APPENDIX K
TRANSPORTATION OPERATIONS REVIEW

Transportation Operations Review of 7-Eleven Store and Gas Station at Power Inn Road & Elder Creek Road

Prepared for:
City of Sacramento, Department of Public Works

FEHR PEERS

August 30, 2022

RS22-4208

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Executive Summary

Purpose

This study analyzes transportation operations associated with implementation of the proposed 7-Eleven convenience market and gas station, which would be located in the southeast quadrant of the Power Inn Road/Elder Creek Road intersection in the City of Sacramento. This study describes existing conditions, analyzes the project's expected travel characteristics, reviews how the project would affect travel conditions near the site vicinity, and recommends improvements to better accommodate all modes of travel.

Project Description

According to the project site plan (*7-Eleven Site #1054793 at 6441 Power Inn Road*, Kimley Horn, May 2022), the proposed project would consist of the following land uses:

- 4,755 square-foot convenience market
- 10 vehicle fueling positions (passenger vehicles/SUVs/small trucks)
- 3 heavy vehicle fueling positions
- CAT truck weigh scale

Vehicular access would be provided by one driveway on Elder Creek Road and one driveway on Power Inn Road. One of the primary purposes of this study is to evaluate what turning movements should be permitted at each project driveway.

Existing Conditions

Power Inn Road and Elder Creek Road are each four-lane arterials along the project frontage. They are designated as Surface Transportation Assistance Act (STAA) truck routes and are also part of the City's High Injury Network (through its *Vision Zero Plan*), which are corridors with the highest levels of fatal and serious crashes for pedestrians, bicyclists, and motorists.

The Power Inn Road/Elder Creek Road intersection is controlled by a traffic signal and operates at Level of Service (LOS) D during the AM and PM peak hours. Trucks represent 12% of AM peak hour traffic and 7% of PM peak hour traffic passing through the intersection.

Project Travel Characteristics

The proposed project would generate approximately 300 AM peak hour and 250 PM peak hour gross trips. The majority of these trips would be pass-by, meaning they do not add new trips to the surrounding roadways but would enter/exit the project driveways. After considering pass-by trips, the proposed project would generate

approximately 73 AM peak hour and 62 PM peak hour new vehicle trips. Trucks would represent 8-10% of all trips entering/exiting the site.

The project site plan indicates that trucks would enter the fueling pumps area and CAT scale from Driveway 1 on Elder Creek Road. After using these facilities, trucks would exit the site from Driveway 2 onto Power Inn Road.

All movements would be permitted at Driveway 1 on Elder Creek Road. Due to queuing concerns at Driveway 2 on Power Inn Road, movements were assumed to be restricted to right-turns only for analysis purposes.

Existing Plus Project Conditions

The project would worsen PM peak hour operations at the Power Inn Road/Elder Creek Road intersection from LOS D to E, though the average delay per vehicle would increase by only 2 seconds. Based on City of Sacramento General Plan Policy M 1.2.2, LOS E or better conditions is considered the operating objective for this intersection.

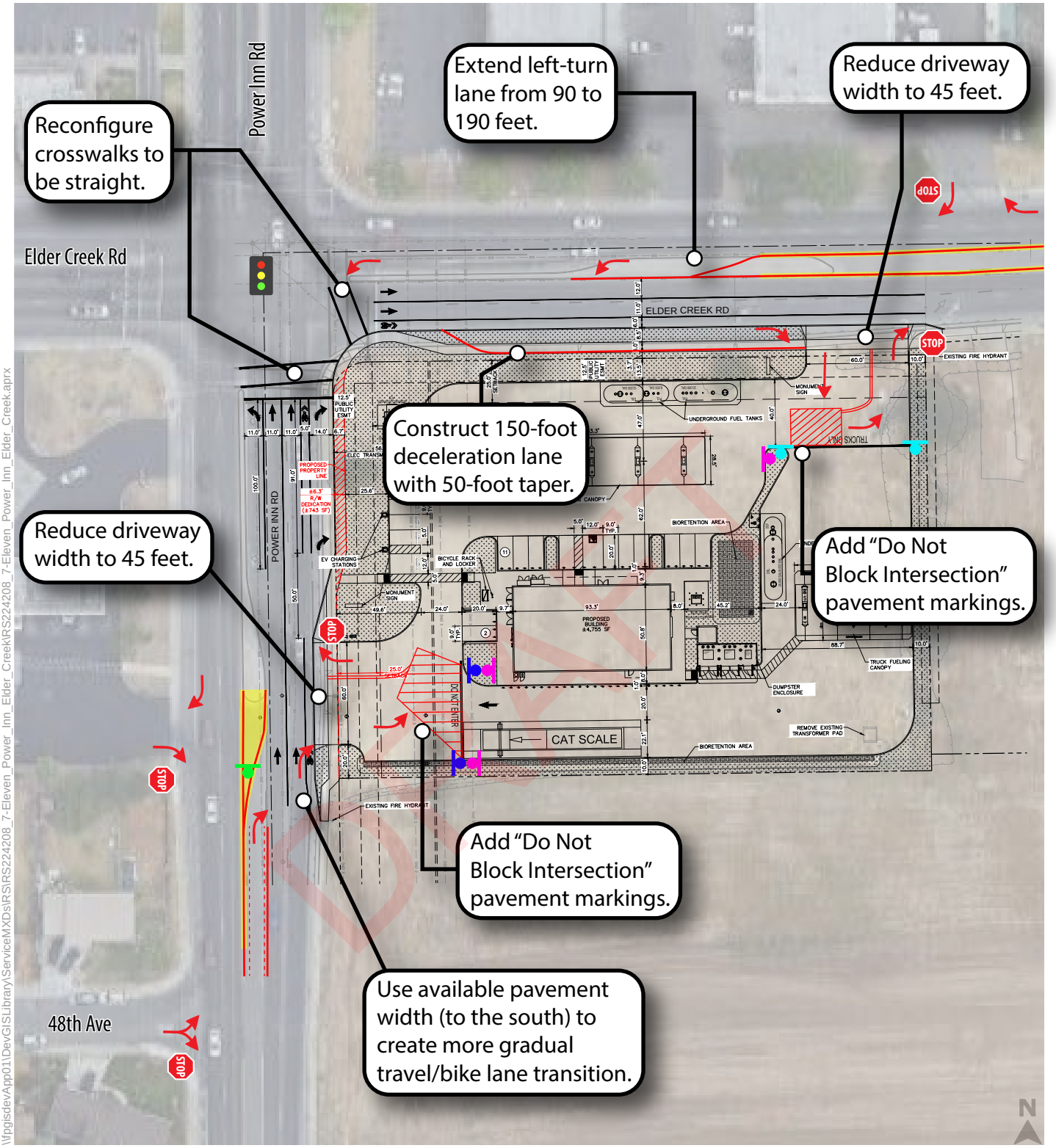
The project site plan indicates that the proposed site improvements would include construction of a dedicated right-turn lane on northbound Power Inn Road at Elder Creek Road. Additionally, Class II bike lanes (on-street with pavement marking and signage) and sidewalks would be constructed along the project frontages.

Project Access and On-Site Circulation

City of Sacramento *Street Design Standards* (2009) were compared to the project site plan for consistency. The project was found to be consistent in 7 topical areas and inconsistent in 4 other areas. Two of these inconsistencies stemmed from the project's physical size itself. The remaining two pertained to project site plan elements, for which recommendations were made below to achieve consistency.

Figure ES-1 illustrates the recommendations of the study. Recommended improvements include lengthening the westbound left-turn lane on Elder Creek Road at Power Inn Road by 100 feet, which would restore PM peak hour operations to LOS D under Existing Plus Project conditions. Other improvements include:

- Constructing an eastbound right-turn deceleration lane into Driveway 1 on Elder Creek Road;
- Extending the raised median on Elder Creek Road to restrict Driveway 1 to right-turns only;
- Constructing a raised median on Power Inn Road to restrict Driveway 2 to right-turns only;
- Reducing both project driveway widths from 60 to 45 feet;
- Providing a more gradual transition of the outside travel lane and bike lane south of Driveway 2;
- Improving signal timing efficiency;
- Eliminating the proposed "bend" in the south and east leg crosswalks (as shown on the site plan); and
- Adding various on-site pavement markings and signage to guide driver behavior.



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- Traffic Signal
- Stop Sign
- Permitted Movement
- Striping
- "Do Not Enter" Sign
- "Trucks Only" Sign
- "Do Not Block Intersection" Sign
- "No U-Turn" Sign
- Raised Median

Figure ES-1

1. Introduction

1.1 Purpose

This study analyzes transportation operations associated with implementation of a proposed 7-Eleven convenience market and gas station, which would be located in the southeast quadrant of the Power Inn Road/Elder Creek Road intersection in the City of Sacramento. This study describes existing conditions, analyzes the project's expected travel characteristics, reviews how the project would affect travel conditions near the site vicinity, and recommends improvements to better accommodate all modes of travel.

1.2 Project Description

According to the project site plan (*7-Eleven Site #1054793 at 6441 Power Inn Road*, Kimley Horn, May 2022), the proposed project would consist of the following land uses:

- 4,755 square-foot convenience market
- 10 vehicle fueling positions (passenger vehicles/SUVs/small trucks)
- 3 heavy vehicle fueling positions
- CAT scale[1]

Vehicular access would be provided by the following two driveways:

- Driveway 1 – would be situated on Elder Creek Road about 290 feet[2] east of Power Inn Road. It would be situated near an existing driveway serving auto repair and similar businesses.
- Driveway 2 – would be situated on Power Inn Road approximately 185 feet south of Elder Creek Road. It would be situated nearly across from the southerly driveway serving the Arco AM/PM convenience market and gas station.

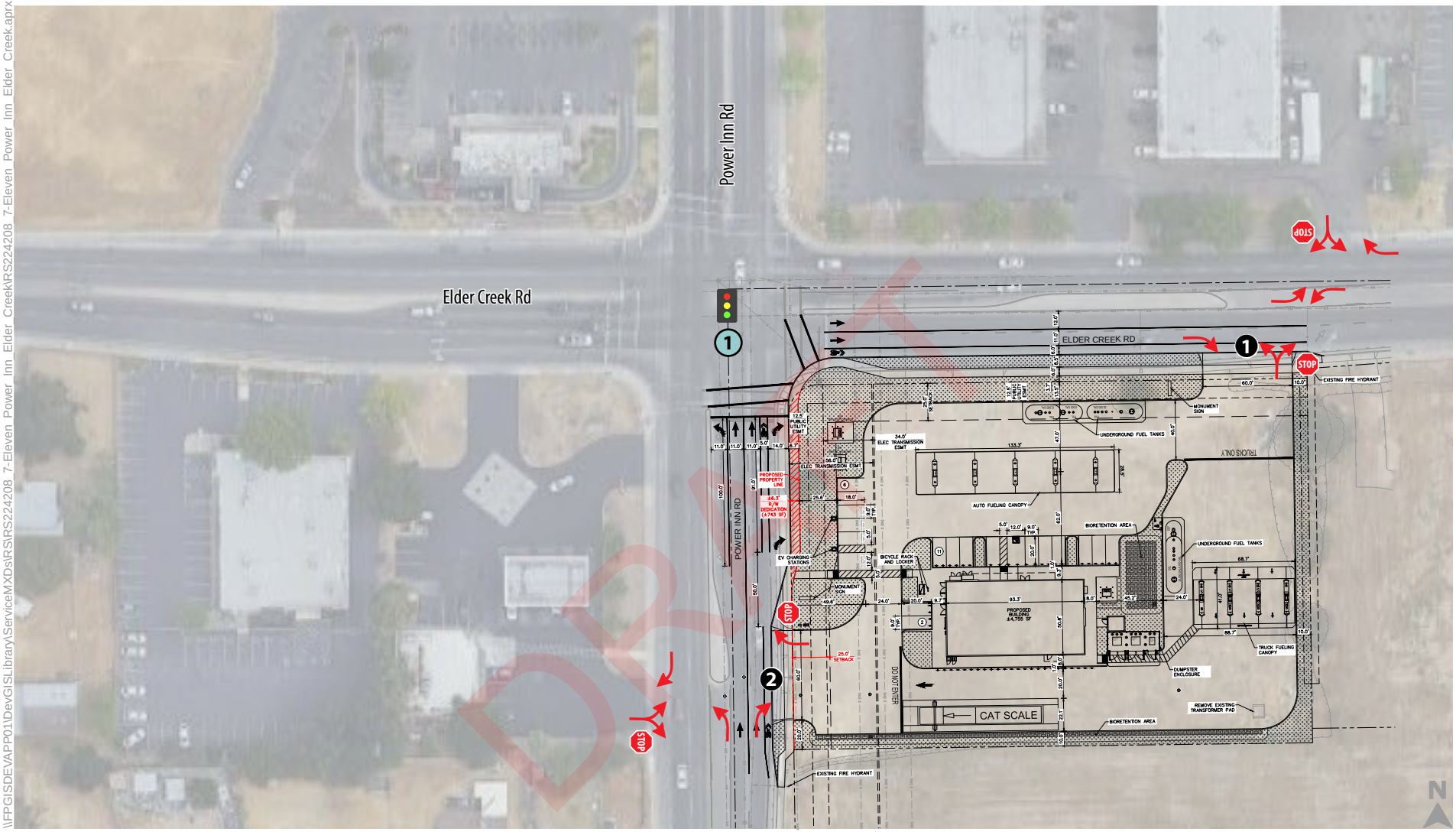
Driveways 1 and 2 would be situated at the easterly and southerly, respectively, edges of the project site. Both driveways would be 60 feet wide and designed for two-way travel that would accommodate large trucks.

