn lane on the northbound approach.
- One left-turn lane, one through lane, and one right-turn lane on the southbound approach.
- One left-turn lane, three through lanes, and one right-turn lane on the eastbound approach.
- One left-turn lane, three through lanes, and one right-turn lane on the westbound approach.

The Transportation Impact Study also identifies two internal signalized intersections that are anticipated at project buildout. These are identified on Figure 3-3 as intersection improvements S3 and S4.

5.0 Conclusion

This Transportation Master Plan utilizes the plan area Transportation Impact Study and subsequent Technical Memorandum to layout the onsite circulation elements for the final proposed land use. The recommended roadway segments and intersection traffic controls in this plan are designed to accommodate the cumulative buildout travel demand forecast models peak hour and roadway segment traffic volumes. This plan also incorporates pedestrian and shared bike way facilities to provide efficient movement and safe travel spaces for all modes of transportation.

Appendix A

Transportation Impact Study
Fehr and Peers – March 2017

APPENDIX G

Transportation Impact Study

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I. INTRODUCTION

PURPOSE

This study analyzes the transportation impacts associated with development of the proposed City of Elk Grove Sphere of Influence Amendment and Multi-Sport Park Complex (EGMSC), which is proposed to be located in the southern portion of the City (Project). The sports complex would be located directly south of Grant Line Road at the Grant Line Road/Waterman Road intersection. This study analyzes expected transportation conditions with development of the proposed Project.

The following analyses were selected for study based on the Project's expected operations and input from City of Elk Grove staff and comments received on the Notice of Preparation from Caltrans, the County of Sacramento, and the Capital Southeast Connector JPA:

Analysis Facility	Peak Hour	Existing Conditions	Existing Plus Project Conditions		Cumulative Conditions						
							Plus Project Buildout				
			Phase 1	Buildout	No Project	Plus Phase 1	Practice	Tournament	Stage Events	League Events	County Fair
Intersection	AM	X		X	X		X				
	PM	X	X	X	X	X	X		X		
	Saturday	X	X		X	X					
Roadway	PM	X	X	X	X	X	X		X	X	X
	Saturday	X	X		X	X		X			
Freeway	AM	X		X	X		X				
	PM	X	X	X	X	X	X				

- Analysis of background and Project traffic impacts at 18 study intersections, under existing conditions, and 20 study intersections under cumulative conditions, during typical weekday peak hour operations and analysis of seven intersections (Bradshaw Road to Promenade Parkway) on Saturday serving the Project under existing and cumulative conditions.
- Analysis of background and Project-related typical weekday PM and Saturday peak hour roadway segment operations. Typical weekday roadway operations were conducted for 22 study segments. Saturday peak roadway segment operations were conducted for the following special uses of the sports facility:
    - Regional/national soccer tournament
    - Local/semi-regional soccer tournament

- Analysis of background and Project traffic impacts on SR 99 and at the SR 99/Grant Line Road interchange, including mainline, merge, and diverge operations.

The rationale for studying each of these scenarios is described in more detail in the following chapters.

PROJECT DESCRIPTION

Figure 1 shows the Project area in the context of the study area, including study intersections. As shown, the Project would be located southeast of, but adjacent to, Grant Line Road at the Grant Line Road/Waterman Road intersection east of State Route 99 (SR 99) east of the Union Pacific Railroad. The Project area is located southwest of, but adjacent to, the existing City of Elk Grove boundary.

The proposed Project consists of amending the City of Elk Grove's Sphere of Influence by approximately 579 acres and constructing and operating a 100-acre Multi-Sport Park Complex on City-owned property. The following summarizes the components of the City's Phase 1 Project and Project buildout.

CITY PHASE 1 PROJECT

The City's Phase 1 Project is the 100-acre Multi-Sport Park Complex. Phase 1 would consist of 16 multi-purpose sports fields that includes 12 full-sized lighted soccer fields (80 x 120 yards) and 4 training fields (80 x 50 yards), amenity concourses (of unspecified size), and an indoor sports facility of up to 100,000 square feet in area. The indoor sports facility would provide space for support facilities that could include restrooms, food and beverage sales, merchandising space, and office space (i.e., in support of tournament and practice activities).

Access for Phase 1 would be provide by a full-access driveway that would create the fourth leg of the Grant Line Road/Waterman Road intersection. The access driveway would traverse the perimeter of the sports fields and create a new right-in/right-out driveway at Grant Line Road. As development occurs in the lands adjacent to the Multi-Sport Park Complex, the access to at the Grant Line Road/Waterman Road intersection will be upgraded from a driveway to a public street. In addition, a signalized full-access intersection will be provided at the Grant Line Road/Mosher Road intersection.

Phase 1 would provide a minimum of 1,160 paved parking spaces, located along the southwest property line and a gravel overflow parking lot along the northeast property line.

CITY SITE BUILDOUT

Buildout of the Project would add the following uses to the 100-acre Multi-Sport Park Complex:

- A stadium park that would have 7,500 fixed seats for field events with an additional on-field seating capacity of 1,500 seats that would accommodate up to 9,000 attendees for stage events.
- A 15-acre Fairgrounds that would provide facilities to support the County Fair and other agricultural-based events.
- 285 acres of commercial/industrial land use.
- 185 acres of mixed use

Refer to Chapter III for a discussion of the Project's expected operations during weekdays and on weekends.

Figure 1: Study Area

STUDY AREA AND PERIODS

The City of Elk Grove typically relies on the weekday AM and PM peak hours to characterize its street system operations and need for capital improvements because these hours generally represent the busiest hours of travel during a typical weekday. Accordingly, this study includes an analysis of potential EGMSC impacts associated with its typical weekday AM and PM peak hour operations. However, in recognition of the peaks in traffic associated with different uses of Phase 1, AM peak hour operations may be omitted and/or Saturday operations may be added. For planned weekend soccer tournaments, a focused analysis along Grant Line Road during the Saturday peak hour is also presented that includes intersections 5 through 11. Similarly, analysis of practice activities at the Multi-Sports Complex is presented during PM peak hour conditions, since practice activities occur in the evenings.

The study area includes the following 18 intersections on Grant Line Road, Kammerer Road, and Waterman Road:

1. I-5 SB Ramps/Hood Franklin Road
2. I-5 NB Ramps/Hood Franklin Road
3. Bruceville Road/Kammerer Road
4. Lent Ranch Parkway/Kammerer Road
5. Promenade Parkway/Kammerer Road
6. SR 99 SB Ramps/Grant Line Road
7. SR 99 NB Ramps/Grant Line Road
8. E. Stockton Boulevard/Grant Line Road
9. Waterman Road/Grant Line Road
10. Mosher Road/Grant Line Road
11. Bradshaw Road/Grant Line Road
12. Grant Line Road/Elk Grove Boulevard
13. Grant Line Road/Bond Road
14. Grant Line Road/Wilton Road
15. Grant Line Road/Sheldon Road
16. Grant Line Road/Calvine Road
17. Waterman Road/Elk Grove Boulevard
18. Waterman Road/Bond Road

These intersections were selected in consultation with City of Elk Grove staff and consider the Project's size, location, and expected generation/distribution of trips. Under cumulative conditions, the planned Big Horn Boulevard/Kammerer Road and Lotz Parkway/Kammerer Road intersections are also analyzed. As shown in **Figure 1**, the study area includes all signalized intersections and key stop controlled intersections on Grant Line Road and Kammerer Road.

The study area also includes 37 and 41 roadway segments under existing and cumulative conditions, respectively. The roadway segments are located on arterial streets. Whereas intersections are analyzed on a peak hour basis to identify impacts and mitigations and size Project access needs, roadways are evaluated to describe to decision-makers and the public the expected change in traffic under various activities at the EGMSC. Roadway segments are not analyzed for impacts. However, the data may be used in support of air quality, noise, and greenhouse gas evaluations by the City.

The following describes the study time periods:

- Weekday AM Peak Hour: occurs between 7:00 to 9:00 AM.
- Weekday PM Peak Hour: occurs between 4:00 to 6:00 PM.
- Saturday Peak Hour: occurs between 9:00 to 11:00 AM. The Saturday peak hour represents the busiest 60 minutes of travel during surveyed tournaments. This information was derived by conducting traffic counts at comparable soccer tournaments in the Sacramento region, and is discussed in detail in Chapter III.

ANALYSIS METHODOLOGIES

Project analysis includes both Level of Service (LOS) and Vehicle Miles of Travel (VMT).

LOS is a qualitative measure of traffic operating conditions whereby a letter grade, from A (the best) to F (the worst), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. In general, LOS A represents free-flow conditions with no congestion, and LOS F represents severe congestion, over-capacity conditions.

VMT is a metric for measuring transportation impacts on the natural environment. It considers the number of miles traveled by motor vehicles (i.e., passenger cars and light trucks) that are produced by or attracted to a project. This allows for an accounting of both the effects of a project's features and its surroundings, as well as its location within the region. VMT considers only motor vehicle trips and excludes trips by other modes. Therefore, the benefits of transit and active transportation trips are captured through reductions in VMT.

Analysis methodologies for LOS and VMT are discussed below.

INTERSECTIONS

All study intersections were analyzed using procedures from the *Highway Capacity Manual* (HCM), Transportation Research Board, 2010 as follows:

- For weekday AM and PM peak hour operations, most study intersections were analyzed using the Synchro 8 software program, which utilizes HCM procedures. HCM 2000 was used to analyze two intersections (Kammerer Road/Lent Ranch Parkway and Grant Line Road/Calvine Road) due to unique signal timing involving the northbound pedestrian phase that occurs simultaneously with the westbound left-turn movement.
- For Saturday peak hour conditions at the project accesses, key intersections on Grant Line Road and Kammerer Road between Bradshaw Road and Promenade Parkway, using the Synchro 8 software program, which utilizes HCM procedures. The state-of-the-practice SimTraffic

microsimulation model, which considers the effects of signal coordination, vehicle queue spillbacks, and other conditions on at the Grant Line Road/Waterman Road and Grant Line Road/Mosher Road (under cumulative conditions) intersections (i.e., the main Project access) to confirm that the proposed access would not result in vehicle queue spillback that would impede traffic flow on Grant Line.

The LOS at signalized and all-way stop-control intersections is based on the average delay experienced by all motorists travelling through the intersection as described in the 2010 HCM. **Table 1** relates the delay range for each LOS category for signalized and unsignalized intersections. For side-street stop-controlled intersections, the delay and LOS is based on the minor street movement with the greatest average delay.

TABLE 1:
LEVEL OF SERVICE THRESHOLDS – INTERSECTIONS

Level of Service	Average Control Delay (seconds per vehicle)	
	Signalized Intersections[1]	Unsignalized Intersections[1]
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

Notes: [1] Delay values rounded to the nearest second and evaluated for LOS based on the above thresholds (i.e, 10 sec = LOS A).
Source: Fehr & Peers, 2016

ROADWAY SEGMENTS

Roadway segments were evaluated by comparing peak hour directional traffic volumes and volume-to-capacity (VC) ratios for key study roadway segments.

Consistent with the General Plan transportation analysis, the analysis presented in this report is based on peak hour directional traffic volumes to address traffic flow directionality that occurs on some study facilities associated with morning and evening work commute patterns.

Table 2 displays peak hour roadway segment service volume thresholds used to evaluation roadway capacity. Service volume thresholds to capacity thresholds presented in the City of Elk Grove's Traffic Impact Analysis Guidelines (July 2000). Consistent with assumptions in the City's General Plan

background report, study segments were analyzed using thresholds for arterial roadways with moderate access control.

TABLE 2:
PEAK HOUR ROADWAY SEGMENT SERVICE VOLUME THRESHOLDS

	Directional Service Volume Threshold (vehicles per lane)
Connector JPA Segments[1]	910
Other Study Segments[2]	990

Notes:
[1]Capital SouthEast Connector – *Planning and Evaluation Traffic Conditions White Paper*, January 25, 2017.
[2]City of Elk Grove – *Traffic Impact Analysis Guidelines*, July 2000. Service volume applies to arterial roadways with moderate access control.
Source: Fehr & Peers, 2017

FREEWAY FACILITIES

Per Caltrans standards, the freeway ramps and mainline were analyzed using procedures from the Highway Capacity Manual, 2010

This procedure determines the LOS based on the computed density, which is expressed in passenger cars per lane, per mile. **Table 3** displays the density ranges associated with each LOS category for basic segments and ramp merge/diverge movements.

TABLE 3:
LEVEL OF SERVICE THRESHOLDS – FREEWAYS

Level of Service	Density (Passenger Cars per Mile per Lane)[1]	
	Signalized Intersections	Unsignalized Intersections
A	≤ 11	≤ 10
B	> 11 to 18	> 10 to 20
C	> 18 to 26	> 20 to 28
D	> 26 to 35	> 28 to 35
E	> 35 to 45	> 35
F	> 45 or any v/c ratio > 1.00[1]	Demand Exceeds Capacity[2]

Notes: [1]V/C ratio = demand flow rate divided by the capacity of a given segment.
[2] Occurs when freeway demand exceeds upstream (diverge) or downstream (merge) freeway segment capacity, or if off-ramp demand exceeds off-ramp capacity.
Source: Fehr & Peers, 2016

As outlined below, SR 99 from just south of Elk Grove Boulevard through the City includes one high occupancy vehicle (HOV) lane and two general purpose lanes in each direction. Therefore, to account for HOV lane utilization, the freeway segment analysis is based on the traffic volume in the general purpose lanes, by removing vehicles using the HOV lanes from the analysis, based on measured HOV volumes documented in Caltrans' District 3 High Occupancy Vehicle Lanes Status Report, Sacramento Metropolitan Area (July 2011).

VEHICLE MILES TRAVELED

The City uses total daily VMT and VMT per service population as the basis for VMT analysis. VMT was calculated using a modified version of SACOG's SACMET regional travel demand forecasting model. The following describes these two VMT metrics and their intended use:

- Total Daily VMT – Includes the sum of all daily VMT produced by all uses within the City of applicable Study Area. The total daily VMT metric is used to assess a project against the Citywide or Study Area total VMT limits. The project is located in the City's East Study Area, so consistency with the East Study Area total daily VMT limit is evaluated.
- VMT per Service Population – Includes the sum of all home generated residential and worker VMT produced by uses in the applicable land use designation, divided by the sum of total employees and population in the subject area. The VMT per service population metric is used to assess a project against specific land use VMT limits.

Using the modified version of SACOG's SACMET forecasting model, VMT per service population is calculated by first measuring daily home-based residential VMT per capita is calculated. This considers all home-based auto vehicle trips, traced back to the residence of the trip-maker, including home-based work, home-based other, home-based school, and home-based shopping trips. Non-home-based trips are excluded. Second, the home-based work VMT per worker is calculated. This looks at all vehicle trips between home and work. Commercial vehicle trips (e.g., delivery trucks) are excluded from the analysis.

TRAVEL DEMAND FORECASTING

A modified version of SACOG's MTP/SCS travel demand forecasting (TDF) model was used to develop traffic volumes for the study facilities. The official version of the base year model is generally representative of 2012 conditions and the future year model has a 2036 forecast year. However, as is standard practice with large area travel demand models, a thorough model review was completed and the model was refined to ensure that it produced reasonable results in the study area.

The following refinements were implemented in the study area:

- Added roadway network detail
- Updated land use to reflect 2015 conditions in the study area

- Refined the traffic analysis zones (TAZs) in order to get more refined loading of trips in the study area
- Updated network attributes in the study area to reflect existing conditions (e.g. verified roadway network speeds, number of lanes on the roadway, and roadway capacities to reflect existing conditions)
- Updated the future year roadway network in the study area to only reflect the SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) constrained roadway network.
- Updated the future land use information to reflect approved and reasonably foreseeable projects in the study area

Specific information related to the model's performance is described below:

Base Year Model Validation

Before any model can be applied for use in a major specific plan application, it should be evaluated against specific validation criteria identified by Caltrans, the Federal Highways Administration (FHWA), and the California Transportation Commission (CTC). These criteria were developed to ensure that a model is developed such that it can accurately forecast existing conditions based on land use and roadway network information, which improves the model's ability to accurately forecast future conditions. The state-of-the-practice for developing defensible forecasts for changes in the roadway network and/or changes in proposed land use is to use a valid base year model.

The first step of any model validation is to ensure that the model generally produces similar results to existing counts. Please note that, since the model is being used to generate AM peak hour and PM peak hour forecasts, the model must be valid at our study facilities for both time periods.

Key metrics for model validation guidelines are described below:

- The volume-to-count ratio is computed by dividing the volume assigned by the model and the actual traffic count for individual roadways (or intersections). The volume-to-count ratio should be less than 10%.
- The deviation is the difference between the model volume and the actual count divided by the actual count. Caltrans provides guidance on the maximum allowable deviation by facility type (e.g. lower-volume roadways can have a higher deviation than higher-volume roadways). 75% of the study facilities should be within the maximum allowable deviation.
- The correlation coefficient estimates the correlation between the actual traffic counts and the estimated traffic volumes from the model. The correlation coefficient should be greater than 0.88.

- The percent Root Mean Square Error (RMSE) is the square root of the model volume minus the actual count squared divided by the number of counts. It is a measure similar to standard deviation in that it assesses the accuracy of the entire model. The RMSE should be less than 40%.

The model validation statistics are summarized in **Table 4**. As shown in **Table 4**, the model meets or exceeds the identified model validation target criteria in the study area. As such, the model is deemed appropriate for use in this assessment.

TABLE 4:
TRAVEL DEMAND FORECASTING MODEL SUB AREA VALIDATION

Performance Metric	Target Criteria	Peak Hour Model Validation Results	
		AM	PM
Model to Count Ratio	Between 0.90 and 1.10	0.91	0.95
Percent Within Maximum Deviation	> 75%	91%	91%
Percent Root Mean Square Error	< 40%	22%	19%
Correlation Coefficient	> 0.88	0.93	0.94

Notes: Validation based on 35 count locations.
Source: Fehr & Peers, 2017

Traffic Volume Forecasts

The TDF model was used to develop traffic volume forecasts for Project buildout conditions under existing and cumulative conditions except for Phase 1 (i.e., the 100-acre Multi-Sport Park Complex) and analysis that includes stadium events (i.e., concerts and tournaments). Due to the unique trip generation and distribution characteristics of Phase 1 and stadium events, trips for these uses were manually added to the study facilities under existing and cumulative conditions. The future year TDF model was modified to reflect buildout development levels in the City of Elk Grove, including buildout of the Laguna Ridge Specific Plan, Sterling Meadows, the Elk Grove Promenade, and buildout of the following projects considered to be reasonably foreseeable:

- Wilton Rancheria Casino Resort Project
- Bilby Ridge Sphere of Influence Amendment
- Kammerer Road/Highway 99 Sphere of Influence Amendment
- Elk Grove Promenade

Year 2036 levels of development are assumed outside the City of Elk Grove.

All forecasts are adjusted using a growth increment method (i.e., the difference method) that adds the growth in forecasts travel demand to existing traffic counts. The base year TDF model transportation network (in the study area) was modified to account of changes to the network that have occurred between 2008 and 2015 (i.e., when the traffic counts were collected). The 2036 transportation network is consistent with programmed improvements listed in the Final MTP/SCS 2016 project list.

STANDARDS OF SIGNIFICANCE

Consistent with the City of Elk Grove's Traffic Impact Analysis Guidelines (July 2000) and the City's proposed VMT policy, the following evaluation criteria were used to determine the significance of project impacts:

INTERSECTIONS

An impact to a roadway segment is considered significant, and mitigation measures must be identified when:

- The traffic generated by the Project degrades the LOS from an acceptable LOS D or better (without the Project) to an unacceptable LOS E or LOS F (with the Project)
- The level of service (without Project) is unacceptable and Project generated traffic increases the average vehicle delay by more than five seconds

FREEWAY FACILITIES

An impact is considered significant on freeway facilities if the Project causes the facility to change from acceptable to unacceptable LOS.

For facilities, which are or will be (in the cumulative condition), operating at unacceptable LOS without the Project, an impact is considered significant if the Project:

- Increases the V/C ratio on a freeway mainline segment or freeway ramp junction by 0.05
- Increase the number of peak hour vehicles on a freeway mainline segment or freeway ramp junction ramp junction by more than five percent

According to the Guide for the Preparation of Traffic Impact Studies (Caltrans, June 2001), Caltrans strives to maintain a target LOS at the transition between LOS C and LOS D on State highway facilities; therefore, LOS D was selected as the minimum standard for all study freeway facilities.

BICYCLE / PEDESTRIAN / TRANSIT FACILITIES

An impact is considered significant if implementation of the Project will disrupt or interfere with existing or planned bicycle, pedestrian, or transit facilities.

VEHICLE MILES TRAVELED

The City desires to achieve a reduction in the travel distances of automobile trips, referred to as Vehicle Miles Traveled (VMT). Reductions in VMT can be accomplished through a combination of land use and mobility actions. To reduce VMT, the City has established the following metrics and limits.

The following VMT Screening Map identifies areas in the City that are exempt from VMT analysis. These include sites that have been pre-screened through Citywide VMT analysis. Pre-screened areas are shown in white and have been determined to result in 15 percent or below the average service population VMT established for that land use designation if built to the specifications of the Land Use Plan. With an average VMT per service population of 12.0, the City's target VMT per service population threshold is 10.2.

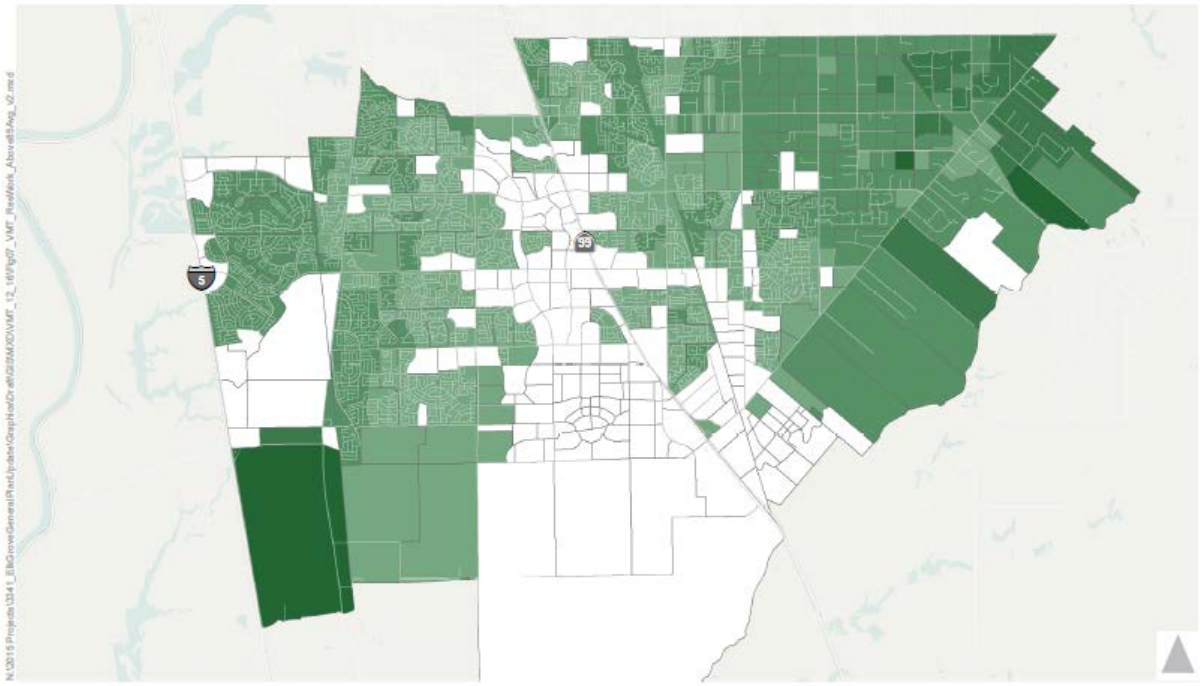


Figure 7
City of Elk Grove
Residential and Work VMT
by Traffic Analysis Zone

For projects that have not been pre-screened and that do not achieve the limits outlined below shall be subject to all feasible mitigation measures necessary to reduce the VMT for, or induced by, the project to the applicable limits. If the VMT for or induced by the project cannot be reduced consistent with the performance metrics outlined below, the City may consider approval of the project, subject to a finding

of overriding consideration and mitigation of transportation impacts to the extent feasible, provided some other form of community benefit is achieved by the project.

- **New Development** – Any new land use plans (and amendments to such plans) and other discretionary development proposals (referred to as "development projects") are required to demonstrate a 15 percent reduction in VMT from existing (2015) conditions. To demonstrate this reduction, conformance with following land use and cumulative VMT limits is required:

    1. **Land Use** – Development projects shall demonstrate that the VMT produced by the project at buildout is equal to or less than the VMT limit of the underlying land use designation, as shown in the following table, which incorporates the 15 percent reduction:

Vehicle Miles Traveled Limits by Land Use Designation

Land Use Designation	VMT Limit (daily per service population)
Commercial and Employment Land Use Designations	
Community Commercial	69.2
Regional Commercial	40.9
Employment Center	11.9
Light Industrial/Flex	26.2
Light Industrial	42.2
Heavy Industrial	31.1
Mixed Use Land Use Designations	
Village Center Mixed Use	27.2
Residential Mixed Use	17.5
Public/Quasi Public and Open Space Land Use Designations	
Parks and Open Space	01
Resource Management and Conservation	01
Public Services	20
Residential Land Use Designations	
Rural Residential	20.1
Estate Residential	18
Low Density Residential	12
Medium Density Residential	10.9

Land Use Designation	VMT Limit (daily per service population)
High Density Residential	7.8
Other Land Use Designations	
Agriculture	30.5

Notes:
1. These land use designations are not anticipated to produce substantial VMT, as they have no residents and limited to no employees. These land use designations therefore have no limit and are exempt from analysis.

2. **Cumulative for Development Projects within the Existing City (2017)** – Development projects located within the existing (2017) City limits shall demonstrate that cumulative VMT would be equal to or less than the established Citywide limit of 5,565,587 VMT (total daily VMT), which incorporates the 15 percent reduction.

3. **Cumulative for Development Projects within Growth Areas** – Development projects located within Study Areas shall demonstrate that cumulative VMT within the applicable Study Area would be equal to or less than the established limit shown in the following table, which incorporates the 15 percent reduction.

Study Area Total Vehicle Miles Traveled Limits

Study Area	VMT Limit (total VMT at buildout)
East Study Area	342,855
South Study Area	1,219,516
West Study Area	550,040

The project is located in a portion for the East Study area. The project and remainder of the East Study Area will meet the buildout VMT Limit 342,855.

II. EXISTING CONDITIONS

This chapter describes the existing transportation system including the roadway, bicycle, pedestrian, and transit systems within the study area.

The City of Elk Grove is generally located in south Sacramento County about 15 miles south of the City of Sacramento. Regional freeway access to Elk Grove is provided by SR 99 and I-5. Grant Line Road provides access to regional destinations northeast of Elk Grove like the City of Rancho Cordova, City of Folsom, and community of El Dorado Hills. Elk Grove is generally served by a network of arterial-level roadways on a one-mile grid with interchanges on SR 99. I-5 has two interchanges that provide direct access to the city.

ROADWAY SYSTEM

- **Grant Line Road** traverses Elk Grove in a southwest to northeast direction. Grant Line Road extends from SR 99 through Elk Grove to White Rock Road in Rancho Cordova. Grant Line Road is six lanes between SR 99 and East Stockton Boulevard. Grant Line Road is four lanes between East Stockton Boulevard and Waterman Road with a grade-separated crossing of the Union Pacific Railroad. Grant Line Road is two lanes east of Waterman Road. Grant line Road is designated as an eight lane arterial between SR 99 and Bradshaw Road and as a six lane arterial east of Bradshaw Road. Grant Line Road between Calvine Road and just east of Equestrian Drive is subject to the Elk Grove Rural Road Improvement Policy. Grant Line Road is also part of the Capital SouthEast Connector project.

- **Kammerer Road** is an east-west road extending from Bruceville Road to West Stockton Boulevard. Kammerer Road is two lanes from just west of Lent Ranch Parkway to Bruceville Road. Kammerer Road is part of the Capital SouthEast Connector project and is designated in the General Plan as an eight lane arterial from SR 99 to Lent Ranch Parkway and as a six-lane arterial from Lent Ranch Parkway to Franklin Boulevard. The general plan includes the extension of Kammerer Road from Bruceville Road to Franklin Boulevard.

- **Waterman Road** is a north-south roadway that extends from Calvine Road to Grant Line Road in the city. Waterman Road is generally two lanes with widening at improved intersection to accommodate it general plan designation as a four-lane arterial. The segment of Waterman Road ½ mile north and south of Sheldon Road is subject to the Elk Grove Rural Road Improvement Policy.

- **State Route 99 (SR 99)** is a north-south freeway that provides a connection between all of the major cities in the Central Valley, from Sacramento and Stockton in the north to the cities of Modesto, Merced, Fresno, and Bakersfield in the south. Access to SR 99 is provided through interchanges at Grant Line Road, Elk Grove Boulevard, Laguna Boulevard/Bond Road, and

Sheldon Road. This section of SR 99 has two mainline travel lanes and one high occupancy vehicle (HOV) lane in either direction with a posted speed limit of 65 mph.

- **Interstate 5 (I-5)** is a north-south freeway that traverses California and is a major national freeway that connects between Mexico and Canada. Near the Hood Franklin Road interchange, I-5 is a four-lane freeway.

Weekday AM and PM peak hour traffic count data was collected in April 21, 2015 and included identification of heavy vehicles, automobiles, bicycles and pedestrian by movement/approach. Saturday peak hour traffic count data was collected on May 21, 2016. All traffic counts included identification of heavy vehicles, automobiles, bicycles and pedestrian by movement/approach. Existing traffic counts are shown on the following figures:

- **Figure 2** shows weekday AM and PM peak hour turning movement counts, lane configurations, and traffic control at each study intersection.
- **Figure 3** shows Saturday peak hour turning movement counts, lane configurations, and traffic control at Intersections 5 through 11.

TRAFFIC OPERATIONS

The following summarizes traffic operations under existing conditions, including peak hour roadway segment volume-to-capacity, intersection operations, and freeway operations at the SR 99/Grant Line Road interchange.

Peak Hour Roadway Segment Volume-to-Capacity

Table 5 displays directional roadway segment traffic volumes and volume-to-capacity ratio for weekday PM and Saturday peak hour conditions for key roadway segment that will provide primary access to the proposed project, including Grant Line Road between SR 99 and Bradshaw Road. As discussed previously, roadways are evaluated to describe to decision-makers and the public the expected change in traffic under various activities at the EGMSC. As shown in **Table 5**, all of the segments will operate below capacity at VC ratio less than 1.00.

Peak Hour Intersection Operations

Table 6 displays the existing weekday AM, PM, and Saturday peak hour traffic operations analysis results at the 18 study intersections (refer to Appendix A for detailed calculations). Most of the existing study intersections have signal control, except for the following:

Side-Street Stop Control

- Hood Franklin Road/I-5 SB Ramps
- Hood Franklin Road/I-5 NB Ramps
- Kammerer Road/Bruceville Road
- Grant Line Road/Mosher Road
- Grant Line Road/Bradshaw Road

All-Way Stop Control

- Grant Line Road/Elk Grove Boulevard

Operation of these intersection will likely degrade sooner than the signal-controlled intersections with the addition of project traffic. As shown, all study intersections currently operate at LOS D or better.

Peak Hour Freeway Operations

Table 7 displays the existing weekday AM and PM peak hour traffic operations analysis results at the 10 study freeway facilities (refer to Appendix A for detailed calculations). As shown, all study freeway facilities at the SR 99/Grant Line Road interchange operate at LOS C or better. However, peak period operations on SR 99 may be worse than reported due to reoccurring bottlenecks. As documented in the California Department of Transportation Mobility Performance Report, 2009, several bottleneck locations exist on SR 99 that meter traffic northbound in the morning and southbound in the evening. These bottlenecks cause congested conditions (i.e., vehicle speed of 35 miles per hour or less) and vehicle queuing on northbound SR 99 during the AM peak period. Similarly, bottlenecks on southbound SR 99 in the evening meter traffic on SR 99 through Elk Grove.

Figure 2: Weekday Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions

Figure 3: Saturday Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions

TABLE 5:
PEAK HOUR ROADWAY SEGMENT OPERATIONS – EXISTING CONDITIONS

Roadway	Segment		Direction	Lanes[1]	Hourly Capacity (Per Lane)	Weekday PM Peak Hour		Saturday Peak Hour	
	From	To				Volume[1]	VC[2]	Volume[1]	VC[2]
Bradshaw Rd	Elk Grove Blvd	Grant Line Rd	SB	2	990	250	0.25	165	0.17
			NB	2	990	254	0.26	135	0.14
Grant Line Rd	SR 99 SB Ramps	SR 99 NB Ramps	EB	6	910	618	0.23	425	0.16
			WB	6	910	1,108	0.41	595	0.22
	SR 99 NB Ramps	E. Stockton Blvd	EB	6	910	1,022	0.37	761	0.28
			WB	6	910	1,234	0.45	695	0.25
	E. Stockton Blvd	Waterman Rd	EB	4	910	826	0.45	622	0.34
			WB	4	910	911	0.50	570	0.31
	Waterman Rd	Mosher Rd	EB	2	910	631	0.69	454	0.50
			WB	2	910	680	0.75	429	0.47
	Mosher Rd	Bradshaw Rd	EB	2	910	564	0.62	432	0.47
			WB	2	910	645	0.71	382	0.42
	Bradshaw Rd	Elk Grove Blvd	EB	2	910	304	0.33	309	0.34
			WB	2	910	402	0.44	217	0.24
Kammerer Rd	Lent Ranch Pkwy	Promenade Pkwy	EB	6	910	285	0.10	214	0.08
			WB	6	910	433	0.16	171	0.06
	Promenade Pkwy	SR 99 SB Ramps	EB	6	910	547	0.20	316	0.12
			WB	6	910	655	0.24	296	0.11
Mosher Rd	Waterman Rd	Grant Line Rd	SB	2	990	75	0.08	77	0.08
			NB	2	990	98	0.10	56	0.06
Waterman Rd	Mosher Rd	Grant Line Rd	SB	2	990	260	0.26	151	0.15
			NB	2	990	231	0.23	147	0.15

[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] VC – Volume-to-Capacity Ratio
Source: Fehr & Peers, 2017

TABLE 6:
PEAK HOUR INTERSECTION LEVEL OF SERVICE – EXISTING CONDITIONS

Intersection	Control	AM Peak Hour		PM Peak Hour		Saturday Peak Hour	
		Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]
1. Hood Franklin Rd/I-5 SB Ramps	SSSC	5 (10)	A (A)	8 (11)	A (B)		
2. Hood Franklin Rd/I-5 NB Ramps	SSSC	2 (11)	A (B)	2 (11)	A (B)		
3. Kammerer Rd/Bruceville Rd	SSSC	10 (19)	A (C)	10 (15)	B (C)		
4. Kammerer Rd/Lent Ranch Pkwy[2]	Signal	5	A	4	A		
5. Kammerer Rd/Promenade Pkwy	Signal	14	B	15	B	10	A
6. Kammerer Rd/SR 99 SB Ramps	Signal	7	A	7	A	5	A
7. Kammerer Rd /SR 99 NB Ramps	Signal	7	A	8	A	4	A
8. Grant Line Rd/E. Stockton Blvd	Signal	17	B	21	C	16	B
9. Grant Line Rd/Waterman Rd	Signal	12	B	8	A	9	A
10. Grant Line Rd/Mosher Rd	SSSC	3 (27)	A (D)	2 (20)	A (C)	2 (13)	A (B)
11. Grant Line Rd/Bradshaw Rd	SSSC	4 (13)	A (B)	5 (15)	A (C)	4 (11)	A (B)
12. Grant Line Rd/Elk Grove Blvd	AWSC	29	D	14	B		
13. Grant Line Rd/Bond Rd	Signal	19	B	18	B		
14. Grant Line Rd/Wilton Rd	Signal	37	D	27	C		
15. Grant Line Rd/Sheldon Rd[2]	Signal	29	C	20	C		
16. Grant Line Rd/Calvine Rd[2]	Signal	21	C	14	B		
17. Waterman Rd/Elk Grove Blvd	Signal	26	C	26	C		
18. Waterman Rd/Bond Rd	Signal	27	C	23	C		

Notes:

AWSC = All-way Stop Control. SSSC = Side-street Stop Control.
[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.
[2]HCM 2000 was used due to unique signal timing or to be consistent with other scenarios.
Source: Fehr & Peers, 2017

TABLE 7:
PEAK HOUR FREEWAY ANALYSIS – EXISTING CONDITIONS

Freeway Facility	Type	Weekday AM Peak Hour		Weekday PM Peak Hour	
		Density	LOS	Density	LOS
1. NB SR 99 South of Grant Line Road	Basic Segment	22.7	C	24.0	C
2. NB SR 99 Grant Line Road Slip Off-Ramp	Diverge	17.6	B	18.7	B
3. NB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	11.5	B	12.5	B
4. NB SR 99 Grant Line Road Slip On-Ramp	Merge	15.4	B	17.1	B
5. NB SR 99 North of Grant Line Road	Basic Segment	16.1	B	18.8	C
6. SB SR 99 North of Grant Line Road	Basic Segment	13.9	B	14.2	B
7. SB SR 99 Grant Line Road Slip Off-Ramp	Diverge	7.4	A	7.9	A
8. SB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	9.6	A	10.7	A
9. SB SR 99 Grant Line Road Slip On-Ramp	Merge	12.9	B	13.9	B
10. SB SR 99 South of Grant Line Road	Basic Segment	15.8	B	17.3	B

Notes:

Source: Fehr & Peers, 2017

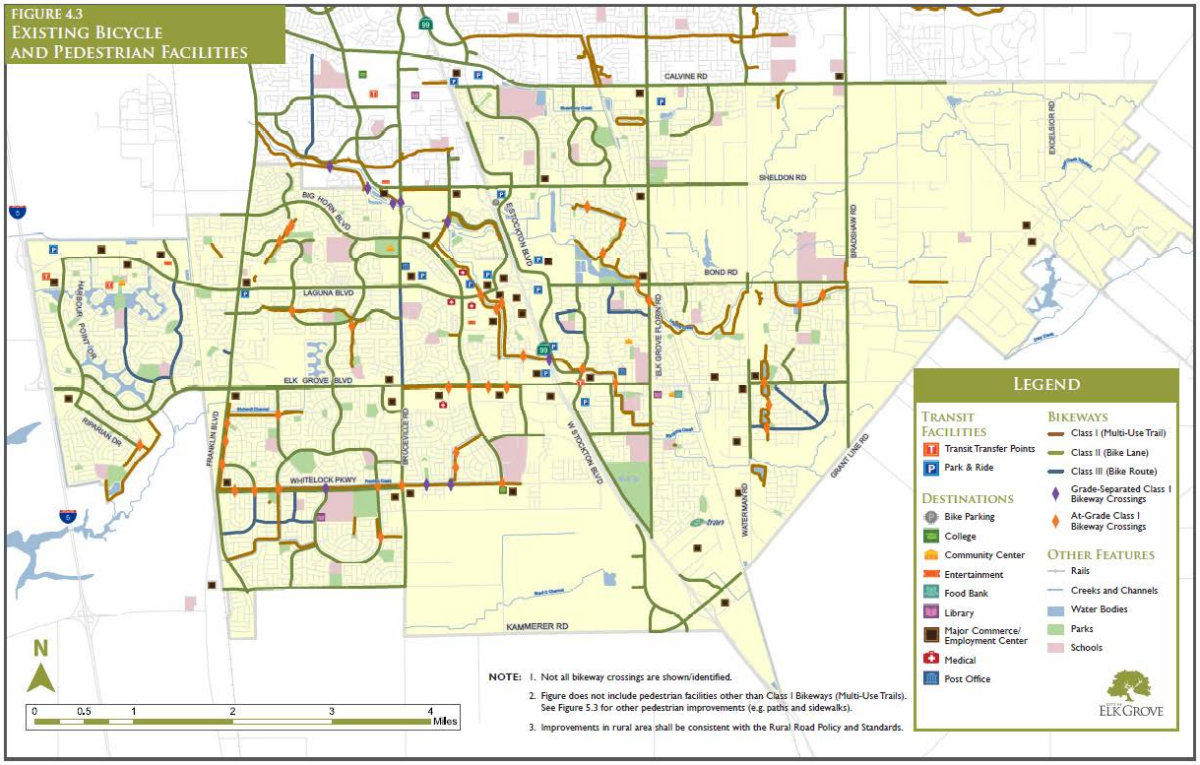
BICYCLE/PEDESTRIAN SYSTEM

Based on the 2009-2013 American Community Survey, in Elk Grove and the State of California, most residents commute by automobile (drive alone or in carpool) to get to work. In Elk Grove, fewer Elk Grove residents (about 1 percent) rely on active transportation including walking and bicycling to work than the state as a whole (about 4 percent).

Most of the bike paths in the city limits are Class II lanes, which are located on existing streets or highways and are striped for one-way bicycle travel. Below are descriptions of bicycle paths and their classifications.

- **Class I** Bike Paths provide a completely separated right-of-way for the exclusive use of bicycles and pedestrian with cross-flow minimized.
- **Class II** Bike Lanes are striped lanes for one-way bike travel on a street or highway.
- **Class III** Bike Routes provide for shared use with pedestrians or motor vehicle traffic.