One of the primary purposes of this study is to evaluate what turning movements should be permitted at each project driveway. This evaluation is performed in Chapter 3.

Refer to **Figure 1** for the project site plan.

[1] CAT Scale provides on-site truck weigh scales. This service is used by trucking operators to ensure trucks do not exceed permitted weight limits.

[2] Referenced from the driveway centerline to the near curb return of the adjacent intersection.



1 Project Driveway

1 Study Intersection

Permitted Movement

Traffic Signal

STOP Stop Sign

Figure 1

Project Site Plan

1.3 Study Intersections and Time Periods

Through coordination with City of Sacramento staff, it was determined that the following study intersection should be studied for weekday AM and PM peak hour conditions:

1. Power Inn Road/Elder Creek Road

Operations are also evaluated at the project's two driveways.

1.4 Analysis Scenarios

The following scenarios are analyzed in this study:

- **Existing Conditions** – represents the baseline condition upon which project effects are evaluated.
- **Existing Plus Project Conditions** – represents changes in travel conditions associated with implementation of the proposed project from existing conditions.

1.5 Analysis Methodology

This study uses the SimTraffic microsimulation model to analyze traffic operating conditions (i.e., delay, level of service, and queuing) at the study intersections. SimTraffic considers the effects of lane utilization, heavy vehicle composition, turn pocket storage lengths, upstream/downstream queue spillbacks, and coordinated signal timings on intersection queuing and delays. Reported results are based on an average of 10 runs. The following procedures and assumptions were applied in the development of the SimTraffic model:

- Roadway geometric data were gathered using aerial photographs and field observations.
- Peak hour traffic volumes were entered into the model according to the peak hour of the study area.
- The peak hour factor (PHF) was set at 1.0 in accordance with City of Sacramento Traffic Impact Study Guidelines.
- Counted pedestrian and bicycle volumes were entered into the model according to peak hour measurements.
- Signal phasing and timings were based on existing signal timing plans provided by the City of Sacramento and field observations.
- Speeds for the model network were based on posted speed limits.

2. Existing Conditions

This chapter describes the existing physical and operational characteristics of the transportation system within the study area including the roadway, bicycle, pedestrian, and transit components of the system.

2.1 Roadway System

The project site is situated in the southeast quadrant of the Power Inn Road/Elder Creek Road. Intersection. These streets are described in detail below (see **Figure 2** for study area roadway network and **Images 1 and 2** on the following pages):

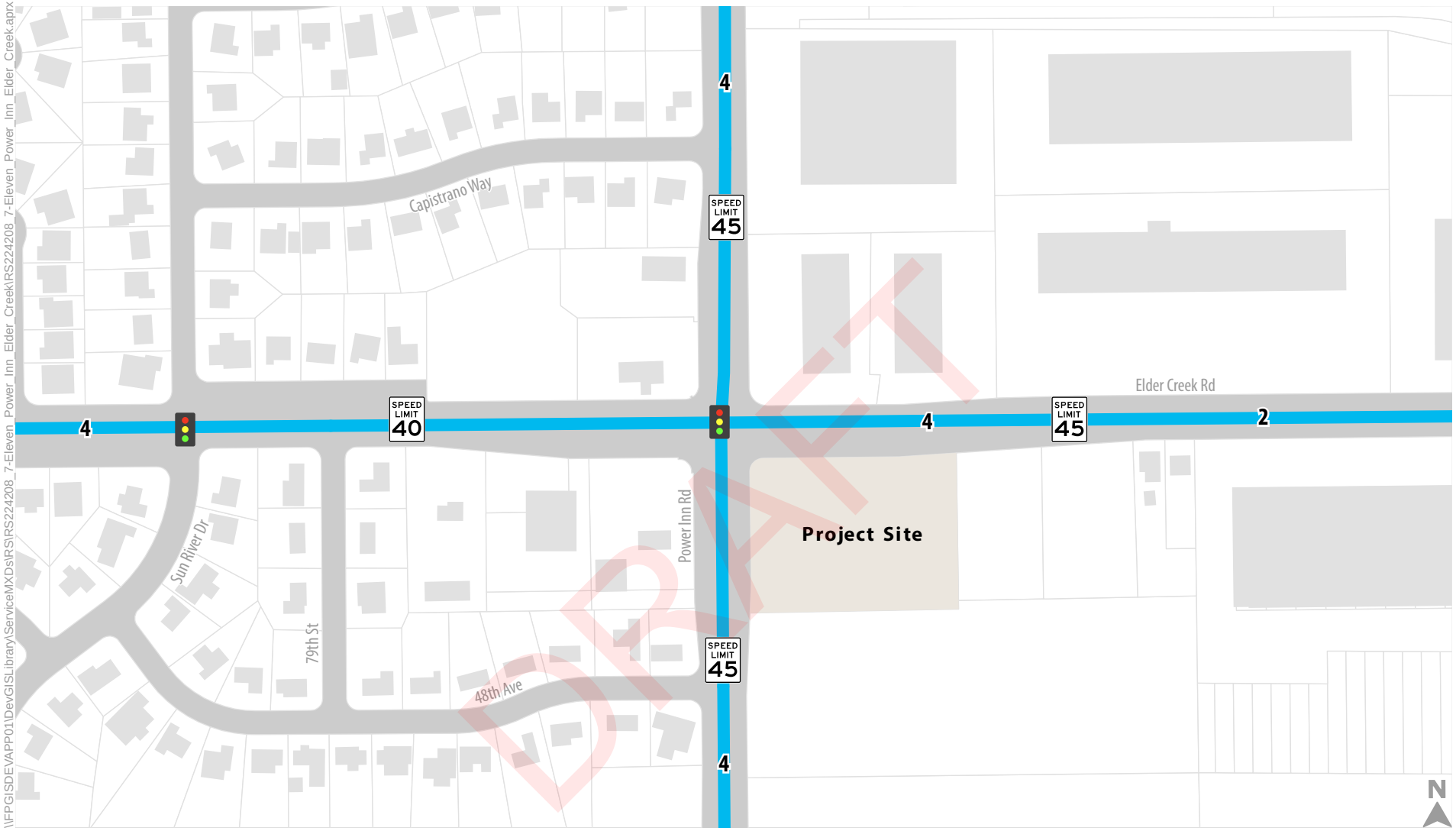
- **Power Inn Road** is a north-south arterial that begins at Folsom Boulevard just south of US Highway 50 and extends southerly through the City of Sacramento and into unincorporated Sacramento County. Within the project vicinity, it has two lanes in each direction separated by either a two-way left-turn lane (TWLTL) or a raised median. It has a posted speed limit of 45 miles per hour (mph) near the project site.
- **Elder Creek Road** is an east-west arterial that begins at Stockton Boulevard within the City of Sacramento, and extends easterly into unincorporated Sacramento County. West of Stockton Boulevard, the roadway becomes 47th Avenue, which has an interchange at State Route (SR) 99. Elder Creek Road features two lanes in each direction west of Power Inn Road and then narrows to a two-lane road approximately 425 feet east of Power Inn Road. Elder Creek Road has a posted speed limit of 40 mph west of Power Inn Road and 45 mph east of Power Inn Road. The roadway features either a TWLTL or a raised median.

The City of Sacramento has established City truck routes as well as Surface Transportation Assistance Act (STAA) truck routes throughout the City.[3] STAA routes allow large trucks (longer than California legal trucks) to operate on the interstate freeway system. According to the City's website, both Power Inn Road and Elder Creek Road are designated as STAA routes. Signage is also present on each road with these designations. The volume of heavy vehicles using each roadway is discussed later this in chapter.

The City of Sacramento is a Vision Zero City.[4] By adopting its *Vision Zero Action Plan* (Vision-Zero-Action-Plan-Adopted-August-2018.pdf (cityofsacramento.org) in 2018, the City is rejecting the notion that traffic crashes are simply accidents but are instead preventable incidents that can and must be systematically addressed. According to the City's *Vision Zero Action*, Elder Creek Road and Power Inn Road are both part of the City's High Injury Network, which are corridors with the highest levels of fatal and serious crashes for pedestrians, bicyclists, and motorists. According to the report, 79% of crashes in the City occur on the City's High Injury Network despite those roadways comprising only 14% of all roadway miles in the City, meaning collision rates are disproportionately high.

[3] CityTruckRoutes.pdf (cityofsacramento.org)

[4] Vision-Zero-Action-Plan-Adopted-August-2018.pdf (cityofsacramento.org)



STAA (Truck) Route

Traffic Signal

SPEED LIMIT 45 Posted Speed Limit

4 - Number of Travel Lanes (excluding turn lanes)

Figure 2

Existing Roadway Network

Image 1: View of queuing on northbound Power Inn Road approaching Elder Creek Road during AM peak hour

Image 2: View on Elder Creek Road looking westbound toward Power Inn Road

2.2 Bicycle and Pedestrian System

Figure 3 displays the existing bicycle and pedestrian facilities in the vicinity of the project site. This data is derived from aerial imagery and field observations. As shown, Class II bike lanes (on-street with appropriate pavement markings and signage) and sidewalks are present on portions of Elder Creek Road and Power Inn Road in the project vicinity. All four legs of the signalized Power Inn Road/Elder Creek Road intersection feature marked crosswalks with pedestrian activated push buttons.

2.3 Transit System

Figure 3 also displays the transit facilities and routes located in the vicinity of the project site. As shown, Sacramento Regional Transit (SacRT) operates Route 61 along Elder Creek Road and Power Inn Road. This route runs in a generally east-west direction on both sides of State Route 99. It begins at the Florin Town Center Transit Center, stops at the Fruitridge Light Rail Station, and terminates at the Pocket transit center. On weekdays, the route operates on 30 minute headways. As shown on Figure 3, bus stops serving this route are situated in the northbound direction of Power Inn Road immediately north of Elder Creek Road and in the westbound direction of Elder Creek Road immediately west of Power Inn Road. Neither stop features a bus turnout or shelter.