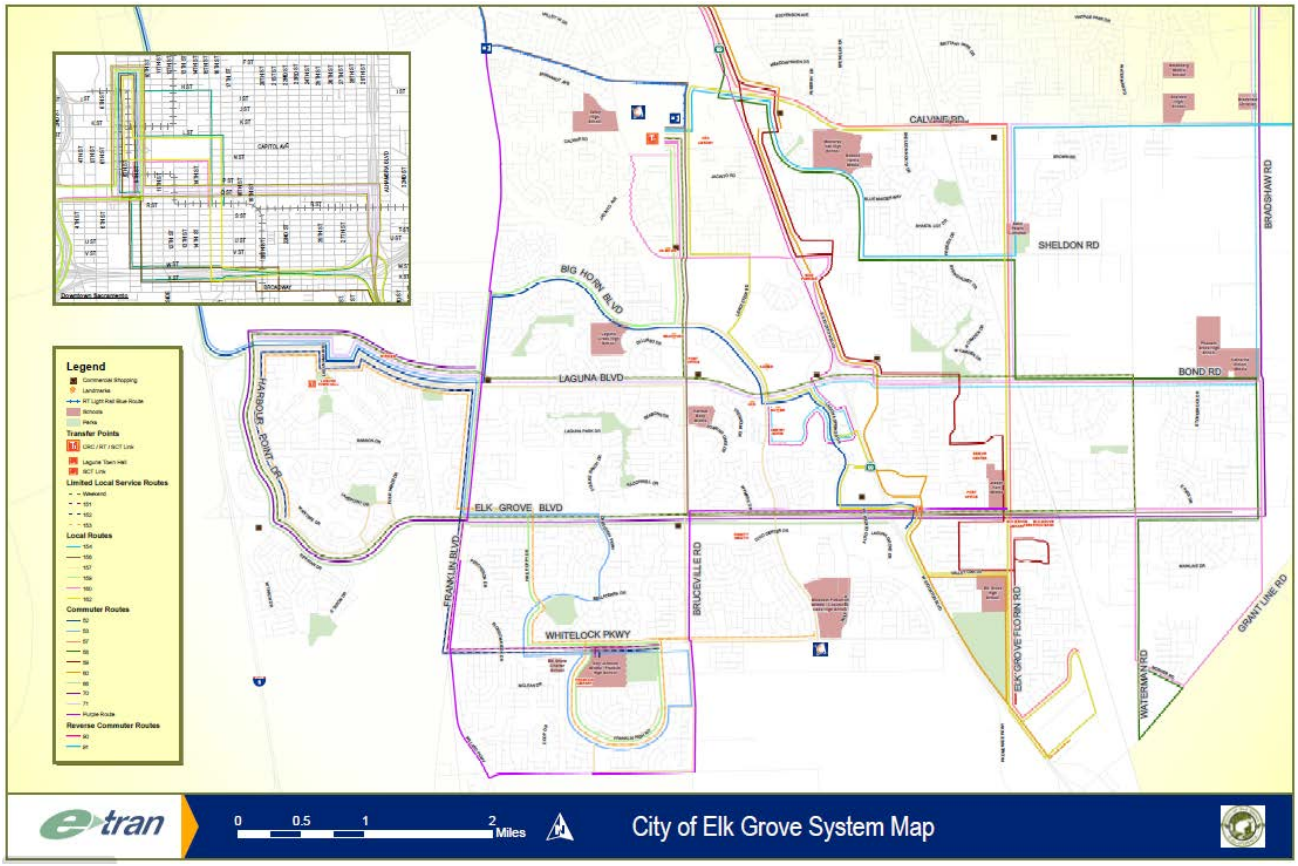
The City adopted the City of Elk Grove Bicycle, Pedestrian, and Trails Master Plan (BPTMP) in July 2014. The BPTMP identifies existing facilities opportunities, constraints and destination points for bicycle users and pedestrians in the City of Elk Grove. Existing bicycle facilities, including Class I Bikeways (Multi-Use Trails) that accommodate pedestrians, documented in the BPTMP are shown in the following graphic (Figure 4.3 of the BPTMP).



TRANSIT SYSTEM

Based on the 2009-2013 American Community Survey, using public transit to work accounted for the next highest share (about 2 percent) In Elk Grove, fewer residents use public transportation to get to work compared to California (about 5 percent).

The City of Elk Grove is served by its own transit system, e-Tran, including e-Tran neighborhood shuttle service (ez-tran), limited local transit service, and commuter routes. Local transit service is provided on weekdays (six routes) and weekends (three routes). e-Tran provides nine commuter routes that operate mid-week, including two reverse commuter routes. The current e-Trans system map is shown below. Commuter Route 58 is the closest service to the Project site. Route 58 has a stop on Mosher Road at Berens Park with three morning and evening scheduled stops. The service operates Monday through Friday.



III. PROJECT TRAVEL CHARACTERISTICS

This chapter describes the expected operations of the proposed Project during typical weekdays and on weekends in which soccer tournaments are being held.

PROPOSED OPERATIONS

The City of Elk Grove provided anticipated operations for Phase 1 and Buildout of the proposed project, which represent anticipated maximum conditions. Therefore, the assumptions are conservative (i.e., on the high side) of conditions that would likely occur for a typical day that would represent average conditions. According to information provided by the City of Elk Grove, the Project would operate as follows:

Phase 1

- **Practice Activities** – The Multi-Sport Park Complex will be available Monday through Friday for practice activities between 5:00 PM and 9:00 PM in one-hour sessions. These activities would generally focus on the local market youth soccer market. Arrival patterns for the first session would coincide with the peak hour of adjacent street traffic. The distribution of trips to/from the Project would follow the general distribution of population with a large share of trips occurring between the project and the Elk Grove area, consistent with the location of Elk Grove-area recreational and club-level soccer teams.
- **Tournament Activities** – The Multi-Sport Park Complex would be available on weekends for tournaments. Tournaments would consist of regional/national and local/semi-regional events. Tournaments are anticipated to be held 20 weekends per year. Peak arrival patterns would occur on Saturday. The distribution of trips to/from the Project would follow the general distribution of population and the ease of access to the regional transportation network.

Buildout

- **Stadium Park** – The stadium park would provide fixed capacity of 7,500 seats with an additional on-field seating capacity of 1,500 seats that would provide maximum capacity of 9,000. The stadium park is anticipated to be used for the following special events.
    - Tournaments – During tournaments, the championship game could be held in the stadium park. This use would not add any additional event participation beyond the tournament activities.

- High School Games – During fall and spring, the stadium could be used to host high school sporting events. Games would occur weekday nights with attendance levels similar to other high school stadiums (i.e., typically up to 3,000 seats). Spectators would generally be local, except for visiting teams.

- Stage Performances – Throughout the year, the stadium could be used for outdoor stage performances (e.g., concerts). Average events would occur during the evening hours, likely beginning at 7:00 PM. Maximum attendance could be 9,000 people. With a 7:00 PM start, some attendee's arrival patterns would coincide with the peak hour of adjacent street traffic. The distribution of trips to/from the Project would follow the general distribution of population in the region.

- Small League Sporting Events – The facility could host other smaller league, long field sporting events, including minor league and women's soccer, lacrosse, and Drum Corps show. Attendance for these types of events could reach the maximum of 7,500 people, but would likely average an attendance of 5,000. Some attendee's arrival patterns would coincide with the peak hour of adjacent street traffic. The distribution of trips to/from the Project would be similar to that of the Sacramento Republic FC, which are held at Bonny Field at Cal Expo in the City of Sacramento.

- Fairgrounds – The County Fair generally operates over Memorial Weekend at the end of May (Thursday through Monday). According to the Fair operator, total attendance for the event is 75,000. It is anticipated that for any single day, the largest attendance would likely be 22,000 with up to 75 percent of the day's spectators (up to 16,500) on site at the same time and are assumed to have an average vehicle occupancy of three people per vehicle. Spectators and workers are estimated at 800 and are assumed to drive alone. The distribution of trips to/from the Project would follow the general distribution of population in the region.

- **Lands Adjacent to the Phase 1 (Multi-Sport Park Complex)** – The 479 (+-) acres adjacent to the Multi-Sport Park Complex include industrial, commercial, and mixed use designations. Travel characteristics (i.e., trip generation, distribution, and similar) for these uses would follow similar land uses throughout the Sacramento Region. Peak hour travel will occur Monday through Friday between 7:00 AM and 9:00 AM in the mornings and between 4:00 PM and 6:00 PM in the evenings. The level of travel on weekends will depend on the nature of businesses and tenant mix, which is unknown at this time. However, it is anticipated that some of the commercial land us will support the Multi-Sport Park Complex, including hotels and other service uses.

Based on the proposed operations and use descriptions, the following analysis of the Project under Phase 1 and Buildout conditions is included. For Phase 1, detailed operations analysis is conducted for typical weekday practice activities during the PM peak hour and for Saturday tournament activities.

Under cumulative conditions with Project buildout, the stage event is analyzed in detail, since it would result in the largest number Project-related trips occurring during the weekday PM peak hour, relative to the other special events. The other special events are evaluated by comparing peak hour directional roadway segment traffic volumes and corresponding VC ratio.

Analysis Facility	Peak Hour	Existing Conditions	Existing Plus Project Conditions		Cumulative Conditions						
					No Project	Plus Phase 1	Plus Project Buildout				
			Phase 1	Buildout			Practice	Tournament	Stage Events	League Events	County Fair
Intersection	AM	X		X	X		X				
	PM	X	X	X	X	X	X		X		
	Saturday	X	X		X	X					
Roadway	PM	X	X	X	X	X	X		X	X	
	Saturday	X	X		X	X		X			X
Freeway	AM	X		X	X		X				
	PM	X	X	X	X	X	X				

PROPOSED VEHICULAR ACCESS

With Phase 1, Project access would be provide by a full-access driveway that would create the fourth leg of the Grant Line Road/Waterman Road intersection. The access driveway would traverse the perimeter of the sports fields and create a new right-in/right-out driveway at Grant Line Road.

As development occurs in the lands adjacent to the Multi-Sport Park Complex, the access to at the Grant Line Road/Waterman Road intersection will be upgraded from a driveway to a public street. In addition, a signalized full-access intersection will be provided at the Grant Line Road/Mosher Road intersection.

NEED FOR LOCALLY-VALIDATED TRIP GENERATION DATA FOR SATURDAY TOURNAMENTS

The *Trip Generation Manual, 9th Edition* (Institute of Transportation Engineers, 2012) is a nationally recognized source of trip generation information for a wide variety of land use types. This resource includes the Soccer Complex (488) Land Use Category. The applicable pages pertaining to this land use indicate the following:

- An average Saturday daily trip rate of 117 trips per field was reported based on a single site observation consisting of seven fields. This data point is not suitable for use in estimating the proposed Project's trip generation for the following reasons: the location and age of the count is unknown, the number of fields in use is unknown, and the presence/absence of a local versus regional tournament is unknown. In fact, page 903 of the *Trip Generation Manual*, which contains this information, states the following: "*Users are cautioned to use data with care because of the small sample size.*"

- An average Saturday peak hour of generator trip rate of 30.34 trips per field was reported based on six studies, which ranged in size from three to 20 fields (for an average size of 11 fields). This data is also not suitable for use in estimating the proposed Project's trip generation for the following reasons: the 60-minute period corresponding to the peak hour was not provided, the degree of peaking within the peak hour was not provided (and is referenced as a shortcoming of the data in the Manual), the number of fields in use is unknown, and the presence/absence of a local versus regional tournament is unknown.

Page 26 of the *Trip Generation Handbook, 3rd Edition* (Institute of Transportation Engineers, 2014) states the following: "Collect local data when data plot has only one or two data points." The analysis methodology for tournament activities presented in this study follows this guidance.

DATA COLLECTION AT SOCCER TOURNAMENTS

Saturday traffic counts and field observations were collected at the following soccer tournaments:

- Rick Hitch Roseville Tournament at Maidu Regional Park on Saturday, August 15, 2015
- Placer United Girls Cup at Cherry Island Soccer Complex on Saturday, October 24, 2015

This section describes each tournament in detail, data collection methods, resulting data, and conclusions.

Overview of Soccer Tournaments

Table 8 provides details for the two tournaments, including the date, number of soccer fields in use, game times, parking conditions, etc.

Although the soccer tournaments held at Cherry Island Soccer Complex and Maidu Regional Park were similar in some respects, they were also different in many key respects including:

- Number of fields – Cherry Island had 10 fields in use, whereas Maidu had 5 fields in use.
- Parking price – Cherry Island charged $8 to park on-site and also had free on-street parking, whereas parking at Maidu was free.
- Field Location / Accessibility – Cherry Island may be considered by many to have fewer quality restaurants and stores within a 15-minute drive than Maidu Regional Park. Additionally, it is likely that Cherry Island provided a more robust snack bar than Maidu given the larger size of the event. Finally, the primary entry to Maidu (signalized access from a four-lane arterial) provides greater ease of access than the two unsignalized accesses onto the two-lane streets serving Cherry Island.

- Soccer Team Change of Venue – Whereas most teams playing at Maidu for the Rick Hitch Tournament played both games at that location, nearly 50 percent of teams who played a game at Cherry Island also played a game at a different location on that same Saturday.

TABLE 8:
OVERVIEW OF OBSERVED SOCCER TOURNAMENTS IN SACRAMENTO REGION

Characteristics	Rick Hitch Tournament at Maidu Regional Park	Placer United Girls Cup at Cherry Island Soccer Complex
Date of Count	Saturday, August 15, 2015	Saturday, October 24, 2015
Number of Fields in Use	5	10
Location	Roseville	Sacramento County
Game Times	8:00, 9:15, 10:30, 11:45, 1:00, 2:15, and 3:30	8:00, 9:20, 10:40, 12:00, 1:20, 2:40, and 4:00
Use of fields throughout day	Games played continuously on all fields for first 6 time slots. Slightly reduced use for 7th slot.	Games played continuously on all fields tor all 7 time slots.
Tournament Games Also Held at Other Venues	Yes	Yes
Soccer Team Change of Venue	Vast majority of teams played all Saturday games at Maidu	44 teams played two Saturday games at Cherry Island. 40 teams played one Saturday game at Cherry Island and one game at a different venue. 10 teams played a single Saturday game at Cherry Island.
Parking Fee	Free	$8 for vehicles parking on-site. No fee for vehicles parked on-street.
Adequacy of Parking Supply	Abundant parking was available	Parking demand nearly reached capacity. Some attendees had to park far from complex and walk.
Weather Conditions	Dry	Dry
Site proximity to nearby restaurants and amenities	5 minute drive to various restaurants and stores along Douglas Blvd.	5 minute drive to restaurants along Watt Avenue
Percentage of Local (within SACOG region) vs. Non-Local Teams	83%	37%

Note:
Fehr & Peers, 2017

- Origin of Soccer Teams – Whereas 83 percent of teams in the Rick Hitch Tournament (played at Maidu Regional Park and other venues) were from the SACOG region, only 37 percent of teams in the Placer United Girls Cup (played at Cherry Island and other venues) were from the SACOG

region. The out of area teams traveled from the San Francisco Bay Area, Fresno, San Luis Obispo, Central San Joaquin Valley, and Nevada.

Overview of Data Collection Process

Table 9 describes the data collection process undertaken to perform traffic counts at each tournament. We retained the count firm National Data Services (NDS) to assist us on these efforts.

Field observations indicated that the parking areas for both facilities were well utilized during the counts. At Maidu Regional Park, although the main lots (closest to the fields) were often full, parking was always available along the gravel parking aisle on the south portion of the park. Fehr & Peers did not notice any recurring patterns of motorists entering the area, not finding parking, and then exiting to find a more remote space. However, some soccer-related groups were observed (and recorded) who chose to park in a parking area just beyond the traffic count location and walk to the fields.

Cherry Island Soccer Complex provides both paved parking as well as several unpaved areas within the complex. On-street parking is permitted along the site frontage on U Street and 28th Street, but not on the opposite side of the street ("No Parking" signs are posted).

TABLE 9:
OVERVIEW OF TRAFFIC DATA COLLECTION

Characteristics	Rick Hitch Tournament at Maidu Regional Park	Placer United Girls Cup at Cherry Island Soccer Complex
Date of Count	Saturday, August 15, 2015	Saturday, October 24, 2015
Count Duration [1]	7 AM to 5 PM. In addition, parked vehicles were counted prior to 7 AM and after 5 PM.	7 AM to 6 PM. In addition, parked vehicles were counted prior to 7 AM and after 6 PM.
Other Activities On-Site	Adult softball on two nearby fields. Traffic counters separately classified vehicles associated with adult soccer and softball.	None
Description of Parking Facilities	Large surface lot near fields with two entry/exits. Secondary parking at nearby Maidu School.	On-site parking with entry/exit off U Street and exit-only off 28th Street. On-street parking permitted on U Street and 28th Street.
Data Collection Techniques	Traffic count personnel were stationed at each entry/exit lot. A camera was situated at the driveway entry to Maidu School.	Cameras were situated at the U Street and 28th Street driveways. Traffic count personnel were situated on U Street and 28th Street to record parking maneuvers.
On-Site Data Collection Oversight	John Gard, P.E.	David Stanek, P.E.

Note:
[1]Vehicles present at each facility prior to the beginning of the count or after the end of the count period were considered tournament-related and included as part of the daily traffic estimate.
Fehr & Peers, 2017

In summary, the physical characteristics of each site, coupled with the use of experienced traffic count personnel, allowed for a high-quality empirical observations of the travel demand associated with each soccer tournament.

Traffic Count Results

Table 10 displays the estimated daily and peak hour trip generation of each soccer tournament on each count day. Key findings from this table include:

- The Rick Hitch Tournament at Maidu Regional Park was estimated to generate about 4,000 daily vehicles trips (2,000 inbound and 2,000 outbound). The peak hour of travel occurred from 10:15 to 11:15 AM with 537 trips (48 percent inbound and 52 percent outbound).
- The Placer United Girls Cup at Cherry Island Soccer Complex was estimated to generate about 4,300 daily vehicle trips (2,135 inbound and 2,174 outbound). The peak hour of traveled occurred from 9:00 to 10:00 AM with 540 trips (59 percent inbound and 41 percent outbound).

TABLE 10:
RESULTS OF TRAFFIC DATA COLLECTION

Characteristics	Rick Hitch Tournament at Maidu Regional Park	Placer United Girls Cup at Cherry Island Soccer Complex
Date of Count	Saturday, August 15, 2015	Saturday, October 24, 2015
Daily Conditions		
Total Trips	4,000 vehicles (50% in / 50% out)[1]	4,300 vehicles (50% in / 50% out)[1]
Peak Hour of Generator		
Busiest Hour of Travel	10:15 – 11:15 AM	9:00 – 10:00 AM
Inbound Trips	263 vehicles (49%)	317 vehicles (59%)
Outbound Trips	274 vehicles 51%)	223 vehicles (41%)
Total Trips	537 vehicles	540 vehicles

Notes:
[1]Actual count consists of 1,941 inbound trips and 1,877 outbound trips recorded between 6:45 AM and 5:00 PM. Daily estimate of 2,000 inbound trips based on some vehicles that had already been parked prior to 6:45 AM, and infrequent parking along Johnson Ranch Drive (which was not counted). Field observations revealed that a number of vehicles were still parked on-site after 5 PM.
[2]Actual count consists of 2,135 inbound trips and 2,174 outbound trips recorded between 7 AM and 6:00 PM (including parked vehicles prior to 7 AM and after 6 PM). Minor discrepancy in inbound versus outbound travel likely due to inherent challenges of counting parking maneuvers.
Fehr & Peers, 2017

Refer to Appendix B for charts showing 15-minute arrival and departure traffic flows during each tournament. Key findings from these charts include:

- The Rick Hitch Tournament at Maidu Regional Park showed fairly modest peaks in 15-minute arrivals, but much more pronounced spikes in 15-minute departure flows beginning at 9:15 AM, 10:30 AM, 11:45 AM, and 1 PM. These periods correspond with the completion of the first four games of the day being played simultaneously on all fields.

- Similar to the Maidu observations, the Placer United Girls Cup at Cherry Island Soccer Complex showed spikes in departure flows at 9:15 AM, 10:45 AM, 12:00 PM, 1:15 PM, 2:30 PM, and 4:00 PM. These peaks occurred slightly later (by 15 minutes) due to the longer duration between successive games at Cherry Island versus Maidu.

- The Cherry Island counts indicated that 48 percent of all inbound traffic arrived before 10 AM. In contrast, 37 percent of all inbound traffic at Maidu arrived before 10 AM. The Cherry Island counts also showed a spike in departing traffic from 5:15 to 5:45 PM, in which 352 vehicles (16 percent of total) departed. The Maidu counts did not show a similar end of day spike in outbound travel.