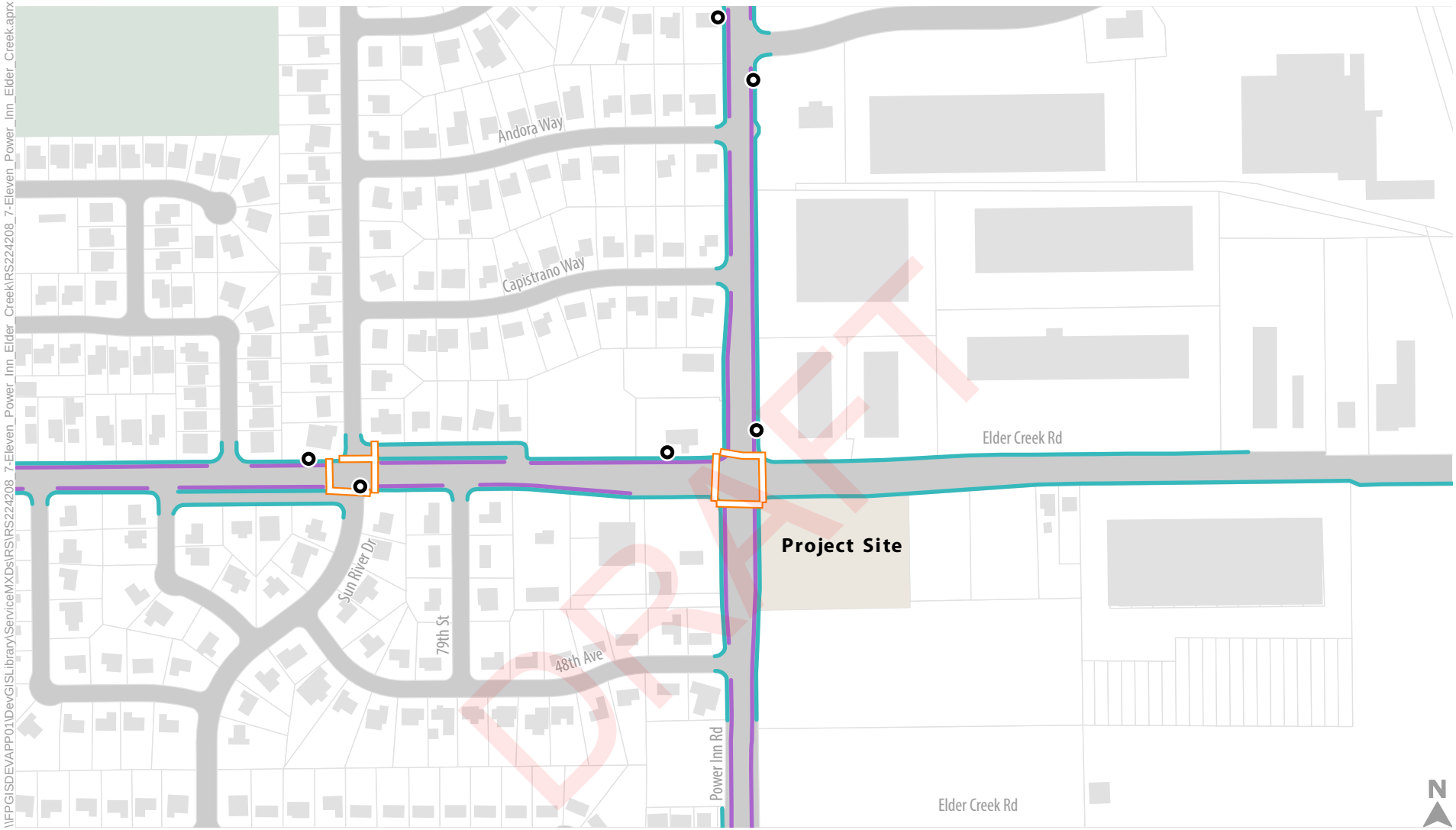
2.4 Traffic Volumes

Fehr & Peers collected AM and PM peak period traffic counts at the study intersection and adjacent driveways on Thursday, July 7, 2022. The AM peak hour occurred from 7:15 to 8:15 AM, while the PM peak hour occurred from 4 to 5 PM. The counts included passenger vehicles/SUVs, heavy vehicles, bicyclists, and pedestrians. Although the counts were conducted while schools were not in session, there are few schools in the area. Furthermore, a comparison of this count against a weekday count conducted in June 2022 revealed this count was greater for nearly all turning movements. Accordingly, observations from Thursday, July 7, 2022 were used in the analysis.

Figure 4 displays the existing weekday AM and PM peak hour traffic volumes, lane configurations, and traffic controls at the study intersection and two existing nearby driveways. Traffic volumes at the intersection are highly directional. During the AM peak hour, traffic flows are heavier on northbound Power Inn Road and eastbound Elder Creek Road. The opposite pattern occurs during the PM peak hour.

Table 1 displays the percentage of trucks by turning movement at the study intersection during each peak hour. As shown, trucks represent 12% of all AM peak hour trips and 7% of all PM peak hour trips passing through the intersection. The following conclusions are derived from Table 1:

- Northbound approach: 97 trucks among the 836 total AM peak hour vehicles (12% trucks).
- Northbound right-turn: 19% trucks during the AM peak hour and 28% trucks during the PM peak hour. This corresponds to 26 trucks turning right during each hour.
- Westbound left-turn: 34 trucks among the 100 AM peak hour vehicles turning left (34% trucks).



Bus Stop (Route 61)

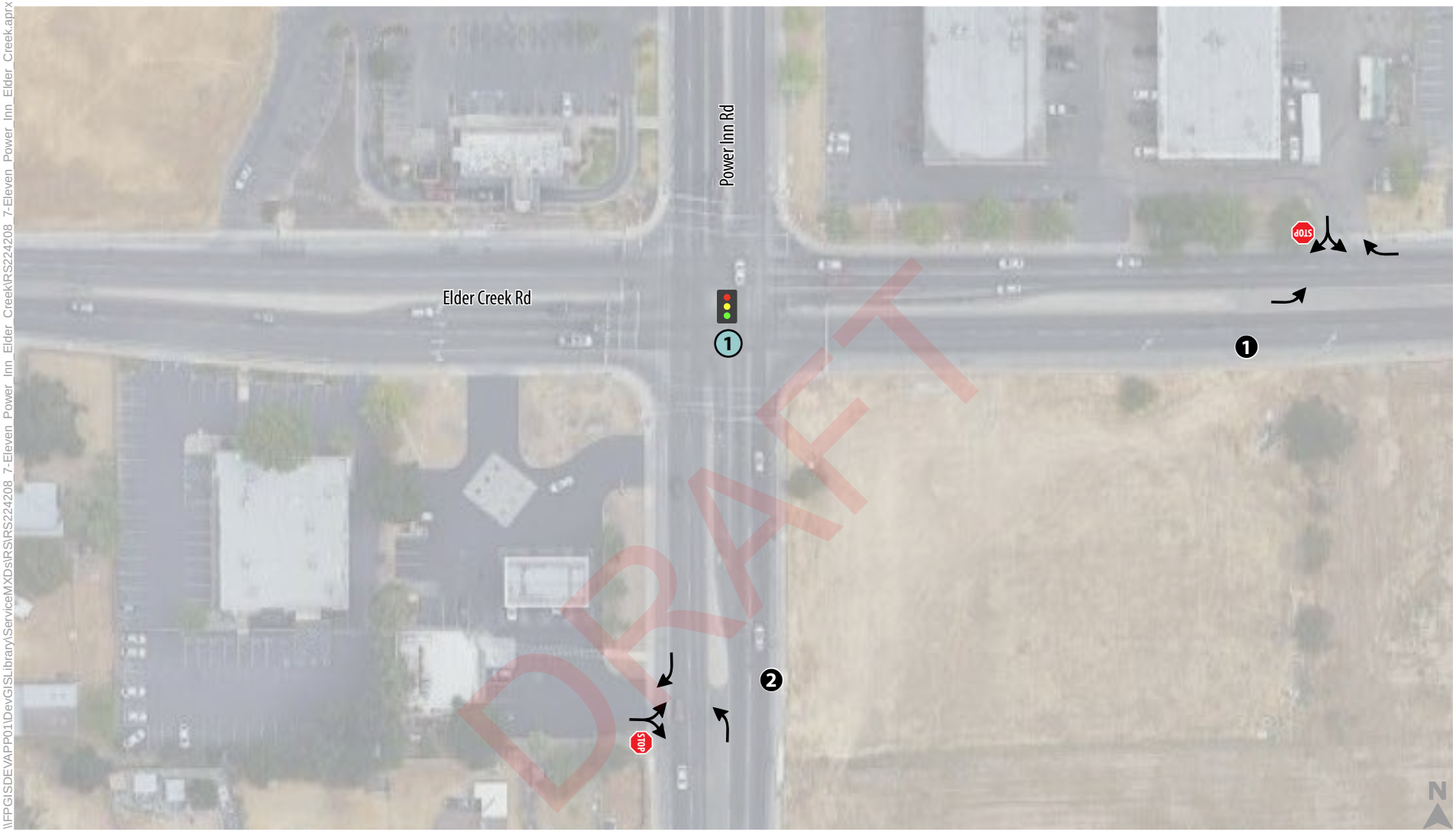
Class II Bike Lane

Marked Crosswalk

Sidewalk

Figure 3

Existing Bicycle, Pedestrian, & Transit Facilities



1 Study Intersection

1 Project Driveway

AM (PM) Peak Hour Traffic Volume

Stop Sign

Traffic Signal

Turn Lane

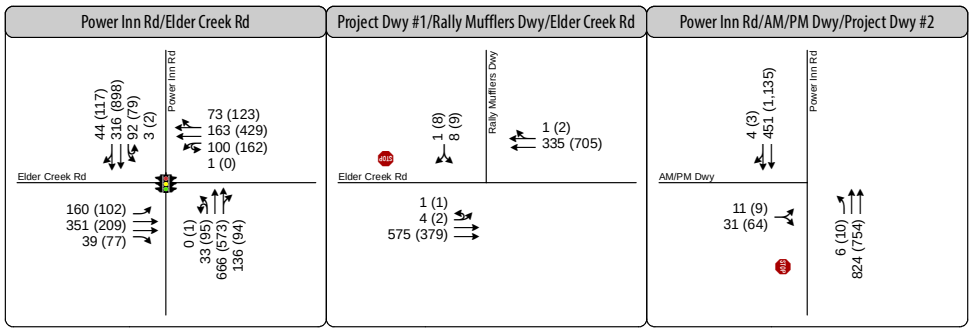


Figure 4

Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions

Table 1: Percent Trucks at Power Inn Road/Elder Creek Road Intersection - Existing Conditions

Direction	Movement	Percent Trucks [1]	
		AM Peak Hour	PM Peak Hour
Northbound	Left-Turn	15%	11%
	Through	10%	7%
	Right-Turn	19%	28%
Southbound	Left-Turn	5%	22%
	Through	18%	4%
	Right-Turn	11%	8%
Eastbound	Left-Turn	5%	2%
	Through	7%	12%
	Right-Turn	23%	9%
Westbound	Left-Turn	34%	10%
	Through	15%	3%
	Right-Turn	5%	6%
Total		12%	7%

Notes:
1. Trucks defined using FHWA definition as Class 5 (two axles with dual tires on the rear axle) or larger. Values rounded to the nearest whole percent.
Source: Traffic counts performed on Thursday, July 7, 2022.

2.5 Intersection Operations

The Power Inn Road/Elder Creek Road intersection operates with protected left-turn phasing on all approaches. Field observations revealed significant queuing. Delays are considerable due to a number of factors present at the intersection including:

- Long cycle lengths (120 to 160 seconds) are typical during both peak hours.
- There is a significant proportion of trucks (see Table 1), which require greater time to accelerate and decelerate than passenger vehicles.
- Lack of right-turn pockets (aside from the eastbound approach) results in the general inability to turn right-on-red due to the presence of a through vehicle.
- Moderate numbers of pedestrians result in crosswalk activations, which temporarily block right-turn movements and extend the overall intersection cycle length.

The data collection effort on Thursday, July 7, 2022 included observations of maximum vehicle queues for selected movements. These results are shown in **Table 2.** As shown, particularly lengthy queues form on the northbound Power Inn Road approach during the AM peak hour and on the westbound Elder Creek Road approach during the PM peak hour. **Images 3 and 4** show northbound and southbound vehicle queues during the AM and PM peak hours, respectively.

Table 2: Maximum Vehicle Queues at Power Inn Road/Elder Creek Road Intersection - Existing Conditions

Direction	Movement	Available Storage [1]	AM Peak Hour			PM Peak Hour		
			Queued Passenger Vehicles	Queued Trucks [2]	Maximum Queue [3]	Queued Passenger Vehicles	Queued Trucks [2]	Maximum Queue [3]
Northbound	Left-Turn	100 ft.	3	0	75 ft.	5	2	275 ft.
	Through/Right-Turn	300 ft.	11	6	725 ft.	12	2	450 ft.
Southbound	Left-Turn	150 ft.	9	0	225 ft.	6	1	225 ft.
Westbound	Through/Right-Turn	1,900 ft.	5	2	275 ft.	21	1	600 ft.

Notes:
1. Defined as length of turn pocket or distance to upstream public street intersection.
2. Trucks defined using FHWA definition as Class 5 (two axles with dual tires on the rear axle) or larger. Values rounded to the nearest whole percent.
3. Maximum queue calculated assuming 25 feet of storage per passenger vehicle and 75 feet of storage per truck. All reported values are on a "per lane" basis.

Source: Traffic counts performed on Thursday, July 7, 2022.

Although not reported in Table 2, queues also spilled out of the westbound left-turn lane during the PM peak hour. As noted previously, this movement has a high percentage of trucks.

Image 3: View of northbound queued traffic during the AM peak hour from the Arco AM/PM southerly driveway

Image 4: Image of southbound Power Inn Road vehicle queue extending back to Signal Court during the PM peak hour

Settings within SimTraffic (e.g., truck distance, driver behavior, etc.) were calibrated to match (to the extent possible) the maximum queues shown in Table 2.[5] The following critical movements were compared:

Movement	Observed	SimTraffic
Northbound Through (AM Peak Hour):	725 feet	575 feet
Southbound Left (AM Peak Hour):	225 feet	175 feet
Northbound Through (PM Peak Hour):	450 feet	400 feet
Westbound Through (PM Peak Hour):	600 feet	575 feet
Southbound Through (PM Peak Hour):	1,000 ft. [6]	925 feet

[5] Perfect calibration is not possible due to random natural of actual arriving traffic (and the assumption of a 1.0 PHF in SimTraffic, versus the slightly more peaked condition in the field).

[6] Although this movement was not formally counted, Fehr & Peers staff recorded that it has extended beyond Signal Court by the middle of the peak hour, which is situated 925 feet north of the study intersection.

In several instances, SimTraffic underestimated the observed maximum queue length. To address this issue, Fehr & Peers relied on the use of a "difference method"[7] queue length forecasting procedure. This procedure adds the increase in queues caused by the project (as predicted by SimTraffic) to the observed maximum queue for each movement.

Table 3 displays the existing LOS and delay during the AM and PM peak hours at the study intersection. Technical calculations are provided in **Appendix A**. As shown, the intersection operates at LOS D during both peak hours, though it is noted that operations during the PM peak hour are within one second of degrading to LOS E.

Table 3: Peak Hour Intersection Level of Service - Existing Conditions

Intersection	Control	AM Peak Hour		PM Peak Hour	
		Average Delay [1]	LOS	Average Delay [1]	LOS
1. Power Inn Road/Elder Creek Road	Signal	38	D	54	D

Notes:
1. Intersection analyzed using SimTraffic microsimulation model. Average delay is reported for all approaches. All results are rounded to the nearest second.
Source: Fehr & Peers, 2022.

[7] The "difference method" is regularly used with travel demand forecasting models to estimate plus project or future year traffic volumes. This method eliminates inherent inconsistencies between model outputs and observed conditions. Applied to microsimulation (i.e., SimTraffic) models, the difference method accounts for queues that are difficult to replicate. In cases where the software under- or over-estimates maximum queue lengths, the difference method provides an estimate of the net increase in queue length between existing and plus project conditions.

3. Existing Plus Project Conditions

This chapter analyzes how the proposed project would affect transportation conditions in the study area.

3.1 Project Travel Characteristics

This section describes the project's expected travel characteristics including new and pass-by vehicle trips, and the directionality of those trips.

3.1.1 Trip Generation

Data from the *Trip Generation Manual (TGM), 11th Edition* (Institute of Transportation Engineers, 2021) was used to estimate the trip generation of the convenience market and 10 passenger vehicle/SUV/small truck fueling positions. Because the *TGM* does not include a land use category for truck fueling positions or weigh scales, it was determined that a trip generation study should be performed at a similar facility along an existing truck route. The 99 Travel Center – Chevron Truck Center (located on SR 99 south of Yuba City near Oswald Road) was selected.[8] The portion of that center was counted on Tuesday, July 12, 2022. It included 5 truck fueling pumps and a CAT scale. During the AM and PM peak hours, those uses (which were isolated from the rest of the site) generated 16 and 17 trips, respectively.

Using the July 2022 traffic counts at the Power Inn Road/Elder Creek Road intersection and historic data from the City of Sacramento website, approximately 32,000 vehicles per day are estimated to pass through this intersection on a weekday. During the AM and PM peak periods, trucks represented a combined 9.4% of all trips passing through the intersection. This implies approximately 3,000 trucks per day pass through this intersection.

According to data on Caltrans' website, approximately 2,000 trucks per day travel on SR 99 along the 99 Travel Center – Chevron Truck Center frontage. To account for increased levels of trucks already present along the project frontage (from which trips to the truck fueling pumps and CAT scales could be drawn from), the observed AM and PM peak hour truck trip generation from the SR 99 site was increased by 50% for purposes of estimating trips generated by the truck fueling pumps and CAT scale at the project site.

Table 4 displays the project's daily, AM peak hour, and PM peak hour trip generation. Data regarding the percentage of project trips that would be "pass-by" was obtained from the *TGM*. As shown, 75% of trips associated with the convenience market and general purpose fueling pumps are expected to be pass-by based on this resource.

[8] This site was selected because it was more similar in scale to the proposed project than other potential sites in the Sacramento region. Other sites featuring scales and truck fueling were either situated on interstate freeways or were part of much larger truck centers.

Table 4: Trip Generation – Proposed Project

Land Use	ITE Code	Quantity	Daily		AM Peak Hour of Adjacent Street				PM Peak Hour of Adjacent Street			
			Trip Rate [1]	Trips	Trip Rate[1]	Vehicle Trips			Trip Rate[1]	Vehicle Trips		
						In	Out	Total		In	Out	Total
4,755 square-foot Convenience Market with 10 general fueling positions	945	10 VFP	257.1	2,571	27.0	135	135	270	22.8	114	114	228
3 truck fueling positions and CAT Scale	-	3 Truck VFP + CAT Scale	-	250 [2]	-	15	10	25	-	14	10	24
Gross Project Trips			-	2,821	-	150	145	295	-	128	124	252
Pass-by Trips (LUC 945) [3]				-1,928	-	-101	-101	-202	-	-85	-85	-170
Pass-By Trips (CAT Scale and truck fueling) [3]			-	-200	-	-10	-10	-20	-	-10	-10	-20
New Vehicle Trips			-	693	-	39	34	73	-	33	29	62

Notes:
1 Trip rates for convenience market based on published data in the *Trip Generation Manual* (Institute of Transportation Engineers, 2021). Trips generated by truck fueling positions and CAT scale based on data collected on July 12, 2022 at the 99 Travel Center – Chevron Truck Center with project trips factored up to account for increase in trucks along project frontage versus on State Route 99 adjacent to that site.
2 Number of daily trips estimated by using AM and PM k-factors from the convenience market data, applied to the 3 truck fueling positions and CAT scale peak hour data.
3. Pass-by trips for convenience market/fueling pumps: 75% (per *Trip Generation Manual*). Pass-by for truck fueling pumps and CAT scale: gas station land uses: 80% based on observations at 99 Travel Center – Chevron Truck Center.
VFP = Vehicle fueling position.
Source: Fehr & Peers, 2022.

The directionality of individual trucks entering/exiting the 99 Travel Center – Chevron Truck Center on SR 99 was also observed. Nearly 80% of outbound trucks continued in the same direction they were traveling upon arriving. This suggests a large proportion of truck fueling and weigh scale trips would also be pass-by.

Table 4 shows that the project driveways on Power Inn Road and Elder Creek Road would accommodate 295 total AM peak hour trips and 252 total PM peak hour trips. The majority of these trips would be pass-by, meaning they do not add new trips to the surrounding roadways but utilize the project driveways.

Trucks would represent 8-10% of all trips entering/exiting the site during the AM and PM peak hours.

3.1.2 Vehicle Trip Distribution and Assignment

StreetLight Data, Inc. is a third-party vendor that obtains (anonymous) traveler information from mobile apps on cell phones. A dataset was purchased from this company (representing pre-COVID conditions in 2019) of mobile device data for visitation (by both customers and employees) to the Arco AM/PM gas station and convenience market situated in the southwest quadrant of the Power Inn Road/Elder Creek Road intersection. The data was aggregated to the Census Block Group (CBGs) geography level and used to determine the spatial distribution of trip origins and destinations. Because some of the CBGs near the ARCO AM/PM are large, it was necessary to review locations of residences and employment within those zones along with street connectivity to assess whether they would use Power Inn Road or Elder Creek Road to access the site. **Table 5** shows the resulting directionality of trips.

Table 5: Project Trip Distribution (New Trips)

Trip Distribution	Percent of Trips [1]
To/from the north on Power Inn Road	24%
To/from the south on Power Inn Road	26%
To/from the east on Elder Creek Road	17%
To/from the west on Elder Creek Road	33%
Total	100%

Notes:
1. Based on StreetLight Data, Inc. spatial distribution of trips to/from the Arco AM/PM convenience market and gas station situated in the southwest quadrant of the Power Inn Road/Elder Creek Road intersection. Proposed project assumed to have similar distribution (for new trips).
Source: Fehr & Peers, 2022.

New trips generated by the project are expected to have a similar distribution to what is shown in Table 5. This is reasonable because of the similarity of use and geographic locations of the two projects.

Pass-by trips generated by the project would be assigned to the two project driveways in proportion to the adjacent street traffic flows (and considering that pass-by maneuvers are generally easier to perform when the land use is situated on the right side of the road versus the left).

The project site plan indicates that the truck fueling pumps and CAT scale would be accessed from Driveway 1 on Elder Creek Road. Once using these facilities, trucks would exit the site from Driveway 2 onto Power Inn Road.

3.2 Traffic Forecasts

Project trips were assigned to the study intersection in accordance with the project's trip generation estimate from Table 4 and trip distribution percentages described above. Project trips were then added to the existing volumes to yield the existing plus project AM and PM peak hour intersection turning movement volume forecasts shown on **Figure 5**.

Note that the project site plan indicates that the proposed site improvements would include construction of a dedicated northbound right-turn lane on Power Inn Road at Elder Creek Road. This lane is shown on Figure 5.