- Appendix B includes a plot that compares the total 15-minute trip generation of Maidu Regional Park and Cherry Island. Between 10 AM and 2:30 PM, Maidu Regional Park generated 367 more trips than Cherry Island despite having half the number of fields.

Table 11 displays the trip generation rates per field for each soccer tournament. This table shows that the Rick Hitch Tournament at Maidu Regional Park had a measured trip rate that was nearly twice the rate observed for the Placer United Girls Cup at Cherry Island Soccer Complex.

TABLE 11:
SATURDAY TRIP GENERATION RATES AT SOCCER TOURNAMENTS

Soccer Tournament	Occupied Fields	Peak Hour [3]		Daily	
		Trips	Trip Rate	Trips	Trip Rate
Rick Hitch Tournament at Maidu Regional Park [1]	5	537	107.4 trips/field	4,000	800 trips/field
Placer United Girls Cup at Cherry Island Soccer Complex [2]	10	540	54 trips/field	4,300	430 trips/field

Notes:
[1]Observations on Saturday, August 15, 2015.
[2]Observations on Saturday, October 24, 2015.
[3]Peak hour of travel at Maidu Regional Park occurred from 10:15 to 11:15 AM. Peak hour of travel at Cherry Island Soccer Complex occurred from 9:00 to 10:00 AM.
Fehr & Peers, 2017

This data has yielded the following key conclusions:

- The Rick Hitch Tournament at Maidu Regional Park had a 'per field' trip rate of nearly twice the rate observed at the Placer United Girls Cup at Cherry Island Soccer Complex. The difference in trip rates between these tournaments is a function of local versus regional team participation. This will be a critical distinction when analyzing the travel characteristics of the proposed Project.
- The Rick Hitch Tournament showed substantially greater levels of mid-day departure and return activity than the Placer United Girls Cup. The Placer United Girls Cup had a greater proportion of early arrivals and late departures associated with a longer duration of stay. [1]

TRIP GENERATION

Trip generation for the practice activities, tournaments, and special events, including stage events, league events, and the County fair is presented below.

Practice Activities

Table 12 displays weekday AM and PM peak hour trip generation for practice activities at the proposed Multi-Sport Park Complex, developed using trip generation rates presented in Trip Generation, 9th Edition (Institute of Transportation Engineers). Specifically, we developed weekday AM and PM peak hour trip generation using trip rates for Soccer Complex (Land Use Code 488).

TABLE 12:
WEEKDAY AM AND PM PEAK HOUR TRIP GENERATION FOR PRACTICE ACTIVITIES

Land Use (Practice Activities)	Occupied Fields	Weekday Peak Hour Trip Generation							
		Trip Rate [trips/field]		Trips					
				AM			PM		
		AM	PM	Total	In	Out	Total	In	Out
Soccer Complex[1]	16	1.12	17.7	18	10	8	283	190	93

Notes:
[1]ITE Land Use Code 488. Trip rates are for peak hour of adjacent street traffic.
Fehr & Peers, 2017

As shown in Table 12, a typical weekday PM peak hour would generate about 283 trips with most trips entering the Project.

[1] There are several potential explanations for these differences in travel behaviors. They may be associated with the proximity/quality of nearby eating and shopping establishments, differences in weather conditions (August versus October), and/or differences in the degree of preparation between the different levels of competition at each tournament.

Tournament Activities

Table 13 displays Saturday peak hour trip generation for local/semi-regional and regional/national soccer tournaments, based on the measured trip generation rates presented in **Table 11**. As shown, the local/semi-regional tournament would generate nearly twice as many trips per day as the national/regional tournament.

TABLE 13:
SATURDAY PEAK HOUR TRIP GENERATION FOR TOURNAMENTS ACTIVITIES

Soccer Tournament	Occupied Fields	Saturday Peak Hour [1]	
		Trip Rate [trips/field}	Trips
Local/Semi-Regional Tournament	16	107.4	1,718
Regional/National Tournament	16	54	864

Notes:
[1]Based on observations Rick Hitch Tournament at Maidu Regional Park in Roseville and Placer Girls Cup at Cherry Island Sports Complex in Sacramento County.
Fehr & Peers, 2017

League and Stage Events

The trip generation for league and stage events was developed based on travel behavior collected at Sacramento area entertainment venues, including Bonney Field at Cal Expo and Sleep Train Arena in the North Natomas.

The following summarizes key finding from travel behavior data collected at Bonney Field on Saturday, September 20, 2014. During this event, the Sacramento Republic FC hosted a home playoff match with an announced sell-out crowd of 8,000 persons:

- The gates opened at 6:00 PM and the match started at 7:30 PM. The following shows the vehicular arrival percentages in 30-minute increments. This data indicates 6.1 percent of inbound traffic arrived during the 4:00 to 6:00 PM peak period (i.e., the peak hour of adjacent street traffic) and that 70 percent of inbound traffic arrived during the one hour prior to the start of the event.

Time	Inbound Percentage
5:30 to 6:00 PM	6.1%
6:00 to 6:30 PM	16.7%
6:30 to 7:00 PM	38.0%
7:00 to 7:30 PM	32.0%
7:30 to 8:00 PM	7.2%
Total	100%

- During the pre-event peak hour, there was approximately one outbound trip for every 30 inbound trips. These trips were presumably made by employees, delivery, or attendee drop-off.
- Vehicle occupancy was recorded for over 1,900 inbound vehicles, with the average vehicle occupancy being 2.23 persons per vehicle.
- Travel to Bonney Field by walk or bike was negligible.

These findings were compared to counts conducted on April 5, 2012 during a Sacramento Kings game at Sleep Train Arena. During that game, 67.4 of inbound traffic arrived during the one hour before the start of the event with an observed average vehicle occupancy of 2.27 persons per vehicle.

Table 14 displays weekday PM peak hour trip generation for league and stage events, based on the use description and the travel behavior characteristics outlined above. The trip generation is provided for the peak hour of adjacent street traffic and for the pre-event peak hour.

TABLE 14:
WEEKDAY PM PEAK HOUR TRIP GENERATION FOR LEAGUE AND STAGE EVENTS

Use	Seats	Average Vehicle Occupancy	Vehicles	Weekday Peak Hour Trip Generation By Analysis Period					
				Peak Hour of Adjacent Street Traffic			Pre-Event Peak Hour		
				Total	Inbound	Outbound	Total	Inbound	Outbound
League Events	7,500	2.23	3,363	212	205	7	2,433	2,354	78
Stage Events	9,000		4,036	951	920	31	2,919	2,825	94

Notes:
Fehr & Peers, 2017

County Fair

Table 15, displays weekday PM peak hour trip generation for the County Fair special event. The trip generation for the County Fair was estimated based on the use description provided to the City of Elk Grove by the Sacramento County Fair operator. For this portion of the Project, a County Fair represents the anticipated highest-operating event and will likely operate annually on the five days prior to and during the Memorial Day Holiday weekend. The Fair would operate Thursday through Sunday from 10:00 AM to 10:00 PM and from 10:00 AM to 7:00 PM on Memorial Day.

The Fair is anticipated to average 70,000 to 75,000 spectators per year, which would represent an average daily attendance of up to 15,000 spectators per day. Accounting for all potential simultaneous events that could occur at the Fair (i.e., concerts and rodeos), the largest attendance on any single day is estimated to be 22,000 and would likely occur on the weekend. Since the Fair would operate on the

Memorial Day Holiday weekend, we estimated trip generation for Fair-related activities on the first day of the Fair (i.e., the Thursday) to coincide with mid-week PM peak hour commute activities prior to the Holiday weekend.

- Estimated Thursday Attendance – Thursday attendance was calculated at 15 percent of average annual attendance of 75,000 spectators, which represents 75% of the average daily attendance of 15,000. Thursday attendance was estimated at 11,250 spectators.

TABLE 15:
WEEKDAY PM PEAK HOUR TRIP GENERATION FOR COUNTY FAIR[1]

Use	Thursday Spectators Attendance [persons][2]	Average Vehicle Occupancy[3]	Thursday Spectator Vehicles	Participant and Worker Vehicles[4]	Thursday Vehicle Trip Ends				
					Daily[5]	Peak Hour to Daily Factor[6]	Peak Hour		
							Total	Inbound	Outbound
County Fair	11,250	3.00	3,750	800	9,100	10%	910	528	382

Notes:
[1]Trip generation developed based on use descriptions provided to City of Elk Grove by Sacramento County Fair operator.
[2]Thursday attendance was estimated at 75 percent of the average daily attendance of 15,000, which represents 15 percent of the average annual attendance of 75,000 spectators. Thursday attendance was estimated at 11,250 spectators.
[3]Average vehicle occupancy based on operational characteristics provided by Sacramento County Fair and is within the range of rates documented in *Managing Travel for Planned Special Events*, FHWA.
[4]Participants and workers are assumed to drive alone.
[5]Peak day vehicles developed by multiplying peak day spectator and participant and worker vehicles by two to account for vehicles entering and exiting the Project.
[6]Peak hour to daily factor based on the peak hour to daily trip generation factor for Amusement Park (ITE 9th Edition Land Use Code 480). For the Amusement Park land use, the peak hour of the generator represents 10 percent of daily trip generation.
Fehr & Peers, 2017

Adjacent Lands

The TDF model was used to develop trip generation for the lands adjacent to Phase 1 (i.e., the 100-acre Multi-Sport Park Complex). **Table 16** displays total AM peak hour and PM peak hour trip generation for the lands adjacent to Phase 1, based on the validated TDF model. About 19 percent of the AM peak hour trips and 24 percent of the PM peak hour trips remain internal to the Project.

TABLE 16:
WEEKDAY PEAK HOUR TRIP GENERATION FOR LANDS ADJACENT TO PHASE 1

Soccer Tournament	AM Peak Hour	PM Peak Hour
Lands Adjacent to Phase 1	4,140	5,380

Notes:
Trip generation based on validated modified version of the SACMET regional travel demand forecasting model.
Fehr & Peers, 2017

TRIP DISTRIBUTION

Figure 4 displays the expected distribution of trips for Phase 1 activities under existing conditions, based on general population distribution. **Figure 5** displays the expected distribution of trips for Phase 1 activities and special events under cumulative conditions. **Figure 5** includes two distributions. The distribution based on general population is for assignment of trips for practice activities, tournaments, stage events and activities associated with the County Fair. These events are expected to have origins/destinations representative of the region's population. The distribution for league events is based on anonymous cell phone data collected for attendees at a Sacramento Republic FC matches. Like the Sacramento Republic FC matches, league events are expected to be attended by a segment of the general population. Therefore, cell phone data was used to capture the origins/destination of this population.

Table 17 displays the trip distribution for lands adjacent to Phase 1 under existing and cumulative conditions. The validated TDF model was used to distribute trips to/from the lands adjacent to Phase 1.

TABLE 17:
TRIP DISTRIBUTION FOR LANDS ADJACENT TO PHASE 1

Analysis Scenario	Trip Distribution To/From		
	North	East	West
Existing	25%	17%	58%
Cumulative	24%	23%	53%

Notes:
Trip distribution based on validated modified version of the SACMET regional travel demand forecasting model.
Fehr & Peers, 2017

Figure 4: Trip Distribution (Phase 1 and Special Events) – Existing Conditions

Figure 5: Trip Distribution (Phase 1 and Special Events) – Cumulative Conditions

IV. EXISTING PLUS PROJECT CONDITIONS

This chapter analyzes the potential impact of the proposed Project to the surrounding roadway network under an "Existing Plus Project" scenario. This analysis scenario considers potential impacts due to implementation of Phase 1, including weekday PM peak hour practice activities and Saturday peak hour tournaments and Project buildout.

TRAFFIC OPERATIONS

The following summarizes traffic operations under Existing Plus Project conditions, including peak hour roadway segment volume-to-capacity, intersection operations, and freeway operations at the SR 99/Grant Line Road interchange.

Traffic volume forecasts were developed using the methodology discussed Chapter 1, which includes manual assignment of Phase 1 and stadium events and use of the validated TDF model for assignment of lands adjacent to Phase 1. Intersection turning movement forecasts under Existing Plus Project conditions are show on the following figures:

- **Figure 6** shows weekday PM peak hour turning movement forecasts, lane configurations, and traffic control at each study intersection for Phase 1 Practice Activity conditions.
- **Figure 7** shows Saturday peak hour turning movement forecasts, lane configurations, and traffic control at Intersections 5 through 11 for Phase 1 Local/Semi-Regional Tournament conditions.
- **Figure 8** shows Saturday peak hour turning movement forecasts, lane configurations, and traffic control at Intersections 5 through 11 for Phase 1 Regional/National Tournament conditions.
- **Figure 9** shows weekday AM and PM peak hour turning movement forecasts, lane configurations, and traffic control at each study intersection for Buildout conditions.

Figure 6: Weekday PM Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Phase 1 Conditions – Practice Activities

Figure 7: Saturday Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Phase 1 Conditions – Local/Semi-Regional Tournament

Figure 8: Saturday Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Phase 1 Conditions – Regional/National Tournament

Figure 9: Weekday Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Phase Buildout Conditions – Practice Activities

Peak Hour Roadway Segment Volume-to-Capacity

Table 18 displays directional roadway segment traffic volumes and VC ratio with the addition of Phase 1 trips. The following two analysis scenarios are presented: weekday PM peak hour conditions with the addition vehicle trips from practice activities; and Saturday peak hour conditions with trips from tournament activities. As shown in **Table 18**, all of the segments will operate below capacity at VC ratio less than 1.00 under both analysis scenarios.

Table 19 displays directional roadway segment traffic volumes and VC ratio with the addition trips from Phase 1 and Project Buildout. Both analysis scenarios are presented for weekday PM peak hour conditions with the addition vehicle trips from practice activities. As shown in **Table 19**, most of the segments would continue to operate below capacity, except for segments of Grant Line Road between E. Stockton Boulevard and Bradshaw Road

Peak Hour Intersection Operations

Table 20 displays the existing weekday AM, PM, and Saturday peak hour traffic operations analysis results at the 18 study intersections with the addition of Phase 1 trips (refer to Appendix A for detailed calculations). The following two analysis scenarios are presented: weekday PM peak hour conditions with the addition vehicle trips from practice activities; and Saturday peak hour conditions with trips from tournament activities. As shown in **Table 20**, all study intersections would continue to operate acceptably at LOS D or better.

Table 21 displays the existing weekday AM and PM peak hour traffic operations analysis results at the 18 study intersections with the addition trips from Project Buildout with practice activities occurring at the Multi-Sport Park Complex (refer to Appendix A for detailed calculations). As shown in **Table 21**, most of the study intersections would continue to operate acceptably at LOS D or better, except for the following intersections with Project Buildout:

- Kammerer Road/Bruceville Road – LOS F on the controlled (i.e., Kammerer Road) approach
- Grant Line Road/Waterman Road – LOS F operations
- Grant Line Road/Mosher Road – LOS F on the controlled (i.e., Mosher Road) approach
- Grant Line Road/Bradshaw Road – LOS E on the controlled (i.e., Bradshaw Road) approach
- Grant Line Road/Elk Grove Boulevard – LOS E operations

Peak Hour Freeway Operations

Table 22 displays the existing weekday AM and PM peak hour traffic operations analysis results at the 10 study freeway facilities with the addition of trips from Phase 1 and Project Buildout conditions (refer to

Appendix A for detailed calculations). AM peak hour analysis is only presented under the Buildout scenario do to the low trip generation of Practice Activities during the AM peak hour.

As shown in **Table 22**, all study freeway facilities at the SR 99/Grant Line Road interchange would continue to operate acceptably at LOS D or better.

TABLE 18:
PEAK HOUR ROADWAY SEGMENT OPERATIONS – EXISTING PLUS PHASE 1 PROJECT CONDITIONS

Roadway	Segment		Direction	Lanes[1]	Hourly Capacity (Per Lane)	Weekday PM Peak Hour				Saturday Peak Hour					
						Existing		Existing Plus Phase 1 (Practice Activities)		Existing		Existing Plus Phase 1 (Tournaments)			
												Regional/National		Local/Semi-Regional	
	From	To				Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]
Bradshaw Rd	Elk Grove Blvd	Grant Line Rd	SB	2	990	250	0.25	254	0.26	165	0.17	175	0.18	182	0.18
			NB	2	990	254	0.26	256	0.26	135	0.14	142	0.14	153	0.15
Grant Line Rd	SR 99 SB Ramps	SR 99 NB Ramps	EB	6	910	618	0.23	753	0.28	425	0.16	787	0.29	1,023	0.37
			WB	6	910	1,108	0.41	1,120	0.41	595	0.22	641	0.23	709	0.26
	SR 99 NB Ramps	E. Stockton Blvd	EB	6	910	1,022	0.37	1,176	0.43	761	0.28	1,174	0.43	1,443	0.53
			WB	6	910	1,234	0.45	1,309	0.48	695	0.25	981	0.36	1,404	0.51
	E. Stockton Blvd	Waterman Rd	EB	4	910	826	0.45	941	0.52	622	0.34	1,035	0.57	1,304	0.72
			WB	4	910	911	0.50	986	0.54	570	0.31	856	0.47	1,279	0.70
	Waterman Rd	Mosher Rd	EB	2	910	631	0.69	644	0.71	454	0.50	605	0.66	740	0.81
			WB	2	910	680	0.75	713	0.78	429	0.47	516	0.57	572	0.63
	Mosher Rd	Bradshaw Rd	EB	2	910	564	0.62	580	0.64	432	0.47	492	0.54	581	0.64
			WB	2	910	645	0.71	678	0.74	382	0.42	469	0.52	525	0.58
	Bradshaw Rd	Elk Grove Blvd	EB	2	910	304	0.33	317	0.35	309	0.34	362	0.40	440	0.48
			WB	2	910	402	0.44	430	0.47	217	0.24	294	0.32	343	0.38
Kammerer Rd	Lent Ranch Pkwy	Promenade Pkwy	EB	6	910	285	0.10	291	0.11	214	0.08	229	0.08	239	0.09
			WB	6	910	433	0.16	436	0.16	171	0.06	182	0.07	197	0.07
	Promenade Pkwy	SR 99 SB Ramps	EB	6	910	547	0.20	553	0.20	316	0.12	331	0.12	341	0.13
			WB	6	910	655	0.24	658	0.24	296	0.11	307	0.11	322	0.12
Mosher Rd	Waterman Rd	Grant Line Rd	SB	2	990	75	0.08	75	0.08	77	0.08	77	0.08	77	0.08
			NB	2	990	98	0.10	98	0.10	56	0.06	56	0.06	56	0.06
Waterman Rd	Mosher Rd	Grant Line Rd	SB	2	990	260	0.26	264	0.27	151	0.15	161	0.16	168	0.17
			NB	2	990	231	0.23	233	0.24	147	0.15	154	0.16	165	0.17

Notes:
[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] VC – Volume-to-Capacity Ratio
Source: Fehr & Peers, 2017

TABLE 19:
PEAK HOUR ROADWAY SEGMENT OPERATIONS – EXISTING PLUS PROJECT BUILDOUT CONDITIONS

Roadway	Segment		Direction	Lanes[1]	Hourly Capacity (Per Lane)	Weekday PM Peak Hour					
						Existing		Phase 1 (Practice Activities)		Buildout (Practice Activities)	
	From	To				Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]
Bradshaw Rd	Elk Grove Blvd	Grant Line Rd	SB	2	990	250	0.25	254	0.26	324	0.33
			NB	2	990	254	0.26	256	0.26	452	0.46
Grant Line Rd	SR 99 SB Ramps	SR 99 NB Ramps	EB	6	910	618	0.23	753	0.28	1,350	0.49
			WB	6	910	1,108	0.41	1,120	0.41	1,592	0.58
	SR 99 NB Ramps	E. Stockton Blvd	EB	6	910	1,022	0.37	1,176	0.43	1,983	0.73
			WB	6	910	1,234	0.45	1,309	0.48	2,369	0.87
	E. Stockton Blvd	Waterman Rd	EB	4	910	826	0.45	941	0.52	1,842	**1.01**
			WB	4	910	911	0.50	986	0.54	2,142	**1.18**
	Waterman Rd	Mosher Rd	EB	2	910	631	0.69	644	0.71	893	0.98
			WB	2	910	680	0.75	713	0.78	928	**1.02**
	Mosher Rd	Bradshaw Rd	EB	2	910	564	0.62	580	0.64	911	**1.00**
			WB	2	910	645	0.71	678	0.74	795	0.87
	Bradshaw Rd	Elk Grove Blvd	EB	2	910	304	0.33	317	0.35	429	0.47
			WB	2	910	402	0.44	430	0.47	446	0.49
Kammerer Rd	Lent Ranch Pkwy	Promenade Pkwy	EB	6	910	285	0.10	291	0.11	396	0.14
			WB	6	910	433	0.16	436	0.16	598	0.22
	Promenade Pkwy	SR 99 SB Ramps	EB	6	910	547	0.20	553	0.20	701	0.26
			WB	6	910	655	0.24	658	0.24	868	0.32
Mosher Rd	Waterman Rd	Grant Line Rd	SB	2	990	75	0.08	75	0.08	310	0.31
			NB	2	990	98	0.10	98	0.10	440	0.44
Waterman Rd	Mosher Rd	Grant Line Rd	SB	2	990	260	0.26	264	0.27	434	0.44
			NB	2	990	231	0.23	233	0.24	512	0.52