It was apparent from preliminary SimTraffic analysis of existing plus project conditions that operational problems would occur if Driveway 2 on Power Inn Road permitted all turning movements. The operational problems would stem from two conditions. First, the driveway is situated just south of the northbound left-turn pocket approaching Elder Creek Road, meaning that a dedicated southbound left-turn lane into Driveway 2 could not be provided (meaning left-turning vehicles waiting to enter the site would queue in the through lane). Second, heavy flows of northbound traffic during the AM peak hour would cause extended periods in which southbound left-turns into the site would be blocked and vehicles could not exit the driveway.[9] **Image 4** illustrates the type of queuing and operational problems that would occur under this condition. Accordingly, for analysis purposes, movements at Driveway 2 were assumed to be restricted to right-turns only (note that all turn movements were assumed to continue to be allowed at the opposing Arco AM/PM driveway).

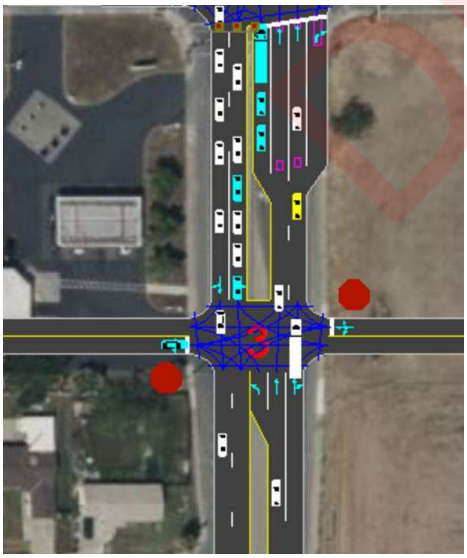
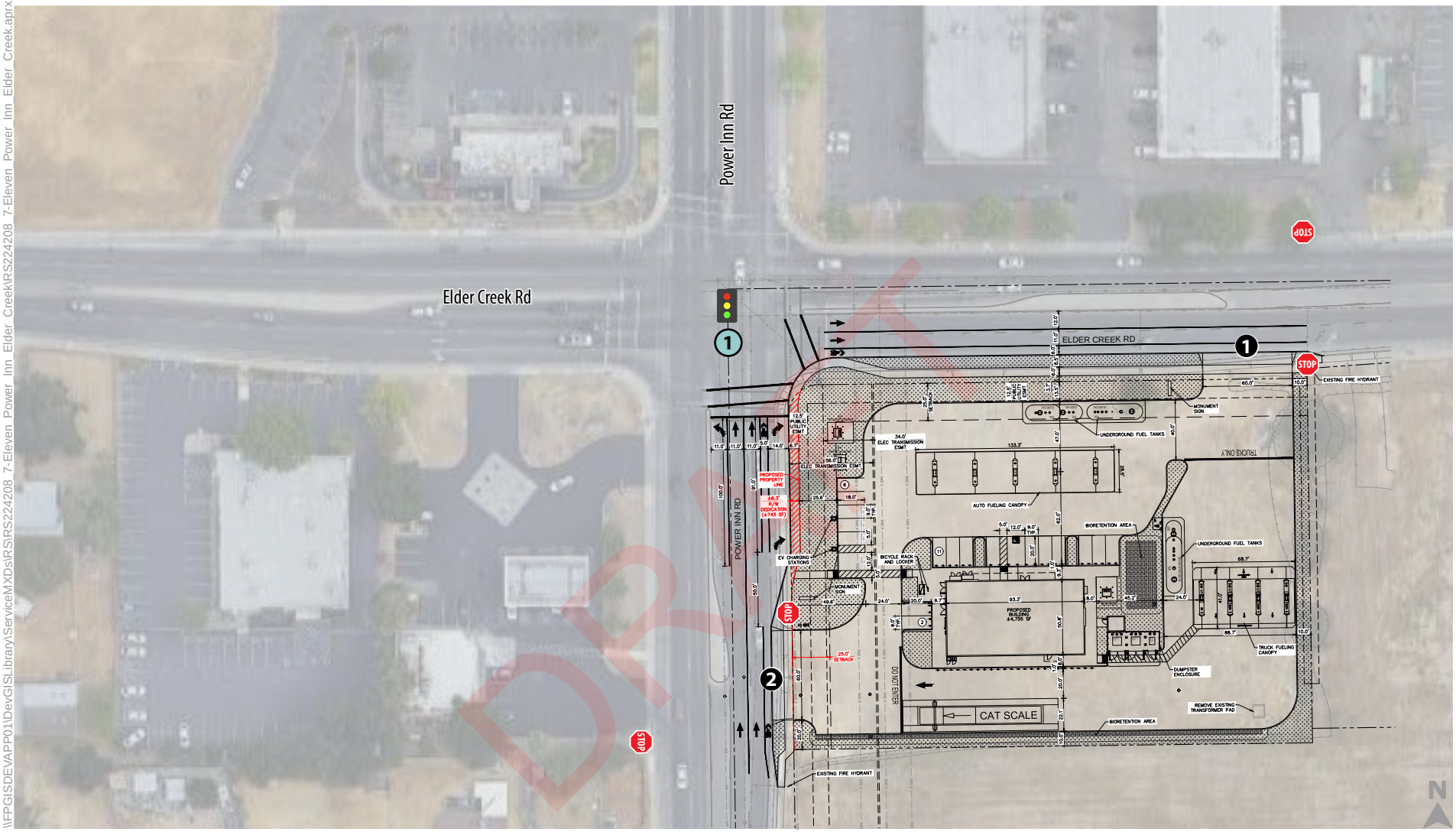


Image 4: Screenshot of queuing in through lanes on southbound Power Inn Road at Driveway 2 assuming full access

[9] During the AM peak hour on the day of the counts, Fehr & Peers staff observed queued northbound traffic blocking the Driveway 2 location for two continuous minutes.



1 Study Intersection

1 Project Driveway

AM (PM) Peak Hour Traffic Volume

Stop Sign

Traffic Signal

Turn Lane

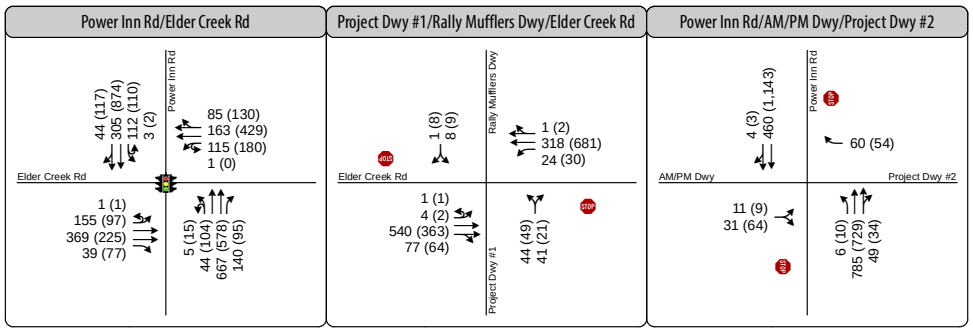


Figure 5

Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Project Conditions

3.3 Vehicle Miles Traveled (VMT)

The *Transportation Impact Analysis Guidelines* (City of Sacramento, 2020) recommend the use of "screening thresholds" to quickly determine whether a project may be presumed to have a less-than-significant VMT impact without conducting a detailed project generated VMT analysis. Screening can be used for "small projects" based on the definition and project sizes below:

- Absent substantial evidence indicating that a project would generate a potentially significant level of VMT or inconsistency with the regional Sustainable Communities Strategy (SCS) or inconsistency with the adopted General Plan, projects with up to 10 single unit homes, projects with up to 15 multiple unit homes, retail projects up to 50,000 cumulative square feet, light industrial projects up to 20,000 square feet, and office projects up to 10,000 square feet may be assumed to cause a less-than significant transportation impact.

Although far less than 50,000 square feet of building space is proposed on the project site, the project's trip generation is nevertheless considerable given the proposed uses. The *Transportation Impact Analysis Guidelines* (City of Sacramento, 2020) contains the following significance criteria for retail projects:

- Retail projects greater than 50,000 cumulative square feet that do not create a net increase in total VMT should be presumed to have a less than significant impact.

The proposed project would generate a negligible amount of new VMT. This conclusion is based on the following facts:

1. Over 75% of trips generated by the project would be 'pass-by' from Power Inn Road or Elder Creek Road. Pass-by traffic, by definition, does not generate VMT as the trip is already on the adjacent street.
2. The convenience market and gas station component of the project represents over 90% of the project's expected trip generation. Other 7-Eleven gas station and convenience market facilities already exist two miles to the southwest, two miles to the southeast, and two miles to the northeast of the project site. A store is not present to the northwest of the project site, which features a large amount of residential. Constructing the project at the proposed location would enable vehicle trips otherwise being made by residents of that area to one of the existing stores to instead be destined for the geographically closer proposed store. This would result in a net reduction in VMT.

Therefore, project VMT impacts are considered less than significant.

3.4 Intersection Operations

Table 6 displays the existing plus project intersection LOS and delay during the AM and PM peak hours at the study intersection and two project driveways. Technical calculations are provided in **Appendix B**.

Table 6: Peak Hour Intersection Level of Service – Existing Plus Project Conditions

Intersection [1]	Control	Existing Conditions				Existing Plus Project Conditions			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Average Delay	LOS	Average Delay	LOS	Average Delay	LOS	Average Delay	LOS
1. Power Inn Rd/Elder Creek Rd	Signal	38	D	54	D	40	D	56	E
2. Elder Creek Road/Driveway 1	Side-Street Stop [2]	Does Not Exist				11	B	51	F
3. Power Inn Road/Driveway 2	Side-Street Stop [3]	Does Not Exist				12	B	22	C

Notes:
1. Intersections analyzed using SimTraffic microsimulation model. Average delay is the weighted average of all approaches at signalized intersections. All results are rounded to the nearest second.
2. For Driveway 1, delay and LOS are reported for the outbound shared left/right movement.
3. For Driveway 2, delay and LOS are reported for the outbound right-turn movement.
Source: Fehr & Peers, 2022.

City of Sacramento General Plan Policy M 1.2.2 states that "the City will strive to operate the roadway network at LOS D or better for vehicles during typical weekday conditions, including AM and PM peak hour". This policy also includes specific areas where conditions worse than LOS D are permitted, as well as an itemized list of corridors where LOS E or F operations are expected. Elder Creek Road between Stockton Boulevard and Florin Perkins Road is among the corridors allowed to operate at LOS E. A lower LOS is permitted "because expansion of the roadway would cause undesirable impacts or conflict with other community values". Power Inn Road is not among the list of corridor exceptions.

Based on the above, LOS E or better conditions is considered the operating objective for the Power Inn Road/Elder Creek Road study intersection. Table 6 indicates that the project would worsen operations from LOS D to E during the PM peak hour, though the delay increase would only be two seconds. As noted previously, over 75% of trips generated by the project would be "pass-by", meaning they would not be adding vehicles to the surrounding roadway network. Accordingly, the modest delay increase shown above is to be expected.

Table 6 also indicates that during the PM peak hour, motorists exiting Driveway 1 onto Elder Creek Road experience LOS F conditions with delays of nearly one minute. This is caused by the considerable volume of outbound left-turns (49 vehicles) and westbound through traffic occasionally blocking the driveway.

Table 7 displays the maximum expected queue lengths under existing plus project conditions for critical turning movements at the study intersection (see **Appendix B** for technical calculations). Note that increases in queuing are not forecasted in the northbound or southbound left-turn lanes because queues already exceed the available turn lane capacity. The effects of increased left/U-turn traffic are reflected in increased through lane queuing.