Notes:
[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] VC – Volume-to-Capacity Ratio
Source: Fehr & Peers, 2017

TABLE 20:
PEAK HOUR INTERSECTION LEVEL OF SERVICE – EXISTING PLUS PHASE 1 PROJECT CONDITIONS

Intersection	Control	Weekday PM Peak Hour				Saturday Peak Hour					
		Existing		Existing Plus Phase 1 (Practice Activities)		Existing		Existing Plus Phase 1 (Tournaments)			
								Regional/National		Local/Semi-Regional	
		Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]
1. Hood Franklin Rd/I-5 SB Ramps	SSSC	8 (11)	A (B)	8 (11)	A (B)						
2. Hood Franklin Rd/I-5 NB Ramps	SSSC	2 (11)	A (B)	2 (11)	A (B)						
3. Kammerer Rd/Bruceville Rd	SSSC	10 (15)	B (C)	10 (16)	B (C)						
4. Kammerer Rd/Lent Ranch Pkwy[2]	Signal	4	A	4	A						
5. Kammerer Rd/Promenade Pkwy	Signal	15	B	15	B	10	A	10	A	10	A
6. Kammerer Rd/SR 99 SB Ramps	Signal	7	A	7	A	5	A	6	A	7	A
7. Grant Line Rd/SR 99 NB Ramps	Signal	8	A	10	A	4	A	6	A	8	A
8. Grant Line Rd/E. Stockton Blvd	Signal	21	C	22	C	16	B	17	B	19	B
9. Grant Line Rd/Waterman Rd	Signal	8	A	16	B	9	A	17	B	36	D
10. Grant Line Rd/Mosher Rd	SSSC	2 (20)	A (C)	2 (21)	A (C)	2 (13)	A (B)	1 (15)	A (C)	1 (17)	A (C)
11. Grant Line Rd/Bradshaw Rd	SSSC	5 (15)	A (C)	5 (16)	A (C)	4 (11)	A (B)	3 (12)	A (B)	3 (13)	A (B)
12. Grant Line Rd/Elk Grove Blvd	AWSC	14	B	16	C						
13. Grant Line Rd/Bond Rd	Signal	18	B	18	B						
14. Grant Line Rd/Wilton Rd	Signal	27	C	28	C						
15. Grant Line Rd/Sheldon Rd[2]	Signal	20	C	21	C						
16. Grant Line Rd/Calvine Rd[2]	Signal	14	B	14	B						
17. Waterman Rd/Elk Grove Blvd	Signal	26	C	26	C						
18. Waterman Rd/Bond Rd	Signal	23	C	23	C						

AWSC = All-way Stop Control. SSSC = Side-street Stop Control.
[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.
[2]HCM 2000 was used due to unique signal timing or to be consistent with other scenarios..
Source: Fehr & Peers, 2017

TABLE 21:
PEAK HOUR INTERSECTION LEVEL OF SERVICE – EXISTING PLUS PROJECT BUILDOUT CONDITIONS

Intersection	Control	Weekday AM Peak Hour				Weekday PM Peak Hour			
		Existing		Existing Plus Buildout (Practice Activities)		Existing		Existing Plus Buildout (Practice Activities)	
		Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]
1. Hood Franklin Rd/I-5 SB Ramps	SSSC	5 (10)	A (A)	5 (10)	A (B)	8 (11)	A (B)	8 (12)	A (B)
2. Hood Franklin Rd/I-5 NB Ramps	SSSC	2 (11)	A (B)	2 (12)	A (B)	2 (11)	A (B)	3 (12)	A (B)
3. Kammerer Rd/Bruceville Rd	SSSC	10 (19)	A (C)	65 (212)	**F (F)**	10 (15)	B (C)	14 (21)	B (C)
4. Kammerer Rd/Lent Ranch Pkwy[2]	Signal	5	A	8	A	4	A	4	A
5. Kammerer Rd/Promenade Pkwy	Signal	14	B	15	B	15	B	16	B
6. Kammerer Rd/SR 99 SB Ramps	Signal	7	A	11	B	7	A	11	B
7. Kammerer Rd/SR 99 NB Ramps	Signal	7	A	17	B	8	A	17	B
8. Grant Line Rd/E. Stockton Blvd	Signal	17	B	21	C	21	C	41	D
9. Grant Line Rd/Waterman Rd	Signal	12	B	93	**F**	8	A	190	**F**
10. Grant Line Rd/Mosher Rd	SSSC	3 (27)	A (D)	2(>500)	**A (F)**	2 (20)	A (C)	1 (>500)	**A (F)**
11. Grant Line Rd/Bradshaw Rd	SSSC	4 (13)	A (B)	14 (49)	**B (E)**	5 (15)	A (C)	12 (43)	**B (E)**
12. Grant Line Rd/Elk Grove Blvd	AWSC	29	D	39	**E**	14	B	20	C
13. Grant Line Rd/Bond Rd	Signal	19	B	22	C	18	B	19	B
14. Grant Line Rd/Wilton Rd	Signal	37	D	46	D	27	C	35	D
15. Grant Line Rd/Sheldon Rd[2]	Signal	29	C	32	C	20	C	23	C
16. Grant Line Rd/Calvine Rd[2]	Signal	21	C	22	C	14	B	15	B
17. Waterman Rd/Elk Grove Blvd	Signal	26	C	44	D	26	C	39	D
18. Waterman Rd/Bond Rd	Signal	27	C	33	C	23	C	26	C

Notes:
AWSC = All-way Stop Control. SSSC = Side-street Stop Control.
[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.
[2]HCM 2000 was used due to unique signal timingor to be consistent with other scenarios.
Source: Fehr & Peers, 2017

TABLE 22:
PEAK HOUR FREEWAY ANALYSIS – EXISTING PLUS PHASE 1 AND BUILDOUT CONDITIONS

Freeway Facility	Type	Weekday AM Peak Hour				Weekday PM Peak Hour					
		Existing		Existing Plus Buildout (Practice Activities)		Existing		Existing Plus Practice Activities			
								Phase 1		Buildout	
		Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
1. NB SR 99 South of Grant Line Road	Basic Segment	22.7	C	24.9	C	24.0	C	34.8	D	33.2	D
2. NB SR 99 Grant Line Road Slip Off-Ramp	Diverge	17.6	B	19.6	B	18.7	B	26.9	C	26.0	C
3. NB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	11.5	B	11.5	B	12.5	B	19.7	C	18.4	C
4. NB SR 99 Grant Line Road Slip On-Ramp	Merge	15.4	B	18.7	B	17.1	B	24.8	C	25.9	C
5. NB SR 99 North of Grant Line Road	Basic Segment	16.1	B	19.0	C	18.8	C	31.4	D	33.9	D
6. SB SR 99 North of Grant Line Road	Basic Segment	13.9	B	18.8	C	14.2	B	21.9	C	23.9	C
7. SB SR 99 Grant Line Road Slip Off-Ramp	Diverge	7.4	A	13.4	B	7.9	A	16.7	B	18.7	B
8. SB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	9.6	A	10.1	A	10.7	A	7.9	A	8.8	A
9. SB SR 99 Grant Line Road Slip On-Ramp	Merge	12.9	B	13.5	B	13.9	B	17.6	B	18.4	B
10. SB SR 99 South of Grant Line Road	Basic Segment	15.8	B	16.6	B	17.3	B	20.2	C	21.6	C

Notes:
Source: Fehr & Peers, 2017

V. CUMULATIVE CONDITIONS

This chapter analyzes the potential impacts of the proposed Project on the surrounding roadway network under cumulative conditions without and with the proposed Project. This analysis scenario considers potential impacts due to implementation of Phase 1 and Project Buildout. Prior to presenting the analysis results, the planned transportation network and population and employment growth assumptions are discussed to provide context for the impact analysis.

CUMULATIVE SETTING

As discussed in Chapter 1, a modified version of SACOG's MTP/SCS travel demand forecasting (TDF) model was used to develop traffic volumes for the study facilities. The off-the-shelf version of the base year model is generally representative of 2012 conditions and the future year model has a 2036 forecast year. However, as is standard practice with large area travel demand models, a thorough model review was completed and the model was refined to ensure that it produced reasonable results in the study area. The future year TDF model was modified to reflect buildout development levels in the City of Elk Grove, including buildout of the Laguna Ridge Specific Plan, Sterling Meadows, the Elk Grove Promenade, and buildout of the following projects considered to be reasonably foreseeable for the transportation impact analysis:

- Wilton Rancheria Casino Resort Project
- Bilby Ridge Sphere of Influence Amendment
- Kammerer Road/Highway 99 Sphere of Influence Amendment
- Elk Grove Promenade

The transportation network includes programmed improvements included in the SACOG Metropolitan Transportation Plan/Sustainable Communities Strategy (MTP/SCS) 2016 constrained roadway network, with construction anticipated by 2036. The following compares the MTP/SCS 2016 transportation network on Kammerer Road and Grant Line Road to the planned SouthEast Connector JPA and the City of Elk Grove General Plan.

In an effort to better match planned improvements on Kammerer Road with available funding and to improve accessibility, The City of Elk Grove investigated and recommended an Interim Phasing concept to the Connector JPA. The Interim Phase for Kammerer Road would reconstruct the existing two-lane roadway from Lent Ranch Parkway to Bruceville Road and construct a new two-lane road extension from Bruceville Road to I-5. The original improvements planned by the City of Elk Grove on Kammerer Road were to reconstruct Kammerer Road between Lent Ranch Parkway and Bruceville Road as a four-lane roadway without the extension to I-5. The Interim Phase would accommodate future SouthEast Connector improvements.

Source	Planned Network		
	Roadway	Segment	Facility
MTP/SCS 2016	Kammerer Road	I-5 to Bruceville Road	4-Lane Arterial
		Bruceville Road to Lent Ranch Parkway	4-Lane Arterial
		Lent Ranch Parkway to E. Stockton Boulevard	6-Lane Arterial
	Grant Line Road	E. Stockton Boulevard to Bradshaw Road	4-Lane Arterial
		Bradshaw Road to Calvine Road	2-Lane Arterial
SouthEast Connector JPA (Interim Phase)	Kammerer Road	I-5 to Bruceville Road	2-Lane Expressway
		Bruceville Road to Lent Ranch Parkway	2/5-Lane Arterial
		Lent Ranch Parkway to E. Stockton Boulevard	6-Lane Arterial
	Grant Line Road	E. Stockton Boulevard to Waterman Road	4-Lane Arterial
		Bradshaw Road to Calvine Road	2-Lane Arterial
SouthEast Connector JPA (Phase 1 Connector)	Kammerer Road	I-5 to Bruceville Road	4-Lane Expressway
		Bruceville Road to Lent Ranch Parkway	4-Lane Thoroughfare
		Lent Ranch Parkway to E. Stockton Boulevard	6-Lane Thoroughfare
	Grant Line Road	E. Stockton Boulevard to Bradshaw Road	4-Lane Thoroughfare
		Bradshaw Road to Calvine Road	4-Lane Thoroughfare
SouthEast Connector JPA (Ultimate Connector)	Kammerer Road	I-5 to Bruceville Road	4-Lane Expressway
		Bruceville Road to Lent Ranch Parkway	6-Lane Thoroughfare
		Lent Ranch Parkway to E. Stockton Boulevard	6-Lane Thoroughfare
	Grant Line Road	E. Stockton Boulevard to Bond Road	6-Lane Thoroughfare
		Bond Road to Calvine Road	4-Lane Thoroughfare
Elk Grove General Plan	Kammerer Road	I-5 to Bruceville Road	6-Lane Arterial
		Bruceville Road to Lent Ranch Parkway	6-Lane Arterial
		Lent Ranch Parkway to E. Stockton Boulevard	8-Lane Arterial
	Grant Line Road	E. Stockton Boulevard to Bradshaw Road	8-Lane Arterial
		Bradshaw Road to Calvine Road	6-Lane Arterial

TRAFFIC OPERATIONS – CUMULATIVE NO PROJECT CONDITIONS

The following summarizes traffic operations under Cumulative No Project conditions, including peak hour roadway segment volume-to-capacity, intersection operations, and freeway operations at the SR 99/Grant Line Road interchange.

Traffic volume forecasts were developed using the methodology discussed Chapter 1. Intersection turning movement forecasts under Cumulative No Project conditions are show on the following figures:

- **Figure 10** shows weekday peak hour turning movement forecasts, lane configurations, and traffic control at each study intersection.
- **Figure 11** shows Saturday peak hour turning movement forecasts, lane configurations, and traffic control at Intersections 5 through 11.

Figure 10: Weekday Peak Hour Traffic Volumes and Lane Configurations – Cumulative No Project Conditions

Figure 11: Saturday Peak Hour Traffic Volumes and Lane Configurations – Cumulative No Project Conditions

Peak Hour Roadway Segment Volume-to-Capacity

Table 23 displays directional roadway segment traffic volumes and VC ratio for weekday PM and Saturday peak hour conditions for key roadway segment that will provide primary access to the proposed Project, including Grant Line Road between SR 99 and Bradshaw Road. As discussed previously, roadways are evaluated to describe to decision-makers and the public the expected change in traffic under various activities at the EGMSC.

As shown in **Table 23**, substantial growth in weekday and Saturday peak hour and would occur on Kammerer Road and Grant Line Road as a result of planned and reasonably foreseeable land use growth in the study area. Of particular note are the Bilby Ridge and Kammerer Road/Highway 99 Sphere of Influence amendments west of SR 99. These projects were not assumed in the MTP/SCS 2016 or in the transportation analysis for the SouthEast Connector. Consequently, there is an imbalance created with the constrained transportation network. As a result of this imbalance, seven segments during the weekday PM peak hour and two segment during the Saturday peak hour would operate above capacity, VC greater than 1.00.

Peak Hour Intersection Operations

Table 24 displays the existing weekday AM, PM, and Saturday peak hour traffic operations analysis results at the 20 study intersections (refer to Appendix D for detailed calculations) under Cumulative No Project conditions. As shown in **Table 24**, ten intersections during the weekday AM and PM peak hours and two intersections during the Saturday peak hour would operate unacceptably at LOS E or F under Cumulative No Project conditions. These results are due largely to land use growth in the study area.

Peak Hour Freeway Operations

Table 25 displays weekday AM and PM peak hour traffic operations analysis results at the 10 study freeway facilities under Cumulative No Project conditions (refer to Appendix D for detailed calculations). As shown in **Table 25**, all study freeway facilities at the SR 99/Grant Line Road interchange would operate at LOS D or better.

TABLE 23:
PEAK HOUR ROADWAY SEGMENT OPERATIONS – CUMULATIVE NO PROJECT CONDITIONS

Roadway	Segment		Direction	Existing	Cumulative		Weekday PM Peak Hour				Saturday Peak Hour			
							Existing		Cumulative		Existing		Cumulative	
	From	To		Hourly Capacity (Per Lane)	Lanes[1]	Hourly Capacity (Per Lane)	Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]
Bradshaw Rd	Elk Grove Blvd	Grant Line Rd	SB	990	4	990	250	0.25	650	0.33	165	0.17	578	0.29
			NB	990	4	990	254	0.26	860	0.43	135	0.14	370	0.19
Grant Line Rd	SR 99 SB Ramps	SR 99 NB Ramps	EB	910	6	910	618	0.23	4,060	**1.49**	425	0.16	1,744	0.64
			WB	910	6	910	1,108	0.41	3,450	**1.26**	595	0.22	2,934	**1.07**
	SR 99 NB Ramps	E. Stockton Blvd	EB	910	6	910	1,022	0.37	3,044	**1.12**	761	0.28	1,599	0.59
			WB	910	6	910	1,234	0.45	2,742	**1.00**	695	0.25	2,086	0.76
	E. Stockton Blvd	Waterman Rd	EB	910	5	910	826	0.45	2,329	0.85	622	0.34	1,299	0.48
			WB	910	5	910	911	0.50	2,016	**1.11**	570	0.31	1,456	0.80
	Waterman Rd	Mosher Rd	EB	910	5	910	631	0.69	1,675	0.61	454	0.50	961	0.35
			WB	910	5	910	680	0.75	1,385	0.76	429	0.47	1,088	0.60
	Mosher Rd	Bradshaw Rd	EB	910	4	910	564	0.62	1,520	0.84	432	0.47	784	0.43
			WB	910	4	910	645	0.71	1,148	0.63	382	0.42	1,047	0.58
	Bradshaw Rd	Elk Grove Blvd	EB	910	2	910	304	0.33	605	0.66	309	0.34	359	0.39
			WB	910	2	910	402	0.44	485	0.53	217	0.24	471	0.52
Kammerer Rd	Lent Ranch Pkwy	Promenade Pkwy	EB	910	6	910	285	0.10	2,588	0.95	214	0.08	1,038	0.38
			WB	910	6	910	433	0.16	2,573	0.94	171	0.06	2,074	0.76
	Promenade Pkwy	SR 99 SB Ramps	EB	910	7	910	547	0.20	4,810	**1.32**	316	0.12	1,855	0.51
			WB	910	7	910	655	0.24	4,270	**1.56**	296	0.11	3,808	**1.39**
Mosher Rd	Waterman Rd	Grant Line Rd	SB	990	2	990	75	0.08	345	0.35	77	0.08	141	0.14
			NB	990	2	990	98	0.10	225	0.23	56	0.06	221	0.22
Waterman Rd	Mosher Rd	Grant Line Rd	SB	990	2	990	260	0.26	680	0.69	151	0.15	379	0.38
			NB	990	2	990	231	0.23	715	0.72	147	0.15	349	0.35

Notes:
[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] VC – Volume-to-Capacity Ratio
Source: Fehr & Peers, 2017

TABLE 24:
PEAK HOUR INTERSECTION LEVEL OF SERVICE – CUMULATIVE NO PROJECT CONDITIONS

Intersection	Control	Weekday AM Peak Hour				Weekday PM Peak Hour				Saturday Peak Hour			
		Existing		Cumulative		Existing		Cumulative		Existing		Cumulative	
		Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]
1. Hood Franklin Rd/I-5 SB Ramps	Signal	5 (10)	A (A)	12	B	8 (11)	A (B)	12	B				
2. Hood Franklin Rd/I-5 NB Ramps	Signal	2 (11)	A (B)	17	B	2 (11)	A (B)	12	B				
3. Kammerer Rd/Bruceville Rd	Signal	10 (19)	A (C)	63	**E**	10 (15)	B (C)	53	D				
4. Kammerer Rd/Lent Ranch Pkwy[2]	Signal	5	A	105	**F**	4	A	161	**F**				
5. Kammerer Rd/Promenade Pkwy	Signal	14	B	156	**F**	15	B	276	**F**	10	A	39	D
6. Kammerer Rd/SR 99 SB Ramps	Signal	7	A	182	**F**	7	A	141	**F**	5	A	67	**E**
7. Kammerer Rd/SR 99 NB Ramps	Signal	7	A	50	D	8	A	35	D	4	A	20	C
8. Grant Line Rd/E. Stockton Blvd	Signal	17	B	138	**F**	21	C	195	**F**	16	B	84	**F**
9. Grant Line Rd/Waterman Rd	Signal	12	B	34	C	8	A	25	C	9	A	8	A
10. Grant Line Rd/Mosher Rd	Signal	3 (27)	A (D)	13	B	2 (20)	A (C)	14	B	2 (13)	A (B)	11	B
11. Grant Line Rd/Bradshaw Rd	Signal	4 (13)	A (B)	36	D	5 (15)	A (C)	14	B	4 (11)	A (B)	14	B
12. Grant Line Rd/Elk Grove Blvd	AWSC	29	D	110	**F**	14	B	49	**E**				
13. Grant Line Rd/Bond Rd	Signal	19	B	30	C	18	B	29	C				
14. Grant Line Rd/Wilton Rd	Signal	37	D	83	**F**	27	C	76	**E**				
15. Grant Line Rd/Sheldon Rd[2]	Signal	29	C	34	C	20	C	35	D				
16. Grant Line Rd/Calvine Rd[2]	Signal	21	C	26	C	14	B	15	B				
17. Waterman Rd/Elk Grove Blvd	Signal	26	C	58	**E**	26	C	55	**D**				
18. Waterman Rd/Bond Rd	Signal	27	C	46	D	23	C	34	C				
19. Kammerer Rd/Big Horn Blvd	Signal			53	D			60	**E**				
20. Kammerer Rd/Lotz Pkwy	Signal			67	**E**			75	**E**				

Notes:
AWSC = All-way Stop Control. SSSC = Side-street Stop Control.
[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.
[2]HCM 2000 was used due to unique signal timing or to be consistent with other scenarios.
Source: Fehr & Peers, 2017

TABLE 25:
PEAK HOUR FREEWAY ANALYSIS – CUMULATIVE NO PROJECT CONDITIONS

Freeway Facility	Type	Weekday AM Peak Hour				Weekday PM Peak Hour			
		Existing		Cumulative		Existing		Cumulative	
		Density	LOS	Density	LOS	Density	LOS	Density	LOS
1. NB SR 99 South of Grant Line Road	Basic Segment	22.7	C	35.9	E	24.0	C	34.5	D
2. NB SR 99 Grant Line Road Slip Off-Ramp	Diverge	17.6	B	27.6	C	18.7	B	26.8	C
3. NB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	11.5	B	14.9	B	12.5	B	19.7	C
4. NB SR 99 Grant Line Road Slip On-Ramp	Merge	15.4	B	18.8	B	17.1	B	24.3	C
5. NB SR 99 North of Grant Line Road	Basic Segment	16.1	B	20.9	C	18.8	C	32.3	D
6. SB SR 99 North of Grant Line Road	Basic Segment	13.9	B	30.5	D	14.2	B	20.7	C
7. SB SR 99 Grant Line Road Slip Off-Ramp	Diverge	7.4	A	24.1	C	7.9	A	15.5	B
8. SB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	9.6	A	9.8	A	10.7	A	7.8	A
9. SB SR 99 Grant Line Road Slip On-Ramp	Merge	12.9	B	16.9	B	13.9	B	17.5	B
10. SB SR 99 South of Grant Line Road	Basic Segment	15.8	B	20.1	C	17.3	B	20.1	C

Notes:

Source: Fehr & Peers, 2017

TRAFFIC OPERATIONS – CUMULATIVE PLUS PROJECT CONDITIONS

The following summarizes traffic operations under Cumulative Plus Project conditions, including peak hour roadway segment volume-to-capacity, intersection operations, and freeway operations at the SR 99/Grant Line Road interchange.

Traffic volume forecasts were developed using the methodology discussed Chapter 1, which includes manual assignment of Phase 1 and stadium events and use of the validated TDF model for assignment of lands adjacent to Phase 1. Intersection turning movement forecasts under Cumulative Plus Project conditions are show on the following figures:

- **Figure 12** shows weekday PM peak hour turning movement forecasts, lane configurations, and traffic control at each study intersection for Phase 1 Practice Activity conditions.
- **Figure 13** shows Saturday peak hour turning movement forecasts, lane configurations, and traffic control at Intersections 5 through 11 for Phase 1 Local/Semi-Regional Tournament conditions.
- **Figure 14** shows Saturday peak hour turning movement forecasts, lane configurations, and traffic control at Intersections 5 through 11 for Phase 1 Regional/National Tournament conditions.
- **Figure 15** shows weekday peak hour turning movement forecasts, lane configurations, and traffic control at each study intersection for Buildout Practice Activity conditions.
- **Figure 16** shows weekday PM peak hour turning movement forecasts, lane configurations, and traffic control at each study intersection for Buildout Stage Event conditions.

Figure 12: Weekday Peak Hour Traffic Volumes and Lane Configurations – Cumulative Plus Phase 1 Conditions – Practice Activities

Figure 13: Saturday Peak Hour Traffic Volumes and Lane Configurations – Cumulative Plus Phase 1 Conditions – Local/Semi-Regional Tournament

Figure 14: Saturday Peak Hour Traffic Volumes and Lane Configurations – Cumulative Plus Phase 1 Conditions – Regional/National Tournament

Figure 15: Weekday Peak Hour Traffic Volumes and Lane Configurations – Cumulative Plus Buildout Conditions – Practice Activities

Figure 16: Weekday Peak Hour Traffic Volumes and Lane Configurations – Cumulative Plus Buildout Conditions – Stage Events

Peak Hour Roadway Segment Volume-to-Capacity

Table 26 displays directional roadway segment traffic volumes and VC ratio under Cumulative Plus Project conditions for weekday PM peak hour conditions for key roadway segment that will provide primary access to the proposed Project, including Grant Line Road between SR 99 and Bradshaw Road. As discussed previously, roadways are evaluated to describe to decision-makers and the public the expected change in traffic under various activities at the EGMSC. As shown in **Table 26**, the addition of Project trips will increase the VC of on most study segments compared to cumulative conditions. The addition of trips from Stage Events, League Events, and the County Fair would cause the segment of Grant Line Road between E. Stockton Boulevard and Waterman Road (Eastbound) to exceed capacity compared to cumulative conditions.

Table 27 displays directional roadway segment traffic volumes and volume-to-capacity VC ratio for weekday Saturday peak hour conditions under Cumulative Plus Project conditions for key roadway segment that will provide primary access to the proposed Project, including Grant Line Road between SR 99 and Bradshaw Road. As shown in **Table 27**, the addition of trips from a Local/Semi-Regional tournament would cause segments of Grant Line Road between the SR 99 NB Ramp and Waterman Road (Westbound) to exceed capacity compared to cumulative conditions.

Peak Hour Intersection Operations

Table 28 displays the weekday PM and Saturday peak hour traffic operations analysis results at the 20 study intersections under Cumulative Plus Phase 1 conditions (refer to Appendix D for detailed calculations). As shown in **Table 28**, the addition of trips from Phase 1 (Practice Activities) would impact operations at the following intersections:

- Kammerer Road/Lent Ranch Parkway – The addition of Project trips would exacerbate unacceptable LOS F conditions.
- Kammerer Road/Promenade Pkwy – The addition of Project trips would exacerbate unacceptable LOS F conditions.
- Kammerer Rd/SR 99 SB Ramps – The addition of Project trips would exacerbate unacceptable LOS F conditions.
- Grant Line Road/E. Stockton Boulevard – The addition of Project trips would exacerbate unacceptable LOS F conditions.
- Grant Line Road/Waterman Road – The addition of Project trips would result in unacceptable LOS E conditions.

- Grant Line Road/Elk Grove Boulevard– The addition of Project trips would exacerbate unacceptable LOS E conditions.
- Grant Line Road/Wilton Boulevard – The addition of Project trips would exacerbate unacceptable LOS E conditions.
- Kammerer Road/Big Horn Boulevard – The addition of Project trips would exacerbate unacceptable LOS E conditions.
- Kammerer Road/Lotz Parkway – The addition of Project trips would exacerbate unacceptable LOS E conditions.

The addition of trips from Phase 1 (Tournaments) would impact operations at the following intersections during Saturday peak hour conditions:

- Kammerer Rd/SR 99 SB Ramps – The addition of Project trips would exacerbate unacceptable LOS E operation.
- Grant Line Road/Waterman Road – The addition of Project trips would result in unacceptable LOS F conditions.
- Grant Line Road/E. Stockton Blvd– The addition of Project trips would exacerbate unacceptable LOS F operation.

Table 29 displays the weekday AM and PM peak hour traffic operations analysis at the 20 study intersections under Cumulative Plus Project Buildout conditions with Practice Activities and Stage Events. (Refer to Appendix D for detailed calculations). As shown in **Table 29**, Buildout of the Project would impact the following study intersections:

- Kammerer Road/Bruceville Road – The addition of Project trips would result in unacceptable LOS E operations in the PM peak hour.
- Kammerer Rd/SR 99 SB Ramps – The addition of Project trips would exacerbate unacceptable LOS F operation.
- Grant Line Road/E. Stockton Blvd– The addition of Project trips would exacerbate unacceptable LOS F operations in the PM peak hour.
- Grant Line Road/Waterman Road – The addition of Project trips would result in LOS E operations in the AM peak hour and would result in LOS F operations in the PM peak hour.
- Grant Line Road/Mosher Road – The addition of Project trips would result in LOS F operations in the AM and PM peak hours.

- Grant Line Road/Bradshaw Road – The addition of Project trips would result in LOS E operations in the AM peak hour.
- Grant Line Road/Elk Grove Boulevard– The addition of Project trips would exacerbate unacceptable LOS F conditions in the AM peak hour and unacceptable LOS E conditions in the PM peak hour.
- Grant Line Road/Wilton Boulevard – The addition of Project trips would exacerbate unacceptable LOS F conditions in the AM peak hour and unacceptable LOS E conditions in the PM peak hour..
- Waterman Road/Elk Grove Boulevard – The addition of Project trips would exacerbate unacceptable LOS E conditions in the AM peak hour and would result in unacceptable LOS E operations in the PM peak hour.
- Kammerer Road/Big Horn Boulevard – The addition of Project trips would result in unacceptable LOS E conditions in the AM peak hour and would exacerbate unacceptable LOS E conditions in the PM peak hour.
- Kammerer Road/Lotz Parkway – The addition of Project trips would exacerbate unacceptable LOS E conditions in the PM peak hour.

Peak Hour Freeway Operations

Table 30 displays the weekday AM and PM peak hour traffic operations analysis results at the 10 study freeway facilities under Cumulative Plus Project conditions. During the AM peak hour, Project Buildout with Practice Activities was analyzed. During PM peak hour conditions, operations with Practice Activities with Phase 1 and Project Buildout were analyzed (refer to Appendix D for detailed calculations). As shown in **Table 30**, all study freeway facilities at the SR 99/Grant Line Road interchange would operate at LOS D or better.

TABLE 26:
PEAK HOUR ROADWAY SEGMENT OPERATIONS – CUMULATIVE PLUS PROJECT WEEKDAY CONDITIONS

Roadway	Segment		Direction	Lanes[1]	Hourly Capacity (Per Lane)	Weekday PM Peak Hour									
						Cumulative		Cumulative Plus Project							
								Practice Activities		Stage Event		League Event		County Fair	
	From	To				Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]
Bradshaw Rd	Elk Grove Blvd	Grant Line Rd	SB	4	990	650	0.33	704	0.36	718	0.36	709	0.36	711	0.36
			NB	4	990	860	0.43	932	0.47	931	0.47	930	0.47	938	0.47
Grant Line Rd	SR 99 SB Ramps	SR 99 NB Ramps	EB	6	910	4,060	**1.49**	4,039	**1.48**	4,572	**1.67**	4,691	**1.72**	4286	**1.57**
			WB	6	910	3,450	**1.26**	3,528	**1.29**	3,514	**1.29**	3,511	**1.29**	3601	**1.32**
	SR 99 NB Ramps	E. Stockton Blvd	EB	6	910	3,044	**1.12**	3,210	**1.18**	3,802	**1.39**	3,867	**1.42**	3485	**1.28**
			WB	6	910	2,742	**1.00**	3,212	**1.18**	3,163	**1.16**	3,165	**1.16**	3446	**1.26**
	E. Stockton Blvd	Waterman Rd	EB	5	910	2,329	0.85	2,525	0.92	3,116	**1.14**	3,181	**1.17**	2799	**1.03**
			WB	5	910	2,016	**1.11**	2,539	**1.39**	2,490	**1.37**	2,492	**1.37**	2773	**1.52**
	Waterman Rd	Mosher Rd	EB	5	910	1,675	0.61	1,581	0.58	1,687	0.62	1,697	0.62	1667	0.61
			WB	5	910	1,385	0.76	1,253	0.69	1,308	0.72	1,282	0.70	1389	0.76
	Mosher Rd	Bradshaw Rd	EB	4	910	1,520	0.84	1,766	0.97	1,756	0.96	1,753	0.96	1815	**1.00**
			WB	4	910	1,148	0.63	1,163	0.64	1,286	0.71	1,231	0.68	1220	0.67
	Bradshaw Rd	Elk Grove Blvd	EB	2	910	605	0.66	809	0.89	800	0.88	798	0.88	852	0.94
			WB	2	910	485	0.53	476	0.52	586	0.64	540	0.59	527	0.58
Kammerer Rd	Lent Ranch Pkwy	Promenade Pkwy	EB	6	910	2,588	0.95	2,530	0.93	2,653	0.97	2,635	0.97	2587	0.95
			WB	6	910	2,573	0.94	2,654	0.97	2,644	0.97	2,643	0.97	2703	0.99
	Promenade Pkwy	SR 99 SB Ramps	EB	7	910	4,810	**1.32**	4,655	**1.28**	4,778	**1.31**	4,760	**1.31**	4711	**1.29**
			WB	7	910	4,270	**1.56**	4,376	**1.60**	4,366	**1.60**	4,365	**1.60**	4425	**1.62**
Mosher Rd	Waterman Rd	Grant Line Rd	SB	2	990	345	0.35	565	0.57	565	0.57	565	0.57	565	0.57
			NB	2	990	225	0.23	460	0.46	460	0.46	460	0.46	460	0.46
Waterman Rd	Mosher Rd	Grant Line Rd	SB	2	990	680	0.69	524	0.53	538	0.54	529	0.53	531	0.54
			NB	2	990	715	0.72	602	0.61	601	0.61	600	0.61	608	0.61

Notes:
[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] VC – Volume-to-Capacity Ratio
[3] LOS – Level of Service
Source: Fehr & Peers, 2017

TABLE 27:
PEAK HOUR ROADWAY SEGMENT OPERATIONS – CUMULATIVE PLUS PROJECT SATURDAY CONDITIONS

Roadway	Segment		Direction	Lanes[1]	Hourly Capacity (Per Lane)	Saturday Peak Hour					
						Cumulative		Cumulative Plus Project (Tournaments)			
								Regional/National		Local/Semi-Regional	
	From	To				Volume[1]	VC[2]	Volume[1]	VC[2]	Volume[1]	VC[2]
Bradshaw Rd	Elk Grove Blvd	Grant Line Rd	SB	4	990	578	0.29	638	0.32	644	0.33
			NB	4	990	370	0.19	354	0.18	364	0.18
Grant Line Rd	SR 99 SB Ramps	SR 99 NB Ramps	EB	6	910	1,744	0.64	2,309	0.85	2,552	0.93
			WB	6	910	2,934	**1.07**	2,937	**1.08**	3,067	**1.12**
	SR 99 NB Ramps	E. Stockton Blvd	EB	6	910	1,599	0.59	2,244	0.82	2,513	0.92
			WB	6	910	2,086	0.76	2,424	0.89	2,847	**1.04**
	E. Stockton Blvd	Waterman Rd	EB	5	910	1,299	0.48	1,973	0.72	2,241	0.82
			WB	5	910	1,456	0.80	1,796	0.99	2,219	**1.22**
	Waterman Rd	Mosher Rd	EB	5	910	961	0.35	-	-	-	-
			WB	5	910	1,088	0.60	-	-	-	-
	Mosher Rd	Bradshaw Rd	EB	4	910	784	0.43	682	0.37	771	0.42
			WB	4	910	1,047	0.58	1,291	0.71	1,348	0.74
	Bradshaw Rd	Elk Grove Blvd	EB	2	910	359	0.39	342	0.38	420	0.46
			WB	2	910	471	0.52	667	0.73	717	0.79
Kammerer Rd	Lent Ranch Pkwy	Promenade Pkwy	EB	6	910	1,038	0.38	1,143	0.42	1,200	0.44
			WB	6	910	2,074	0.76	2,070	0.76	2,159	0.79
	Promenade Pkwy	SR 99 SB Ramps	EB	7	910	1,855	0.51	1,987	0.55	2,043	0.56
			WB	7	910	3,808	**1.39**	3,761	**1.38**	3,850	**1.41**
Mosher Rd	Waterman Rd	Grant Line Rd	SB	2	990	141	0.14	-	-	-	-
			NB	2	990	221	0.22	-	-	-	-
Waterman Rd	Mosher Rd	Grant Line Rd	SB	2	990	379	0.38	-	-	-	-
			NB	2	990	349	0.35	-	-	-	-

Notes:
[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] VC – Volume-to-Capacity Ratio
Source: Fehr & Peers, 2017

TABLE 28:
PEAK HOUR INTERSECTION LEVEL OF SERVICE – CUMULATIVE PLUS PHASE 1 CONDITIONS

Intersection	Control	Weekday PM Peak Hour				Saturday Peak Hour					
		Cumulative		Cumulative Plus Phase 1 (Practice Activities)		Cumulative		Cumulative Plus Phase 1 (Tournaments)			
								Regional/National		Local/Semi-Regional	
		Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]
1. Hood Franklin Rd/I-5 SB Ramps	Signal	12	B	13	B						
2. Hood Franklin Rd/I-5 NB Ramps	Signal	12	B	13	B						
3. Kammerer Rd/Bruceville Rd	Signal	53	D	55	D						
4. Kammerer Rd/Lent Ranch Pkwy[2]	Signal	161	**F**	164	**F**						
5. Kammerer Rd/Promenade Pkwy	Signal	276	**F**	278	**F**	39	D	35	D	40	D
6. Kammerer Rd/SR 99 SB Ramps	Signal	141	**F**	146	**F**	67	**E**	68	**E**	93	**F**
7. Kammerer Rd/SR 99 NB Ramps	Signal	35	D	36	D	20	C	19	B	23	C
8. Grant Line Rd/E. Stockton Blvd	Signal	195	**F**	205	**F**	84	**F**	96	**F**	145	**F**
9. Grant Line Rd/Waterman Rd	Signal	25	C	67	**E**	8	A	31	C	82	**F**
10. Grant Line Rd/Mosher Rd	Signal	14	B	14	B	11	B	10	A	11	B
11. Grant Line Rd/Bradshaw Rd	Signal	14	B	14	B	14	B	12	B	15	B
12. Grant Line Rd/Elk Grove Blvd	AWSC	49	**E**	57	**F**						
13. Grant Line Rd/Bond Rd	Signal	29	C	31	C						
14. Grant Line Rd/Wilton Rd	Signal	76	**E**	78	**E**						
15. Grant Line Rd/Sheldon Rd[2]	Signal	35	D	37	D						
16. Grant Line Rd/Calvine Rd[2]	Signal	15	B	15	B						
17. Waterman Rd/Elk Grove Blvd	Signal	55	**D**	55	**D**						
18. Waterman Rd/Bond Rd	Signal	34	C	34	C						
19. Kammerer Rd/Big Horn Blvd	Signal	60	**E**	62	**E**						
20. Kammerer Rd/Lotz Pkwy	Signal	75	**E**	77	**E**						

Notes:
AWSC = All-way Stop Control. SSSC = Side-street Stop Control.
[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.
[2]HCM 2000 was used due to unique signal timing or to be consistent with other scenarios.
Source: Fehr & Peers, 2017

TABLE 29:
PEAK HOUR INTERSECTION LEVEL OF SERVICE – CUMULATIVE PLUS PROJECT BUILDOUT CONDITIONS

Intersection	Control	Weekday AM Peak Hour				Weekday PM Peak Hour					
		Cumulative		Cumulative Plus Buildout (Practice Activities)		Cumulative		Cumulative Plus Buildout			
								Practice Activities		Stage Events	
		Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]	Delay[1]	LOS[1]
1. Hood Franklin Rd/I-5 SB Ramps	Signal	12	B	13	B	12	B	13	B	16	B
2. Hood Franklin Rd/I-5 NB Ramps	Signal	17	B	21	C	12	B	14	B	20	B
3. Kammerer Rd/Bruceville Rd	Signal	63	**E**	66	**E**	53	D	62	**E**	62	**E**
4. Kammerer Rd/Lent Ranch Pkwy[2]	Signal	105	**F**	106	**F**	161	**F**	155	**F**	164	**F**
5. Kammerer Rd/Promenade Pkwy	Signal	156	**F**	152	**F**	276	**F**	263	**F**	269	**F**
6. Kammerer Rd/SR 99 SB Ramps	Signal	182	**F**	180	**F**	141	**F**	139	**F**	158	**F**
7. Kammerer Rd/SR 99 NB Ramps	Signal	50	D	51	D	35	D	35	C	51	D
8. Grant Line Rd/E. Stockton Blvd	Signal	138	**F**	139	**F**	195	**F**	253	**F**	272	**F**
9. Grant Line Rd/Waterman Rd	Signal	34	C	60	**E**	25	C	108	**F**	107	**F**
10. Grant Line Rd/Mosher Rd	Signal	13	B	233	**F**	14	B	162	**F**	216	**F**
11. Grant Line Rd/Bradshaw Rd	Signal	36	D	67	**E**	14	B	15	B	17	B
12. Grant Line Rd/Elk Grove Blvd	AWSC	110	**F**	145	**F**	49	**E**	114	**F**	120	**F**
13. Grant Line Rd/Bond Rd	Signal	30	C	32	C	29	C	31	C	37	D
14. Grant Line Rd/Wilton Rd	Signal	83	**F**	88	**F**	76	**E**	97	**F**	93	**F**
15. Grant Line Rd/Sheldon Rd[2]	Signal	34	C	37	D	35	D	42	D	55	D
16. Grant Line Rd/Calvine Rd[2]	Signal	26	C	26	C	15	B	16	B	20	B
17. Waterman Rd/Elk Grove Blvd	Signal	58	**E**	68	**E**	55	**D**	71	**E**	72	**E**
18. Waterman Rd/Bond Rd	Signal	46	D	47	D	34	C	36	D	36	D
19. Kammerer Rd/Big Horn Blvd	Signal	53	D	55	**E**	60	**E**	64	**E**	73	**E**
20. Kammerer Rd/Lotz Pkwy	Signal	67	**E**	68	**E**	75	**E**	78	**E**	89	**F**

Notes:
AWSC = All-way Stop Control. SSSC = Side-street Stop Control.
[1]Average delay (rounded to the nearest second) and LOS for signalized and all-way stop-controlled intersections is the weighted average for all movements. Average delay and LOS at side-street stop-controlled intersections shown for both worst-case side street movement (in parentheses) and intersection as a whole.
[2]HCM 2000 was used due to unique signal timing or to be consistent with other scenarios.
Source: Fehr & Peers, 2017

TABLE 30:
PEAK HOUR FREEWAY ANALYSIS – CUMULATIVE PLUS PHASE 1 AND BUILDOUT CONDITIONS

Freeway Facility	Type	Weekday AM Peak Hour				Weekday PM Peak Hour					
		Cumulative		Cumulative Plus Buildout (Practice Activities)		Cumulative		Cumulative Plus Practice Activities			
								Phase 1		Buildout	
		Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
1. NB SR 99 South of Grant Line Road	Basic Segment	35.9	E	35.0	D	34.5	D	34.8	D	33.2	D
2. NB SR 99 Grant Line Road Slip Off-Ramp	Diverge	27.6	C	27.1	C	26.8	C	26.9	C	26.0	C
3. NB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	14.9	B	13.9	B	19.7	C	19.7	C	18.4	C
4. NB SR 99 Grant Line Road Slip On-Ramp	Merge	18.8	B	19.7	B	24.3	C	24.8	C	25.9	C
5. NB SR 99 North of Grant Line Road	Basic Segment	20.9	C	21.2	C	32.3	D	31.4	D	33.9	D
6. SB SR 99 North of Grant Line Road	Basic Segment	30.5	D	33.3	D	20.7	C	21.9	C	23.9	C
7. SB SR 99 Grant Line Road Slip Off-Ramp	Diverge	24.1	C	26.0	C	15.5	B	16.7	B	18.7	B
8. SB SR 99 Grant Line Road Loop On-Ramp	Basic Segment	9.8	A	10.0	A	7.8	A	7.9	A	8.8	A
9. SB SR 99 Grant Line Road Slip On-Ramp	Merge	16.9	B	17.1	B	17.5	B	17.6	B	18.4	B
10. SB SR 99 South of Grant Line Road	Basic Segment	20.1	C	20.3	C	20.1	C	20.2	C	21.6	C

Notes:

Source: Fehr & Peers, 2017

VI. PROPOSED IMPROVEMENTS

This chapter presents improvement recommendations for off-site and on-site transportation facilities that would be degraded by the addition of Project traffic under existing and cumulative conditions.