Table 7: Maximum Vehicle Queues at Power Inn Road/Elder Creek Road Intersection – Existing Plus Project Conditions

Direction	Movement	Available Storage [1]	Maximum Queue [2]			
			Existing Conditions		Existing Plus Project Conditions	
			AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
Northbound	Left-Turn	100 ft.	75 ft.	275 ft.	75 ft.	275 ft.
	Through/Right-Turn	300 ft.	725 ft.	450 ft.	800 ft.	550 ft.
Southbound	Left-Turn	150 ft.	225 ft.	225 ft.	225 ft.	225 ft.
Westbound	Through/Right-Turn	1,900 ft.	275 ft.	600 ft.	275 ft.	600 ft.

Notes:
1. Defined as length of turn pocket or distance to upstream public street intersection.
2. Existing maximum queues based on observations from Thursday, July 7, 2022. Increase in maximum queue determined by adding additional queue from the project (estimated by SimTraffic) to the existing maximum queue.
Source: Fehr & Peers, 2022.

Although not reflected in Table 7, turn lane queue exceedances in the westbound left-turn lane, which is 90 feet in length, would be worsened with the addition of project trips. This condition is illustrated in **Image 5**. Additionally, the PM peak hour westbound queue would occasionally extend beyond Driveway 1. This contributes to the aforementioned LOS F conditions for outbound project traffic at Driveway 1. Recommendations to address these conditions are provided in the following chapter.

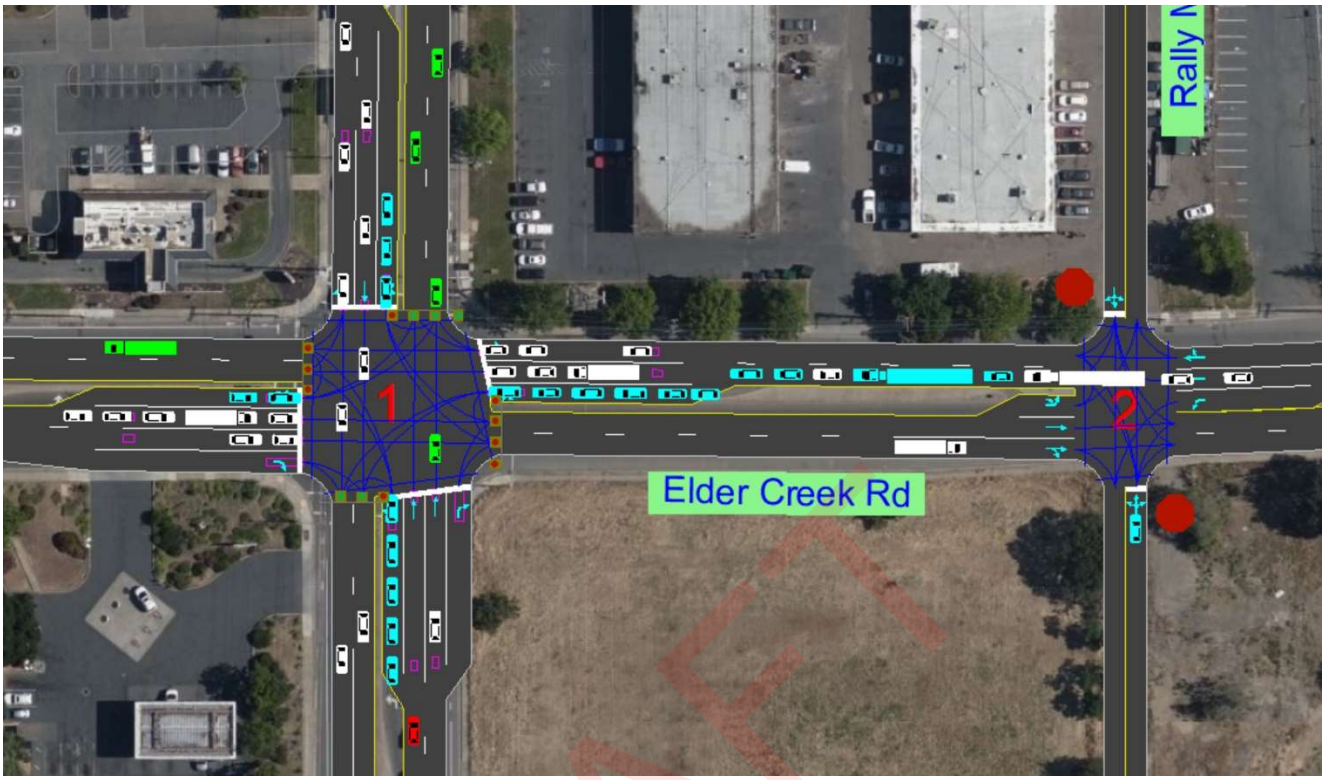


Image 5: Screenshot of existing plus project PM peak hour SimTraffic model showing vehicle queue exceeding available storage in westbound left-turn lane.

4. Project Access and On-Site Circulation Evaluation

This chapter evaluates access to the project site as well as internal circulation within the site. Recommendations are offered to improve circulation for all modes of travel.

4.1 Project Consistency with Applicable City Roadway Design Standards

The *City of Sacramento Design and Procedures Manual: Section 15 Street Design Standard* (2009) includes various standards pertaining to the design of roadways, driveways, bicycle, pedestrian, and transit facilities. Additional design standards can be found in the City's municipal code.[10] Each applicable standard from the above resources is described below, followed by an evaluation of the extent to which the project conforms to it.

Roadway Design Elements

1. *Lane widths are to be no less than 11 feet unless otherwise approved by the City Traffic Engineer.*

   Evaluation: The project would construct a 14-foot wide northbound right-turn lane at the Power Inn Road/Elder Creek Road intersection.

   Consistent: Yes.

2. *Right-turn lanes at four-lane arterial intersections are to be 150 feet in length and include a 50-foot taper.*

   Evaluation: The project would construct a 90-foot long northbound right-turn lane with a 50-foot taper at the Power Inn Road/Elder Creek Road intersection. The project driveway location (and size of the parcel) precludes construction of a 150-foot turn lane.

   Consistent: No.

3. *Curb return radii on arterials (outside of Downtown Sacramento) are to be 32 feet (or greater to accommodate the appropriate design vehicle in a particular situation).*

   Evaluation: The project would reconstruct the northeast corner of the Power Inn Road/Elder Creek Road intersection, replacing the existing 25-foot radius with a 32-foot curb return radius.

   Consistent: Yes.

4. *Crosswalks at controlled intersections must be 12 feet wide with a 10 feet inside clear space.*

   Evaluation: The reconfigured crosswalks in the south and east legs of the intersection would be 12 feet wide.

   Consistent: Yes.

[10] https://library.qcode.us/lib/sacramento_ca/pub/city_code/item/title_17-division_v-chapter_17_508-17_508_050

Driveway Design Elements

5. *No driveways shall be allowed within areas of turn lanes or tapers at four-lane arterial intersections.*

   Evaluation: The project would not construct a driveway within a turn lane or taper.

   Consistent: Yes.

6. *Acceleration and deceleration lanes may be required at driveways and minor intersections based on the street designation, design speed, and projected volumes.*

   Evaluation: The project site plan does not show a right-turn deceleration lane at either driveway. A right-turn deceleration lane is recommended at Driveway 1 on Elder Creek Road given the following factors. First, it is situated along an arterial with a posted speed limit of 45 mph. Second, it would serve a considerable volume of eastbound right-turning traffic (77 AM peak hour vehicles and 64 PM peak hour vehicles). Third, eastbound Elder Creek Road narrows from two lanes to one lane just east of the driveway, creating a merge point near the driveway. A right-turn deceleration lane at Driveway 1 would reduce the speed differential between right-turning traffic and continuing through traffic, reduce conflicts near the lane merge, and help accommodate the swept path of trucks.

   The northbound right-turn volume into Driveway 2 on Power Inn Road would be 49 vehicles during the AM peak hour and 34 vehicles during the PM peak hour. For reasons similar to those above, it would be desirable to provide a right-turn deceleration lane at this driveway. However, the driveway is situated at the very south edge of the parcel, meaning almost the entirety of the deceleration lane would be constructed along the property to the south. Thus, construction of such a turn lane is not currently considered feasible. Additionally, it is noted that deceleration lanes are not present at private driveways along the vast majority of Power Inn Road.

   Consistent: Yes.

7. *The maximum width of two-way industrial driveways should be 45 feet.*

   Evaluation: While the project includes a commercial use (gas station and convenience market), it also includes truck fueling pumps and a CAT scale. Accordingly, an industrial driveway classification was applied for this standard. The project site plan shows that the width of each driveway is 60 feet.

   Consistent: No.

8. *Intersections (and presumably driveways) on opposite sides of the street should be offset by a minimum of 120 feet.*

   Evaluation: Driveway 1 on Elder Creek Road be situated about 60 feet (measured from driveway centerline) west of an existing driveway on the north side of the street that permits all turning movements. This offset driveway alignment would result in conflicts when left-turning vehicles simultaneously enter each driveway. According to Figure 5, the left-turn volume entering each north side driveway is less than 5 vehicles per hour.

   Consistent: No.

Bicycle Facility Design Elements

9. *Class II bike lanes passing through four-lane arterial intersections are to be 5-feet wide.*

   Evaluation: The project would relocate the northbound Class II bike lane on Power Inn Road approaching Elder Creek Road from adjacent to the curb to between the through and right-turn lanes. The relocated bike lane would be 5 feet wide.

   Consistent: Yes.

Pedestrian Facility Design Elements

10. *Crosswalks will be designed to minimize skew.*

    Evaluation: The project would reconstruct the southeast corner of the Power Inn Road/Elder Creek Road intersection, which would cause the south and east crosswalks to have a skew. Further, the project site plan shows that the crosswalks would not be straight, but instead have a bend.

    Consistent: No.

11. *Sidewalk widths are to be a minimum 5 feet wide for all street classifications except arterials, where sidewalks are to be a minimum 6 feet wide.*

    Evaluation: The project would construct 6-foot wide (or slightly greater) sidewalks along its frontage.

    Consistent: Yes.

The inconsistencies associated with items 2 and 8 above are unavoidable based on the project size. Recommendations to address the inconsistencies in items 7 and 10 are presented in Section 4.4.

4.2 Maximum Queues at Project Driveways

Table 8 displays the maximum expected queue lengths under existing plus project conditions at the project driveways (see **Appendix B** for technical calculations). As shown, the maximum vehicle queues exiting each driveway would exceed the available on-site storage during each peak hour.

Recommendations to address on-site storage are presented in Section 4.4.

Table 8: Maximum Vehicle Queues at Project Driveways – Existing Plus Project Conditions

Project Driveway	Movement	Available Storage [1]	Maximum Queue [2]	
			Existing Plus Project Conditions	
			AM Peak Hour	PM Peak Hour
Driveway 1 on Elder Creek Road	Westbound Left-Turn	200 ft.	75 ft.	75 ft.
	Northbound Left/Right	75 ft.	**100 ft.**	**150 ft.**
Driveway 2 on Power Inn Road	Westbound Right-Turn	75 ft.	**150 ft.**	**150 ft.**

Notes:
1. Based on project site plan or aerial imagery.
2. Maximum queue estimated by SimTraffic model. Rounded to the nearest 25 feet.
Bolded cell represents queue that exceeds available storage.

Source: Fehr & Peers, 2022.

4.3 Adjacent Property Site Access Considerations

The vacant parcels immediately east and south of the project site have an M-1 Industrial zoning according to the City's zoning map. These parcels total about 7 acres. A variety of uses are permitted within this zoning designation including commercial, office, and industrial. No site plans or proposed uses are available at this time for these parcels.