EXISTING CONDITIONS

Phase 1

No improvements required.

Buildout

Implementation of the following improvements is recommended to provide acceptable, LOS D or better operations:

Improvement 1 – Kammerer Road/Bruceville Road Intersection

Installation of all-way stop control would provide acceptable LOS C operation in the AM peak hour.

OR

Installation of traffic signal control would provide acceptable LOS A operation in the AM peak hour. Traffic volumes at the intersection would satisfy the peak hour volume warrant for installation of traffic signal control.

Improvement 2 – Grant Line Road/Waterman Road Intersection

Provide the following lane configurations at the intersection:

- Two left-turn lane, one through lane, and one right-turn lane on the northbound approach
- One left-turn lane, one through lane, and two right-turn lanes on the southbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the eastbound approach

- Two left-turn lanes, three through lanes, and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS D in the AM and PM peak hours.

Improvement 3 – Grant Line Road/Mosher Road Intersection

Install traffic signal control and provide the following lane configurations at the intersection:

- One left-turn lane, one through lane, and one right-turn lane on the northbound approach
- One left-turn lane, one through lane, and a right-turn lane on the southbound approach
- One left-turn lane, two through lanes, and one right-turn lane on the eastbound approach
- One left-turn lane, two through lanes, and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS D in the AM and PM peak hours. Traffic volumes at the intersection would satisfy the peak hour volume warrant for installation of traffic signal control.

Improvement 4 – Grant Line Road/Bradshaw Road Intersection

Realign Bradshaw Road to intersect Grant Line Road at 90 degrees. Install traffic signal control and provide the following lane configurations at the intersection:

- One left-turn lane, one right-turn lane on the southbound approach
- One left-turn lane and one through lane on the eastbound approach
- One through lane and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS A in the AM and LOS D in the PM peak hour. Traffic volumes at the intersection would satisfy the peak hour volume warrant for installation of traffic signal control.

Improvement 5 – Grant Line Road/Elk Grove Boulevard Intersection

Realign Elk Grove Boulevard to intersect Grant Line Road at 90 degrees. Install traffic signal control and provide the following lane configurations at the intersection:

- One left-turn lane, one right-turn lane on the southbound approach
- One left-turn lane and one through lane on the eastbound approach
- One through lane and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS C in the AM and PM peak hours. Traffic volumes at the intersection would satisfy the peak hour volume warrant for installation of traffic signal control.

CUMULATIVE CONDITIONS

Implementation of the following improvements is recommended to provide acceptable, LOS D or better operations:

Improvement 6 – Bruceville Road/Kammerer Road

Provide six lane on Kammerer Road east of Bruceville Road. Six lanes on this section of Kammerer Road would be consistent with the Connector JPA ultimate project. Provide the following lane configurations at the intersection:

- One left-turn lane, one through lane, and one right-turn lane on the northbound approach
- Two left-turn lanes, one through lane, and a right-turn lane on the southbound approach
- One left-turn lane, three through lanes, and one right-turn lane on the eastbound approach
- One left-turn lanes, three through lanes, and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS D in the PM peak hour.

Improvement 7 – Lent Ranch Parkway/Kammerer Road

Provide the following lane configurations at the intersection:

- One left-turn lane, one through lane, and one right-turn lanes on the northbound approach
- Two left-turn lanes, one through lane, and one right-turn lane on the southbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the eastbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the westbound approach

With this improvement, delay would be less than delay under cumulative conditions without the project. The intersection would continue to operate at LOS F during the PM peak hours.

Improvement 8 – SR 99 SB Ramps/Grant Line Road

Widen in the median to provide the following lane configurations on the westbound and eastbound approaches:

- Four through lanes and one right-turn lane on the eastbound approach
- Four through lanes and one right-turn lane on the westbound approach

With this improvement, delay would be less than delay under cumulative conditions without the Project. The intersection would continue to operate at LOS F during the PM peak hours. Widening to eight lanes on this section of Grant Line Road would be consistent with the Elk Grove General Plan.

Improvement 9 – E. Stockton Boulevard/Grant Line Road

Widen in the median to provide the following lane configurations on the westbound and eastbound approaches:

- Two left-turn lanes, four through lanes, and one right-turn lane on the eastbound approach
- One left-turn lane, three through lanes, and one shared through/right-turn lane on the westbound approach

With this improvement, delay would be less than delay under cumulative conditions without the Project. The intersection would continue to operate at LOS F during the PM peak hours. Widening to eight lanes on this section of Grant Line Road would be consistent with the Elk Grove General Plan.

Improvement 10 – Waterman Road/Grant Line Road Intersection

Widen Grant Line Road to provide eight through lanes and provide the following lane configurations:

- Three left-turn lanes, one through lane, and one right-turn lane on the northbound approach
- Two left-turn lanes, one through lane, and one right-turn lane on the southbound approach
- Two left-turn lanes, four through lanes, and two right-turn lanes on the eastbound approach
- One left-turn lanes, four through lanes, and one right-turn lane on the westbound approach

With this improvement, delay would be less than delay under cumulative conditions without the project. The intersection would continue to operate at LOS F during the PM peak hours. Widening to eight lanes on this section of Grant Line Road would be consistent with the Elk Grove General Plan.

Improvement 11 – Mosher Road/Grant Line Road Intersection

Widen Grant Line Road to provide six through lanes and provide the following lane configurations:

- One left-turn lane, one through lane, and one right-turn lane on the northbound approach
- One left-turn lane, one through lane, and one right-turn lane on the southbound approach
- One left-turn lane, three through lanes, and one right-turn lane on the eastbound approach

- One left-turn lanes, three through lanes, and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS D in the PM peak hour. Widening to six lanes on this section of Grant Line Road would be consistent with the Connector JPA ultimate project with the Elk Grove General Plan.

Improvement 12 – Grant Line Road/Elk Grove Boulevard Intersection

Install traffic signal control and provide the following lane configurations:

- One left-turn lane and one through lane on the northbound approach
- One through lane and one right-turn lane on the southbound approach
- One left-turn lane and one right-turn lane on the eastbound approach

With this improvement, the intersection would operate acceptably at LOS A in the PM peak hour.

Improvement 13 – Grant Line Road/Wilton Road Intersection

Provide the following lane configurations at the intersection:

- One left-turn lane, one through lane, and one right-turn lane on the northbound approach
- One left-turn lane, and a shared through/right-turn lane on the southbound, eastbound, and westbound approaches.

With this improvement, the intersection would operate at LOS E in the PM peak hour.

Improvement 14 – Waterman Road/Elk Grove Boulevard

Provide the following lane configurations at the intersection:

- Two left-turn lanes, two through lanes, and one right-turn lane on the northbound approach
- One left-turn lane, one through lane, and one right-turn lane on the southbound, eastbound, and westbound approaches.

With this improvement, the intersection would operate at LOS D in the PM peak hour.

Improvement 15 – Big Horn Boulevard/Kammerer Road

Provide six lane on Kammerer Road east of Bruceville Road. Six lanes on this section of Kammerer Road would be consistent with the Connector JPA ultimate project. Provide the following lane configurations at the intersection:

- Two left-turn lanes, two through lanes, and one right-turn lane on the northbound approach
- Two left-turn lanes, two through lanes, and one right-turn lane on the southbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the eastbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS D in the PM peak hour.

Improvement 16 – Lotz Parkway/Kammerer Road

Provide six lane on Kammerer Road east of Bruceville Road. Six lanes on this section of Kammerer Road would be consistent with the Connector JPA ultimate project. Provide the following lane configurations at the intersection:

- Two left-turn lanes, two through lanes, and one right-turn lane on the northbound approach
- Two left-turn lanes, two through lanes, and one right-turn lane on the southbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the eastbound approach
- Two left-turn lanes, three through lanes, and one right-turn lane on the westbound approach

With this improvement, the intersection would operate acceptably at LOS D in the PM peak hour.

ON-SITE CIRCULATION

This chapter presents recommended roadway travel lanes (two-way total) and intersection traffic control for site access and on-site roadways. **Figure 17** shows the concept roadway system. The cumulative buildout travel demand forecasting model was used to develop peak hour and roadway segment traffic volume forecasts for on-site facilities. On-site roadway and intersections are discussed below.

Roadways

Table 31 summarizes on-site roadway travel lanes and level of service for the roadways identified on **Figure 17**, using the daily roadway segment capacities from the City's traffic impact study guidelines.

TABLE 31:
ON-SITE ROADWAY SEGMENT OPERATIONS – CUMULATIVE (PROJECT BUILDOUT) CONDITIONS

On-Site Roadway Segment	Lanes[1]	Daily Capacity[2]	Volume[1]	VC[3]	Level of Service
1	2	18,000	9,400	0.52	A
2	2	18,000	5,200	0.29	A
3	2	18,000	11,100	0.62	B
4	2	18,000	10,900	0.61	B
5	4	36,000	31,000	0.86	D
6	4	36,000	8,200	0.23	A
7	4	36,000	22,700	0.63	B
8	2	18,000	8,500	0.47	A
9	2	18,000	5,200	0.29	A
10	2	18,000	8,500	0.47	A
11	2	18,000	6,400	0.36	A
12	2	18,000	2,300	0.13	A
13	2	18,000	4,100	0.23	A
14	2	18,000	4,800	0.27	A
15	2	18,000	2,400	0.13	A
16	2	18,000	2,000	0.11	A
17	2	18,000	2,900	0.16	A
18	2	18,000	1,000	0.06	A
19	2	18,000	2,700	0.15	A

Notes:
[1] Both directions excluding center turn lanes or right-turn deceleration lanes.
[2] City of Elk Grove – *Traffic Impact Analysis Guidelines*, July 2000. Service volume applies to arterial roadways with moderate access control.
[3] VC – Volume-to-Capacity Ratio
Source: Fehr & Peers, 2017

Intersections

The on-site study intersections were evaluated using the MUTCD peak hour volume warrant for traffic signal installation. As shown, there are 10 major intersections on-site. Of the 10, traffic signal control would be warranted at the first two internal intersections along Mahon Ranch Road, south of Grant Line Road.

Figure 17: Site Access and On-Site Circulation

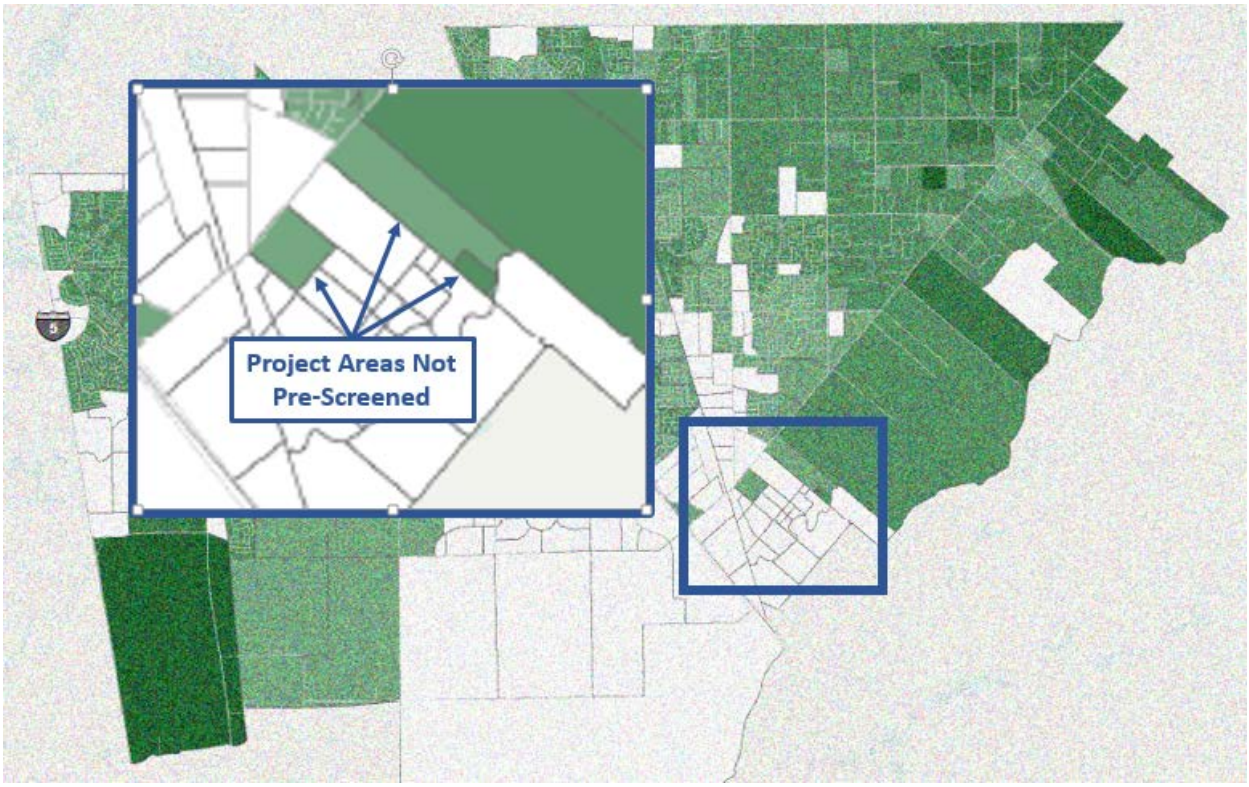
VII. VEHICLE MILES OF TRAVEL

This chapter presents analysis of Project vehicle miles traveled (VMT) under cumulative conditions, relative to the threshold of significance presented in Chapter 1. The VMT analysis includes all of the roadway improvements included as part of the General Plan VMT analysis.

VMT SCREENING

The VMT Screening Map presented in Chapter 1 identifies areas in the City that are exempt from VMT analysis. These include sites that have been pre-screened through Citywide VMT analysis. Pre-screened areas are shown in white and have been determined to result in 15 percent or below the average service population VMT established for that land use designation if built to the specifications of the Land Use Plan.

The Project area is identified on the VMT Screening Map shown below. As shown, most of the Project is exempt form VMT analysis, except for three areas. The non-exempt areas include commercial and mixed-used designated land uses.



VMT LIMITS BY LAND USE DESIGNATION

As outlined in Chapter 1, the non-exempt areas of the Project must demonstrate that the VMT produced by the Project at buildout is equal to or less than the VMT limit of the underlying land use designation. **Table 32** compares the Project's VMT per service population for the non-exempt portions of the Project to the City's VMT limit for those land uses. As shown in **Table 32**, the non-exempt portion of the Project will not exceed the City's VMT limits for their land use designations.

TABLE 32:
VMT BY LAND USE DESIGNATION LIMITS – CUMULATIVE (PROJECT BUILDOUT) CONDITIONS

Non-Exempt Land Use Designation	VMT Per Service Population		Limit Exceeded?
	City VMT Limit	Project VMT	
Community Commercial	69.2	60.8	No
Residential Mixed Use	17.5	12.3	No

Source: Fehr & Peers, 2017

STUDY AREA VMT LIMITS

As outlined in Chapter 1, development Projects located in Study Areas shall demonstrate that cumulative VMT within the Study Area should be equal to or less than the City's established total VMT limits. The proposed Project is located in the East Study Area. **Table 33** compares the total VMT limit for the East Study Area to the City's total VMT limit for the East Study Area. As shown in **Table 33**, the East Study Area would not exceed the City's total VMT limit for the area.

TABLE 33:
STUDY AREA VMT LIMITS – CUMULATIVE (PROJECT BUILDOUT) CONDITIONS

Non-Exempt Land Use Designation	Total VMT		Limit Exceeded?
	City VMT Limit	Project VMT	
East Study Area	342,855	299,108	No

Source: Fehr & Peers, 2017

Appendix B

Elk Grove Multi-Sports Complex VMT Analysis and Transportation Management plan Review

Fehr and Peers – August 24, 2020

FEHR PEERS

MEMORANDUM

Date: August 24, 2020

To: Christopher Jordan, City of Elk Grove

From: David B. Robinson, Fehr & Peers

Subject: **Elk Grove Multi-Sport Complex VMT Analysis and Transportation Management plan Review**

RS20-3924

Fehr & Peers completed a vehicle miles of travel (VMT) analysis of a proposed land use plan to the Elk Grove Multi-Sport Park Complex and the review of the Transportation Management Plan (TMP). The purpose of the VMT analysis is to determine if the proposed land use alterative complies with City of Elk Grove General Plan Policy adopted to reduce VMT and achieve State-mandated reductions in VMT. The TMP review focuses on the adequacy of site access and on-site circulation to accommodate proposed development.

This memorandum compares the land use plan analyzed in the DEIR for the Multi-Sport Park Complex project to the proposed land use plan relative to trip generation and VMT, summarizes the site access and on-site circulation review, and evaluates off-ramp queuing at the SR 99/Grant Line Road intrechange.