The proposed project would not preclude these parcels from having vehicular access onto Power Inn Road or Elder Creek Road. An east leg to the Power Inn Road/48th Avenue intersection could be possible. Driveway access on the south side of Elder Creek Road east of the project site could be possible. Detailed studies would be required to evaluate specific site access requirements based on proposed land uses.

The project site plan indicates that both project driveways would be for the sole usage of project traffic and would not serve as a reciprocal access to adjacent properties.

4.4 Recommendations

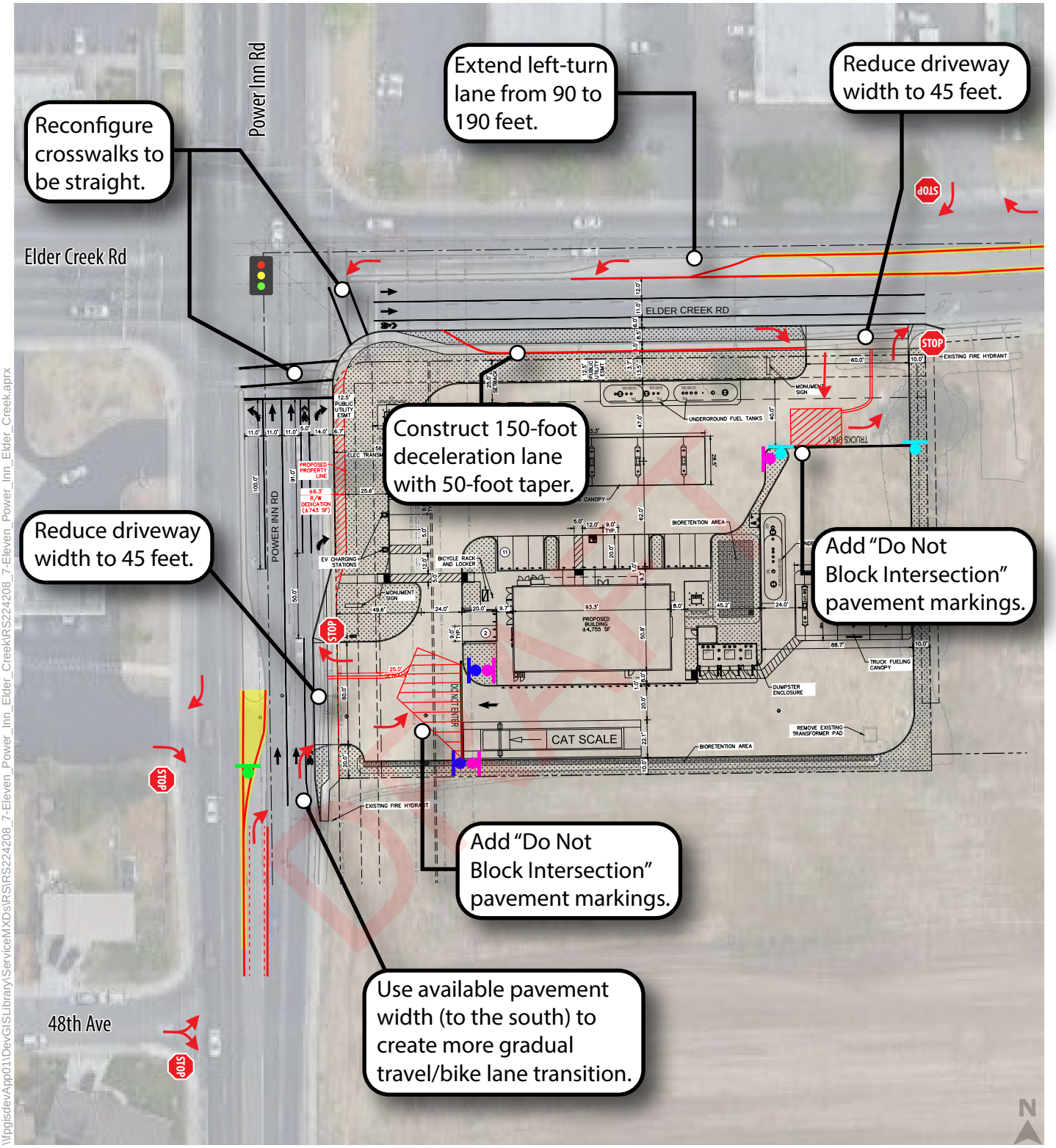
Figure 6 illustrates the recommendations of the study. **Table 9** summarizes each recommendation and provides additional background, reasoning, effectiveness, and/or other information.

Table 9: Recommendations

Recommendation	Notes
Along Elder Creek Road	
Construct 150-foot right-turn deceleration lane with 50-foot taper on eastbound Elder Creek Road at Driveway 1	This would improve safety and operations in this area.
Extend the raised median easterly to restrict movements at Driveway 1 to right-turns only. This would eliminate left-turn ingress and egress at affected driveways on the north side of Elder Creek Road.	Figure 6 shows recommended configuration. Section 3.4 provides the basis for this restriction.
Within the extended raised median on Elder Creek Road, post a "No U-turns Allowed" sign facing eastbound traffic.	This is to discourage outbound project traffic from performing unsafe mid-block U-turns from the inside eastbound travel lane.
At Elder Creek Road/Power Inn Road Intersection	
Extend westbound left-turn lane on Elder Creek Road at Power Inn Road from 90 feet to 190 feet	This can be accomplished by converting a portion of the raised median east of the turn lane into additional turn lane storage. Analysis of the Power Inn Road/Elder Creek Road intersection shows this improvement would reduce delays during the PM peak hour from 56 seconds (LOS E) to 51 seconds (LOS D).
Maintain straight south and east leg crosswalks (some skew is unavoidable)	Project site plan shows a bend in crosswalks, which if constructed, could result in crossing challenges for visually impaired persons.
Improve signal timing efficiency by reducing maximum green extensions for non-peak travel directions, thereby lowering cycle lengths and prioritizing peak traffic flows.	This would improve traffic operations by marginally reducing queuing already present under existing conditions.
Along Power Inn Road	
Construct narrow raised median to restrict movements at Driveway 2 to right-turns only. This would eliminate left-turn ingress and egress at the Arco AM/PM driveway, while maintaining the center refuge lane for the 48th Avenue eastbound left turn.	Figure 6 shows recommended configuration. Section 3.2 provides the basis for this restriction.
Within the raised median of Power Inn Road, post a "No U-turns Allowed" sign facing southbound traffic	Figure 6 shows recommended location of sign.
Use available pavement width south of Driveway 2 to provide a more gradual transition of the outside travel lane and bike lane.	Figure 6 shows area where transition distance should be increased.
Within Project Site	
Narrow both project driveways to 45 feet wide	Recommended to comply with City design standards.

Use double-yellow line striping to demarcate inbound and outbound travel lanes for both driveways	Configuration in Figure 6 is intended to maximize outbound vehicle storage, while not blocking inbound traffic.
Add "Do Not Block Intersection" pavement markings within each driveway	These pavement markings are necessary to ensure that trucks accessing truck fuel pumps and CAT scale are not blocked when entering from Driveway 1 and do not block inbound traffic when exiting from Driveway 2.
Add "Do Not Enter", and "Trucks Only" signs	Signs are recommended as shown in Figure 6.

Source: Fehr & Peers, 2022.



Traffic Signal
Stop Sign
Permitted Movement
Striping
"Do Not Enter" Sign
"Trucks Only" Sign
"Do Not Block Intersection" Sign
"No U-Turn" Sign
Raised Median

Figure 6

Recommendations

APPENDIX A:
EXISTING CONDITIONS TECHNICAL CALCULATIONS

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Conditions**
Volume and Delay by Movement | **AM Peak Hour**

Intersection 1 **Power Inn Road/Elder Creek Road** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	33	31	93.0%	89.6	14.7	F
	Through	666	672	101.0%	37.2	8.0	D
	Right Turn	136	133	98.0%	31.2	9.2	C
	Subtotal	835	836	100.2%	38.5	7.8	D
SB	Left Turn	95	95	99.9%	57.1	7.7	E
	Through	316	322	101.8%	23.8	3.6	C
	Right Turn	44	45	102.0%	11.9	7.3	B
	Subtotal	455	462	101.4%	29.5	4.5	C
EB	Left Turn	160	157	98.2%	59.8	9.1	E
	Through	351	341	97.3%	36.8	2.9	D
	Right Turn	39	38	96.4%	6.0	1.3	A
	Subtotal	550	536	97.5%	41.5	4.1	D
WB	Left Turn	101	99	97.8%	66.9	9.1	E
	Through	163	165	101.3%	36.8	5.5	D
	Right Turn	73	71	96.7%	15.0	7.8	B
	Subtotal	337	335	99.3%	41.1	5.2	D
Total		2,177	2,169	99.6%	37.8	3.7	D

Intersection 2 **Rally Mufflers Dwy-Project Dwy #1/Elder Creek Road** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	8	7	82.5%	4.1	3.7	A
	Through						
	Right Turn	1	2	160.0%	0.5	0.8	A
	Subtotal	9	8	91.1%	3.6	3.1	A
EB	Left Turn	5	4	84.0%	3.2	2.7	A
	Through	575	567	98.6%	2.5	0.3	A
	Right Turn						
	Subtotal	580	571	98.5%	2.6	0.3	A
WB	Left Turn						
	Through	335	331	98.8%	1.4	0.7	A
	Right Turn	1	1	120.0%	0.0	0.0	A
	Subtotal	336	332	98.9%	1.4	0.7	A
Total		925	912	98.5%	2.1	0.4	A

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Conditions**
Volume and Delay by Movement | **AM Peak Hour**

Intersection 3 | **Power Inn Road/AM/PM Dwy-Project Dwy #2** | **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	6	6	98.3%	2.4	3.0	A
	Through	824	825	100.1%	12.0	5.2	B
	Right Turn						
	Subtotal	830	831	100.1%	11.9	5.1	B
SB	Left Turn						
	Through	451	455	100.9%	2.3	0.3	A
	Right Turn	4	4	87.5%	0.9	1.0	A
	Subtotal	455	458	100.7%	2.3	0.3	A
EB	Left Turn	11	9	84.5%	25.0	34.5	C
	Through						
	Right Turn	31	31	99.0%	10.8	17.5	B
	Subtotal	42	40	95.2%	14.0	19.9	B
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,327	1,329	100.2%	8.9	3.8	A

SimTraffic Post-Processor **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs **Existing Conditions**
Volume and Delay by Movement **PM Peak Hour**

Intersection 1 **Power Inn Road/Elder Creek Road** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	96	96	100.4%	95.3	21.4	F
	Through	573	571	99.6%	40.9	6.2	D
	Right Turn	94	92	98.1%	32.6	7.0	C
	Subtotal	763	759	99.5%	46.9	8.5	D
SB	Left Turn	81	75	92.3%	102.7	22.7	F
	Through	898	875	97.4%	62.3	18.3	E
	Right Turn	117	120	102.7%	52.4	18.9	D
	Subtotal	1,096	1,070	97.6%	63.9	18.4	E
EB	Left Turn	102	99	97.5%	61.4	6.0	E
	Through	209	205	98.0%	41.4	5.5	D
	Right Turn	77	75	97.5%	8.1	2.3	A
	Subtotal	388	379	97.8%	40.7	4.3	D
WB	Left Turn	162	155	95.9%	98.5	13.8	F
	Through	429	423	98.5%	46.4	6.7	D
	Right Turn	123	129	104.8%	27.0	7.9	C
	Subtotal	714	707	99.0%	55.1	9.4	E
Total		2,961	2,915	98.4%	54.4	8.1	D

Intersection 2 **Rally Mufflers Dwy-Project Dwy #1/Elder Creek Road** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
SB	Left Turn	9	7	80.0%	32.5	25.2	D
	Through						
	Right Turn	8	9	111.3%	12.4	15.7	B
	Subtotal	17	16	94.7%	19.9	18.8	C
EB	Left Turn	3	2	63.3%	8.0	16.9	A
	Through	379	369	97.4%	2.0	0.3	A
	Right Turn						
	Subtotal	382	371	97.1%	2.0	0.3	A
WB	Left Turn						
	Through	705	695	98.6%	4.8	5.2	A
	Right Turn	2	3	140.0%	0.0	0.0	A
	Subtotal	707	698	98.8%	4.8	5.2	A
Total		1,106	1,085	98.1%	4.1	3.5	A

SimTraffic Post-Processor **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs **Existing Conditions**
Volume and Delay by Movement **PM Peak Hour**

Intersection 3 **Power Inn Road/AM/PM Dwy-Project Dwy #2** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	10	9	89.0%	8.7	11.5	A
	Through	754	748	99.2%	12.6	6.2	B
	Right Turn						
	Subtotal	764	757	99.0%	12.6	6.2	B
SB	Left Turn						
	Through	1,135	1,104	97.3%	3.0	0.2	A
	Right Turn	3	3	103.3%	0.7	0.8	A
	Subtotal	1,138	1,107	97.3%	3.0	0.2	A
EB	Left Turn	9	8	85.6%	74.1	58.9	F
	Through						
	Right Turn	64	68	105.6%	22.1	25.1	C
	Subtotal	73	75	103.2%	27.2	26.3	D
WB	Left Turn						
	Through						
	Right Turn						
	Subtotal						
Total		1,975	1,939	98.2%	7.7	2.8	A

APPENDIX B:
EXISTING PLUS PROJECT CONDITIONS
TECHNICAL CALCULATIONS

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Plus Project Conditions**
Volume and Delay by Movement | **AM Peak Hour**

Intersection 1 **Power Inn Road/Elder Creek Road** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	49	52	106.5%	85.6	15.1	F
	Through	667	674	101.1%	41.4	5.8	D
	Right Turn	140	137	97.5%	25.2	4.9	C
	Subtotal	856	863	100.8%	41.6	6.0	D
SB	Left Turn	115	113	98.2%	58.0	8.8	E
	Through	305	307	100.7%	25.9	4.1	C
	Right Turn	44	46	104.1%	14.9	8.6	B
	Subtotal	464	466	100.4%	32.0	5.0	C
EB	Left Turn	156	162	104.0%	61.7	10.6	E
	Through	369	372	100.7%	37.7	5.9	D
	Right Turn	39	41	105.9%	7.9	3.9	A
	Subtotal	564	575	102.0%	42.1	6.1	D
WB	Left Turn	116	113	97.8%	57.4	7.4	E
	Through	163	169	103.9%	37.9	4.5	D
	Right Turn	85	84	99.2%	16.5	6.1	B
	Subtotal	364	367	100.8%	39.0	3.3	D
Total		2,248	2,271	101.0%	39.5	2.9	D

Intersection 2 **Rally Mufflers Dwy-Project Dwy #1/Elder Creek Road** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	44	46	103.4%	14.0	6.0	B
	Through						
	Right Turn	41	41	101.0%	6.7	3.5	A
	Subtotal	85	87	102.2%	10.5	4.3	B
SB	Left Turn	8	7	91.3%	13.9	15.4	B
	Through						
	Right Turn	1	2	170.0%	1.1	2.6	A
	Subtotal	9	9	100.0%	13.3	15.5	B
EB	Left Turn	5	5	96.0%	8.2	14.4	A
	Through	540	543	100.6%	3.1	0.3	A
	Right Turn	77	74	96.6%	2.3	0.8	A
	Subtotal	622	623	100.1%	3.1	0.3	A
WB	Left Turn	24	23	93.8%	4.0	2.0	A
	Through	318	321	100.9%	1.7	1.2	A
	Right Turn	1	1	130.0%	0.0	0.0	A
	Subtotal	343	345	100.5%	1.9	1.2	A
Total		1,059	1,063	100.4%	3.5	1.0	A

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Plus Project Conditions**
Volume and Delay by Movement | **AM Peak Hour**

Intersection 3 **Power Inn Road/AM/PM Dwy-Project Dwy #2** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	6	6	96.7%	11.4	14.2	B
	Through	785	788	100.4%	13.2	3.9	B
	Right Turn	49	42	85.7%	7.0	4.0	A
	Subtotal	840	836	99.5%	12.9	3.8	B
SB	Left Turn						
	Through	460	464	100.9%	2.2	0.3	A
	Right Turn	4	4	92.5%	1.0	1.4	A
	Subtotal	464	468	100.8%	2.2	0.3	A
EB	Left Turn	11	9	85.5%	23.8	25.2	C
	Through						
	Right Turn	31	31	99.4%	5.2	5.3	A
	Subtotal	42	40	95.7%	9.9	8.3	A
WB	Left Turn						
	Through						
	Right Turn	60	60	99.7%	11.8	8.8	B
	Subtotal	60	60	99.7%	11.8	8.8	B
Total		1,406	1,404	99.9%	9.3	2.7	A

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Plus Project Conditions**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 1 **Power Inn Road/Elder Creek Road** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	119	116	97.6%	95.9	11.6	F
	Through	578	575	99.4%	39.7	7.4	D
	Right Turn	95	95	99.9%	21.3	4.4	C
	Subtotal	792	786	99.2%	45.9	7.4	D
SB	Left Turn	112	112	99.6%	115.3	28.5	F
	Through	874	853	97.6%	66.3	24.9	E
	Right Turn	117	118	100.8%	62.8	29.5	E
	Subtotal	1,103	1,082	98.1%	70.9	25.0	E
EB	Left Turn	98	97	98.9%	68.1	6.2	E
	Through	225	217	96.4%	39.4	8.2	D
	Right Turn	77	77	100.4%	8.4	2.3	A
	Subtotal	400	391	97.8%	40.7	5.1	D
WB	Left Turn	180	179	99.3%	94.2	18.9	F
	Through	429	429	99.9%	43.9	8.2	D
	Right Turn	130	133	102.2%	30.6	9.4	C
	Subtotal	739	740	100.1%	53.9	10.7	D
Total		3,034	2,999	98.8%	56.2	9.1	E

Intersection 2 **Rally Mufflers Dwy-Project Dwy #1/Elder Creek Road** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	49	48	97.6%	62.0	34.2	F
	Through						
	Right Turn	21	22	103.3%	20.3	21.1	C
	Subtotal	70	70	99.3%	50.8	32.6	F
SB	Left Turn	9	7	81.1%	20.9	16.9	C
	Through						
	Right Turn	8	8	105.0%	25.4	32.2	D
	Subtotal	17	16	92.4%	29.6	21.3	D
EB	Left Turn	3	2	63.3%	4.5	5.4	A
	Through	363	358	98.7%	2.8	0.3	A
	Right Turn	64	63	98.8%	2.0	0.5	A
	Subtotal	430	423	98.5%	2.7	0.3	A
WB	Left Turn	30	29	98.0%	5.4	4.6	A
	Through	681	684	100.5%	4.3	2.3	A
	Right Turn	2	2	120.0%	0.1	0.2	A
	Subtotal	713	716	100.4%	4.3	2.3	A
Total		1,230	1,225	99.6%	6.8	2.9	A

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Plus Project Conditions**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 3 **Power Inn Road/AM/PM Dwy-Project Dwy #2** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	10	11	108.0%	23.8	17.0	C
	Through	729	720	98.7%	16.3	10.4	C
	Right Turn	34	36	104.4%	7.5	3.5	A
	Subtotal	773	766	99.1%	16.1	9.9	C
SB	Left Turn						
	Through	1,143	1,122	98.2%	2.8	0.2	A
	Right Turn	3	3	113.3%	0.9	1.0	A
	Subtotal	1,146	1,126	98.2%	2.8	0.2	A
EB	Left Turn	9	8	87.8%	82.6	75.8	F
	Through						
	Right Turn	64	66	102.8%	28.4	34.3	D
	Subtotal	73	74	101.0%	33.8	37.3	D
WB	Left Turn						
	Through						
	Right Turn	54	59	108.7%	22.3	17.1	C
	Subtotal	54	59	108.7%	22.3	17.1	C
Total		2,046	2,024	98.9%	9.8	5.0	A

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Plus Project Conditions (w/ add'l 100' on WBL storage)**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 1 **Power Inn Road/Elder Creek Road** **Signal**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	119	113	95.3%	86.6	17.6	F
	Through	578	571	98.8%	38.6	7.2	D
	Right Turn	95	94	98.9%	20.3	5.3	C
	Subtotal	792	778	98.3%	43.9	8.7	D
SB	Left Turn	112	116	103.3%	110.5	21.9	F
	Through	874	880	100.7%	62.8	22.7	E
	Right Turn	117	113	96.2%	55.0	23.1	D
	Subtotal	1,103	1,109	100.5%	66.9	21.6	E
EB	Left Turn	98	99	100.6%	61.9	9.7	E
	Through	225	224	99.6%	39.5	3.2	D
	Right Turn	77	78	101.7%	11.1	2.6	B
	Subtotal	400	401	100.2%	38.5	2.4	D
WB	Left Turn	180	176	97.7%	59.9	7.2	E
	Through	429	432	100.7%	39.0	4.8	D
	Right Turn	130	134	102.8%	25.3	4.9	C
	Subtotal	739	742	100.4%	42.2	3.3	D
Total		3,034	3,029	99.8%	51.1	9.0	D

Intersection 2 **Rally Mufflers Dwy-Project Dwy #1/Elder Creek Road** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	49	51	103.1%	20.6	9.6	C
	Through						
	Right Turn	21	22	103.8%	10.3	7.7	B
	Subtotal	70	72	103.3%	17.8	8.9	C
SB	Left Turn	9	9	94.4%	14.4	21.1	B
	Through						
	Right Turn	8	9	108.8%	4.7	4.5	A
	Subtotal	17	17	101.2%	13.1	19.3	B
EB	Left Turn	3	2	50.0%	1.6	4.7	A
	Through	363	367	101.1%	2.6	0.4	A
	Right Turn	64	64	100.6%	2.0	0.4	A
	Subtotal	430	433	100.7%	2.5	0.3	A
WB	Left Turn	30	29	98.0%	3.2	1.9	A
	Through	681	681	100.0%	1.7	0.3	A
	Right Turn	2	2	105.0%	0.1	0.3	A
	Subtotal	713	713	100.0%	1.8	0.3	A
Total		1,230	1,235	100.4%	3.1	0.8	A

SimTraffic Post-Processor | **7-Eleven Elder Creek Road/Power Inn Road**
Average Results from 10 Runs | **Existing Plus Project Conditions (w/ add'l 100' on WBL storage)**
Volume and Delay by Movement | **PM Peak Hour**

Intersection 3 | **Power Inn Road/AM/PM Dwy-Project Dwy #2** | **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	10	10	95.0%	16.5	19.4	C
	Through	729	719	98.7%	11.9	4.3	B
	Right Turn	34	36	107.1%	4.3	2.4	A
	Subtotal	773	765	99.0%	11.6	4.2	B
SB	Left Turn						
	Through	1,143	1,148	100.4%	2.8	0.2	A
	Right Turn	3	3	90.0%	0.7	1.0	A
	Subtotal	1,146	1,151	100.4%	2.8	0.2	A
EB	Left Turn	9	8	84.4%	71.3	68.7	F
	Through						
	Right Turn	64	61	94.5%	18.1	14.8	C
	Subtotal	73	68	93.3%	25.2	19.2	D
WB	Left Turn						
	Through						
	Right Turn	54	52	97.0%	10.7	7.5	B
	Subtotal	54	52	97.0%	10.7	7.5	B
Total		2,046	2,036	99.5%	7.3	2.1	A