Land Use Comparison

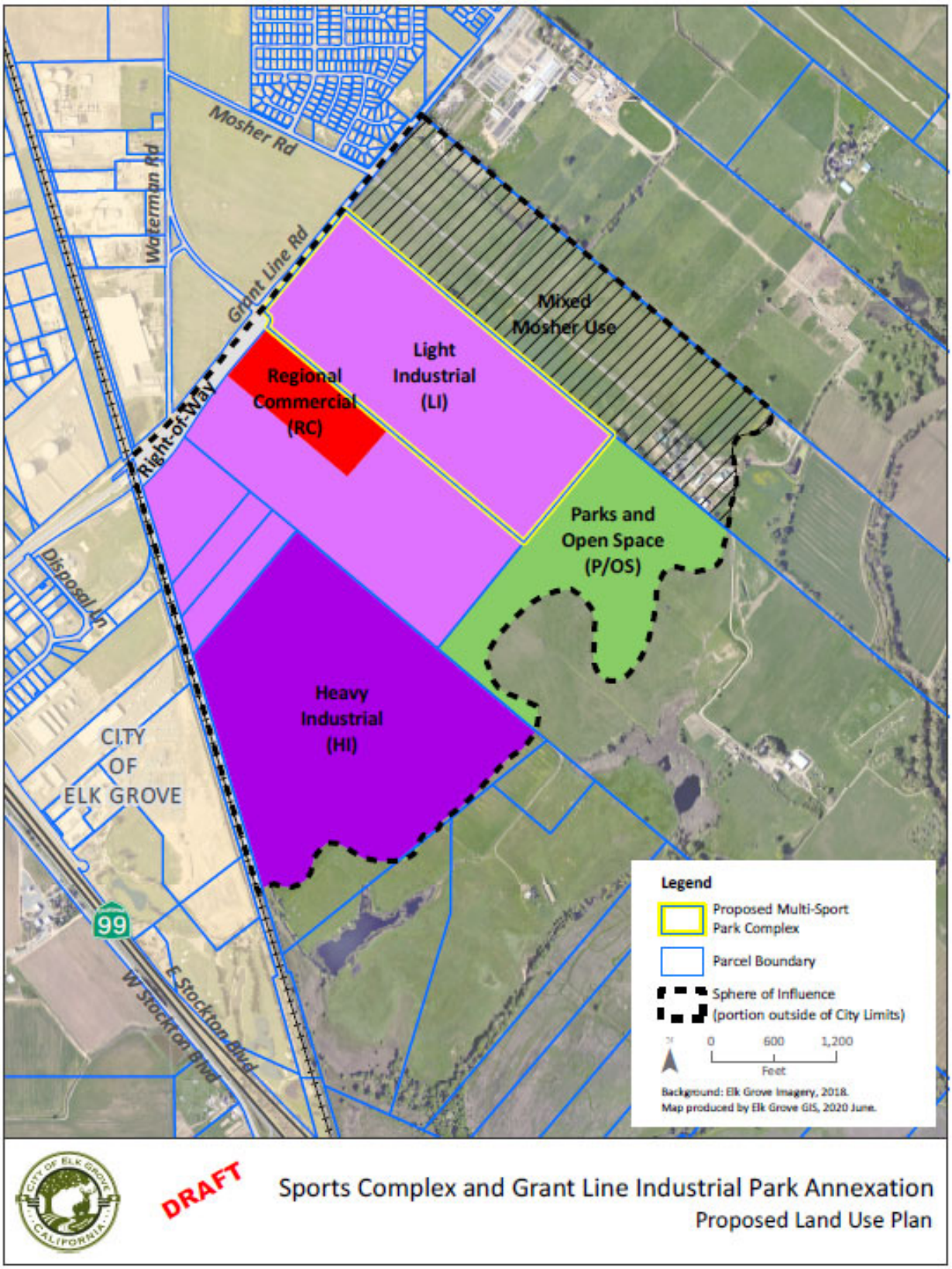
The proposed land use will consist of mixed use, parks and open space, regional commercial, light industrial, and heavy industrial. Figure 1 illustrates the proposed land use plan. The proposed zoning for the City's 103.9-acre parcel is industrial and allows a range of land use activities, including warehousing and manufacturing, as well as the proposed sports complex. Table 1 compares the proposed land use plan to the land use analyzed in the DEIR for the Multi-Sport Park Complex project. As shown, the proposed land use plan shifts Parks/Open Space and Regional Commercial to Light Industrial land use.

Table 1: Land Use Comparison

Land Use	Area[1] (Acres)		Difference (Alt B - DEIR)
	DEIR	Proposed Project	
Existing Right-of-Way (ROW)	8.2	8.2	**0.0**
Heavy Industrial (HI)	143.2	143.2	**0.0**
Light Industrial (LI)	74.4	216.2	**141.8**
Mixed Mosher Use	118.9	118.9	**0.0**
Parks and Open Space (P/OS)	169.0	65.1	**-103.9**
Regional Commercial (RC)	57.9	20.0	**-37.9**
Total	**571.6**	**571.6**	**0.0**

Source: [1]City of Elk Grove

Figure 1 – Proposed Land Use Plan



Trip Generation and VMT

We used the following steps to estimate trip generation and vehicle miles of travel (VMT) for both land use plans:

- Estimated Building Area – Estimated building area using floor-to-area ratios applied in the analysis of the DEIR for the Multi-Sport Park Complex project.
- Trip Generation – Used trip rates published in the Institute of Transportation Engineers (ITE) 10th Edition Trip Generation Manual to estimate typical weekday, AM peak hour, and PM peak hour trip generation for each land use plan.
- Vehicle Mix (Cars, Light Trucks, Heavy Vehicles) – Estimated the mix of cars, light trucks, and heavy vehicles associated with the proposed industrial land uses, based on trip generation data collected at a warehouse facility in Patterson CA.
- Service Population – Estimated employment for each land use plan using per acre employment densities used in the analysis of the DEIR for the Multi-Sport Park Complex project. Estimated population based using an average of 3.23 persons per household for single family residential land use (i.e., Mixed Mosher Use), based on Table 3.2 of Planning Framework chapter of the General Plan.
- VMT Per Service Population – Calculated VMT per service population by land use category using a modified version of SACOG's SACSIM regional travel demand forecasting model
- Automobile VMT – Estimated automobile VMT, consistent with CEQA Section 15064.3 and OPR's Technical Advisory on Evaluating Transportation Impacts in CEQA. Multiplied daily trip generation for cars and light trucks (i.e., automobiles) by the applicable VMT per service population by land use. Estimated automobile VMT for soccer fields by multiplying daily trip generation for cars and light trucks by and an average trip length of five miles.

Table 2 compares the trip generation and VMT for the proposed land use plan to the land use analyzed in the DEIR for the Multi-Sport Park Complex project. As shown, the proposed project would generate about 8,200 fewer trips per day and 700 fewer trips during the PM peak hour. The proposed project would generate about 1,100 more trips during the AM peak hour than was analyzed in the DEIR. The proposed project would result in 22,185 less VMT than the land use plan analyzed in the DEIR. Attachment A includes the detailed inputs and calculations for these travel characteristics.

Table 2: Trip Generation and VMT

Land Use	Trip Generation			VMT
	Daily	AM	PM	
DEIR	52,400	3,620	5,910	231,766
Proposed Project	44,230	4,711	5,220	209,581
Difference (Proposed Project – DEIR)	-8,180	1,090	-690	-22,185

Source: Fehr & Peers, 2020

Site Access and On-Site Circulation

Table 3 compares the recommended roadway travel lanes (two-way total) from the DEIR to the average daily traffic design target based on the proposed land use plan. Attachment B includes the circulation exhibit for the proposed project that shows the study roadway segments.

As shown in Table 3, the proposed land use plan would result in lower on-site daily roadway volumes. The forecasted daily volumes on all on-site roadways would be less than the average daily traffic design targets. Therefore, the proposed roadway system (i.e., number of travel lanes) is adequate to support the proposed project.

Table 3: On-site Roadway Design Targets – Project Buildout

Segment	Lanes	Average Daily Traffic Design Target	DEIR		Proposed Project	
			Daily Volume	Target Exceeded?	Daily Volume	Target Exceeded?
1	2	16,500	9,400	No	8,900	No
2	2	16,500	5,200	No	4,900	No
3	2	16,500	11,100	No	10,500	No
4	2	16,500	10,900	No	10,300	No
5	4	33,300	31,000	No	29,300	No
6	4	33,300	8,200	No	7,800	No
7	4	33,300	22,700	No	21,500	No
8	2	16,500	8,500	No	8,000	No
9	2	16,500	5,200	No	4,900	No
10	2	16,500	8,500	No	8,000	No
11	2	16,500	6,400	No	6,100	No
12	2	16,500	2,300	No	2,200	No
13	2	16,500	4,100	No	3,900	No
14	2	16,500	4,800	No	4,500	No
15	2	16,500	2,400	No	2,300	No
16	2	16,500	2,000	No	1,900	No
17	2	16,500	2,900	No	2,700	No
18	2	16,500	1,000	No	1,000	No
19	2	16,500	2,700	No	2,600	No

[1]Both directions excluding center turn lanes or right-turn deceleration lanes.

[2]City of Elk Grove Transportation Analysis Guidelines, Adopted February 2019 and Updated December 2019 – Roadway performance targets based on 2/4 lane facilities with median and 35 mile per hour speed.

Source: Fehr & Peers, 2020

Attachment C summarizes peak hour traffic volume forecasts with the proposed project with buildout of the project, which were developed using the trip distribution assumptions from the DEIR. As outlined in

Table 2, the proposed project would generate about 1,090 more AM peak hour trips (i.e., compared to the DEIR), which is due to the shift from parks and open space and commercial land use to industrial land use. Most of this increase (i.e., 1,081 trips) in AM peak hour trip generation are inbound movements. As a result, we recommend the following turn lane configurations at the Waterman Road/Grant Line Road intersection with buildout of the proposed project:

Waterman Road/Grant Line Road Intersection (Proposed Project)

Widen Grant Line Road to provide eight through lanes and provide the following lane configurations:

- Three left-turn lanes, one through lane, and one right-turn lane on the northbound approach
- Two left-turn lanes, one through lane, and one right-turn lane on the southbound approach
- Two left-turn lanes, four through lanes, and two right-turn lanes on the eastbound approach
- **Two left-turn lanes**, four through lanes, and one right-turn lane on the westbound approach

As identified with the **bold and underlined text**, we recommend two left-turn lanes on the westbound approach to accommodate the increase in inbound volume during the AM peak hour.

Based on the analysis presented above, no other modifications to the on-site roadway segments or intersection traffic control are recommended.

Off-Ramp Vehicle Queues

Table 4 compares off-ramp vehicle queues to available storage at the SR 99/Grant Line Road interchange under cumulative conditions with build out of the proposed project. As shown, the calculated 95th percentile vehicle queues would not exceed available storage.

Table 4: SR 99/Grant Line Road Off-Ramp Vehicle Queuing – Cumulative Conditions

Off-Ramp	Available Storage[1] (Feet)	95th Percentile Vehicle Queue[2] (Feet)	Queue Exceed Available Storage?
NB	1,500	775	No
SB	1,600	1,075	No

Source: Fehr & Peers, 2020

[1]Available storage measured from intersection stop bar to off-ramp gore point.
[2]Vehicle queues estimated using Synchro 8 software program.

FEHR PEERS

Attachment A - Travel Characteristics

DEIR

Land Use	Acres	FAR	Square Feet	1,000 Square Feet	Residential Density (Units/Acre)	Single Family Dwelling Units	Soccer Fields	Emp/Pop Yields[1]	Service Population			Trip Generation Rates[2]			Trip Generation							Daily		VMT	
													Peak Hour			AM			PM						
									Population	Employment	Total	Daily	AM	PM	Daily	In	Out	Total	In	Out	Total	Heavy Vehicles[3]	Cars & Light Trucks	VMT Per Service Population	Daily VMT[4]
Existing Right-of-Way (ROW)	8.2								-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Industrial (HI)	143.2	0.36	2,245,605	2,246				20		2,864	2,864	4.96	0.70	0.63	11,138	1,383	189	1,572	184	1,231	1,415	2,339	8,799	28.5	64,483
Light Industrial (LI)	74.4	0.36	1,166,711	1,167				20		1,488	1,488	4.96	0.70	0.63	5,787	719	98	817	96	639	735	1,215	4,572	23.5	27,625
Mixed Mosher Use	118.9				6	713		3.23	2,304		2,304	9.44	0.74	0.99	6,734	132	396	528	445	261	706	-	6,734	12.3	28,343
Parks and Open Space (P/OS)	169						16		-	-	-	71.33	0.99	16.43	1,141	10	6	16	174	89	263	-	1,141	-	5,706
Regional Commercial (RC)	57.9	0.29	731,416	731				30		1,737	1,737	37.75	0.94	3.81	27,611	426	261	688	1,338	1,449	2,787	-	27,611	60.8	105,610
Total	**571.6**		**4,143,732**	**4,144**		**713**			**2,304**	**6,089**	**8,393**				**52,412**	**2,670**	**950**	**3,620**	**2,236**	**3,670**	**5,906**	**3,554**	**48,858**	**-**	**231,766**

Proposed Project

Land Use	Acres	FAR	Square Feet	1,000 Square Feet	Residential Density (Units/Acre)	Single Family Dwelling Units	Soccer Fields	Emp/Pop Yields[1]	Service Population			Trip Generation Rates			Trip Generation									VMT	
													Peak Hour			AM			PM						
									Population	Employment	Total	Daily	AM	PM	Daily	In	Out	Total	In	Out	Total	Heavy Vehicles	Cars & Light Trucks	VMT Per Service Population	Daily VMT
Existing Right-of-Way (ROW)	8.2								-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy Industrial (HI)	143.2	0.36	2,245,605	2,246				20		2,864	2,864	4.96	0.70	0.63	11,138	1,383	189	1,572	184	1,231	1,415	2,339	8,799	28.5	64,483
Light Industrial (LI)	216.2	0.36	3,390,362	3,390				20		4,324	4,324	4.96	0.70	0.63	16,816	2,088	285	2,373	278	1,858	2,136	3,531	13,285	23.5	80,275
Mixed Mosher Use	118.9				6	713		3.23	2,304		2,304	9.44	0.74	0.99	6,734	132	396	528	445	261	706	-	6,734	12.3	28,343
Parks and Open Space (P/OS)	65.1						0		-	-	-	71.33	0.99	16.43	-	-	-	-	-	-	-	-	-	-	
Regional Commercial (RC)	20	0.29	252,648	253				30		600	600	37.75	0.94	3.81	9,537	147	90	237	462	501	963	-	9,537	60.8	36,480
Total	**571.6**		**5,888,615**	**5,889**		**713**			**2,304**	**7,788**	**10,092**				**44,226**	**3,751**	**960**	**4,711**	**1,369**	**3,851**	**5,220**	**5,870**	**38,356**	**-**	**209,581**

[1] Emplyment yields per acre. Residential land use persons/household density based on General Plan Planning Framework Table 3.2.

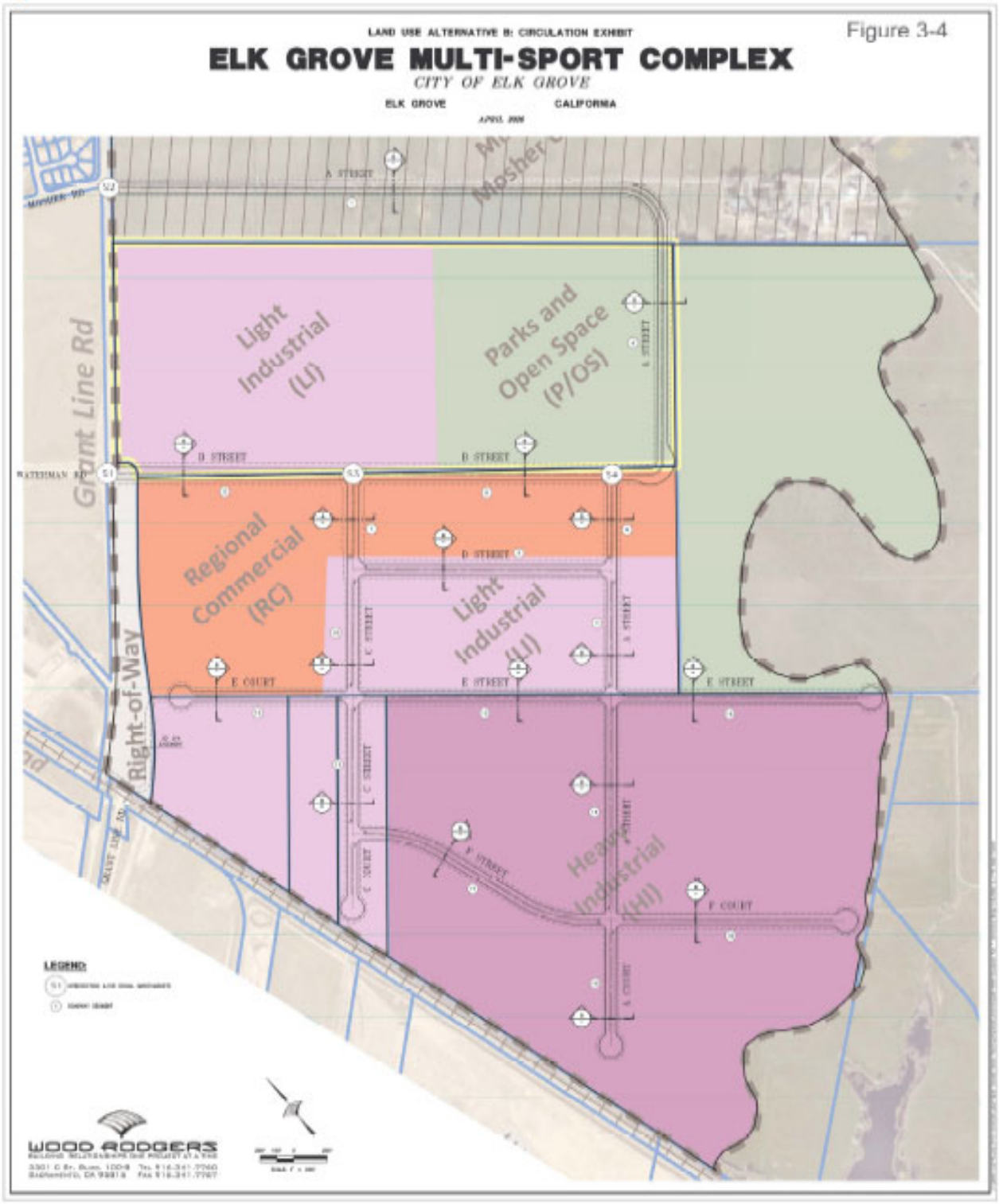
[2] Institute of Transportation Engineers (ITE) 10th Edition Trip Generation Manual. Following rates applied:
Heavy Industrial - Code 110 (General Light Industrial)
Light Industrial - Code 110 (General Light Industrial)
Mixed Mosher Use - Code 210 (Single Family Detached Housing)
Parks & Open Space (Soccer Fields) - Code 488 (Soccer Complex)
Regional Commercial - Code 820 (Shopping Center)

[3] Heavy vehicles percentage (21% of daily traffic) based on data collected at warehouse facility in Patterson, CA. Applied to industrial land uses.

[4] Trip length for sports fields estimated at 70% of average single family residential trip length, 5 miles.

Fehr & Peers, 2020

Figure 3-4


LAND USE ALTERNATIVE B: CIRCULATION EXHIBIT
ELK GROVE MULTI-SPORT COMPLEX
CITY OF ELK GROVE
ELK GROVE
CALIFORNIA
Grant Line Rd
Right-of-Way
Light Industrial (LI)
Parks and Open Space (P/OS)
Regional Commercial (RC)
Light Industrial (LI)
Heavy Industrial (HI)
A STREET
B STREET
C STREET
E COURT
E STREET
F STREET
LEGEND:
WOOD RODGERS

FEHR PEERS

Attachment C - Peak Hour Traffic Volume Forecast With Proposed Project Buildout

Waterman Road/Grant Line Road

Approach	Movement	DEIR AM	DEIR PM	AM	PM	Total Volume Change AM In	AM Out	AM Total	PM In	PM Out	PM Total	Total External Volume Change AM In	AM Out	AM Total	PM In	PM Out	PM Total	Allocation to Intersection AM	PM	External Project Volume Proposed Project AM	Proposed Project PM	Change from DEIR AM	Change from DEIR PM
NB	L	556	1,100	27%	42%															702	967	146	-133
	T	150	322	7%	12%															189	283	39	-39
	R	103	98	5%	4%															130	86	27	-12
WB	L	175	113	9%	4%	1,081	10	1,091	-867	181	-686	845	8	853	-661	138	-523	62%	60%	221	99	46	-14
SB	T	198	172	10%	7%															250	151	52	-21
EB	R	842	787	42%	30%															1,063	692	221	-95
		2,024	**2,592**	**100%**	**100%**															**2,555**	**2,278**	**531**	**-314**

Waterman Road/Mosher Road

Approach	Movement	DEIR AM	DEIR PM	AM	PM	Total Volume Change AM In	AM Out	AM Total	PM In	PM Out	PM Total	Total External Volume Change AM In	AM Out	AM Total	PM In	PM Out	PM Total	Allocation to Intersection AM	PM	External Project Volume Proposed Project AM	Proposed Project PM	Change from DEIR AM	Change from DEIR PM
NB	L	150	225	12%	13%															189	198	39	-27
	T	110	270	9%	16%															139	237	29	-33
	R	140	490	11%	28%															177	431	37	-59
WB	L	367	290	30%	17%	1,081	10	1,091	-867	181	-686	845	8	853	-661	138	-523	38%	40%	463	255	96	-35
SB	T	290	280	24%	16%															366	246	76	-34
EB	R	170	170	14%	10%															215	149	45	-21
		1,227	**1,725**	**100%**	**100%**															**1,549**	**1,516**	**322**	**-209**