Appendix D

Transportation Impact Analysis

KITTELSON & ASSOCIATES

FRESNO COSTCO RELOCATION TRANSPORTATION IMPACT ANALYSIS

FRESNO, CA

May 2023

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Fresno Costco Relocation Transportation Impact Analysis

Fresno, CA

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Section 1
Introduction

INTRODUCTION

This report summarizes the transportation impacts associated with the relocation of a Costco warehouse currently in operation at 4500 W Shaw Ave to a vacant site in the northeast corner of N Riverside Dr and W Herndon Ave in the City of Fresno, CA. Figure 1 illustrates the site vicinity.

PROJECT DESCRIPTION

Costco Wholesale Corporation (Costco) is proposing to relocate their existing wholesale retail facility situated at 4500 W Shaw Ave in Fresno, CA (project). The project would consist of a 191,346-square-foot (sf) relocated retail facility with an attached tire center, 49,996-sf relocated market delivery operation (MDO), 32-position fuel station, and drive-through car wash with approximately 987 parking stalls on a 22.4-acre parcel located at the northeast corner of the intersection of N Riverside Dr and W Herndon Ave. The project would construct a second northbound vehicle travel lane on N Riverside Dr along the project frontage as well as a multiuse path along the southern and western project frontages (W Herndon Ave and N Riverside Dr, respectively). Figure 2 shows the proposed site plan.

The wholesale retail facility is open to Costco members only. The MDOs is a last-mile facility for delivery of large and bulky items and is not open to visitation by Costco members. At MDO facilities, there is a drop off of large goods, organization of the goods, and loading of last-mile trucks for daily deliveries to Costco members' homes.

The project also includes a proposed re-zone and General Plan amendment to reclassify the adjacent portion of W Herndon Ave from expressway to super arterial to allow for appropriate vehicle access. The project site is currently undeveloped and is designated by both the zoning and General Plan as Community Commercial. The project would have its main access points along N Riverside Dr, with secondary access on W Spruce Ave and Arthur Ave (a planned public street on the east side of the site, which would connect to W Herndon Ave).

SCOPE OF THE REPORT

The scope of the report was developed in coordination with the City of Fresno (City) and Caltrans. The analysis performed for this study determines the expected transportation-related effects of the project. *Appendix A* includes the scoping agreement memorandum.

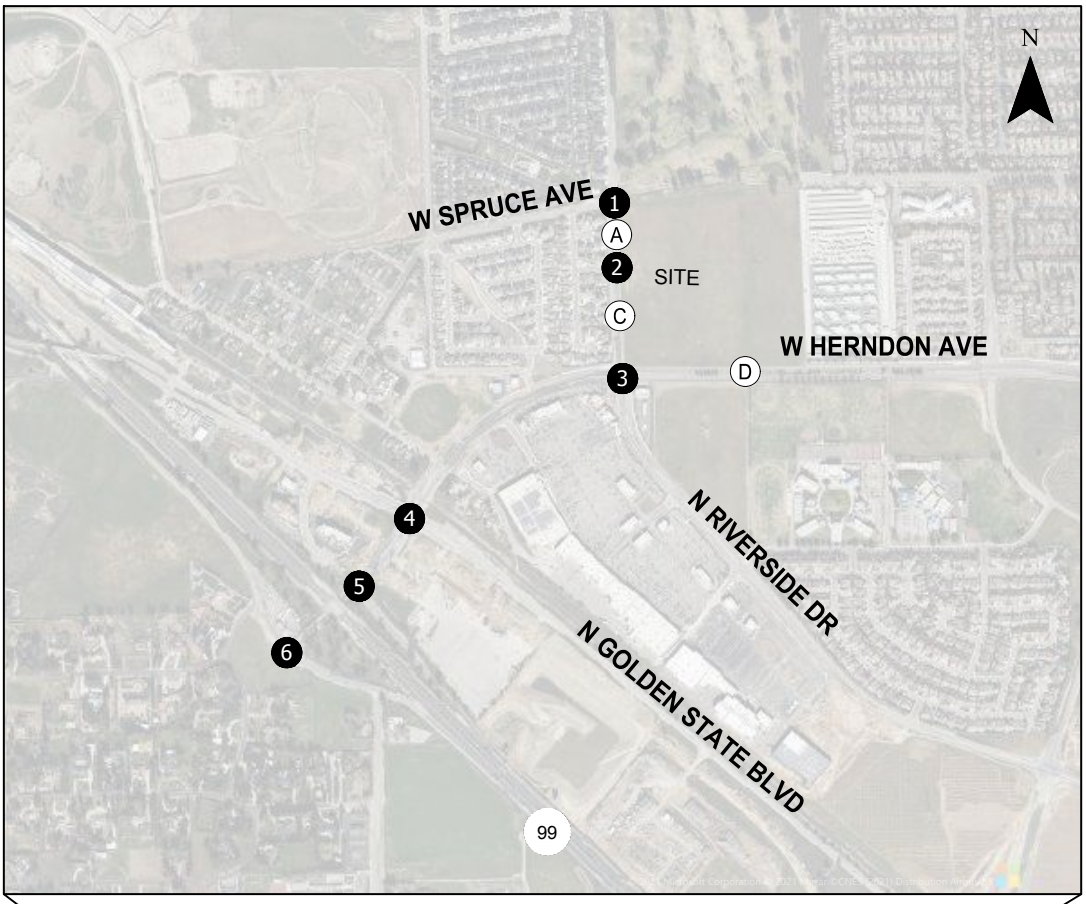
The transportation analyses documented in this report were performed to establish consistency with the City of Fresno General Plan, as implemented through the City's Traffic Impact Study Report Guidelines,[1] and to comply with the California Environmental Quality Act (CEQA), as implemented through the City's CEQA Guidelines for Vehicle Miles Traveled Thresholds.[2] An analysis based on automobile delay (i.e., level of service or LOS) can no longer be used for assessing CEQA impacts. Therefore, the LOS evaluation is not assigned significance levels and is presented in this report regarding consistency with the general plan as a factor for consideration by the decision-makers in acting on the project.

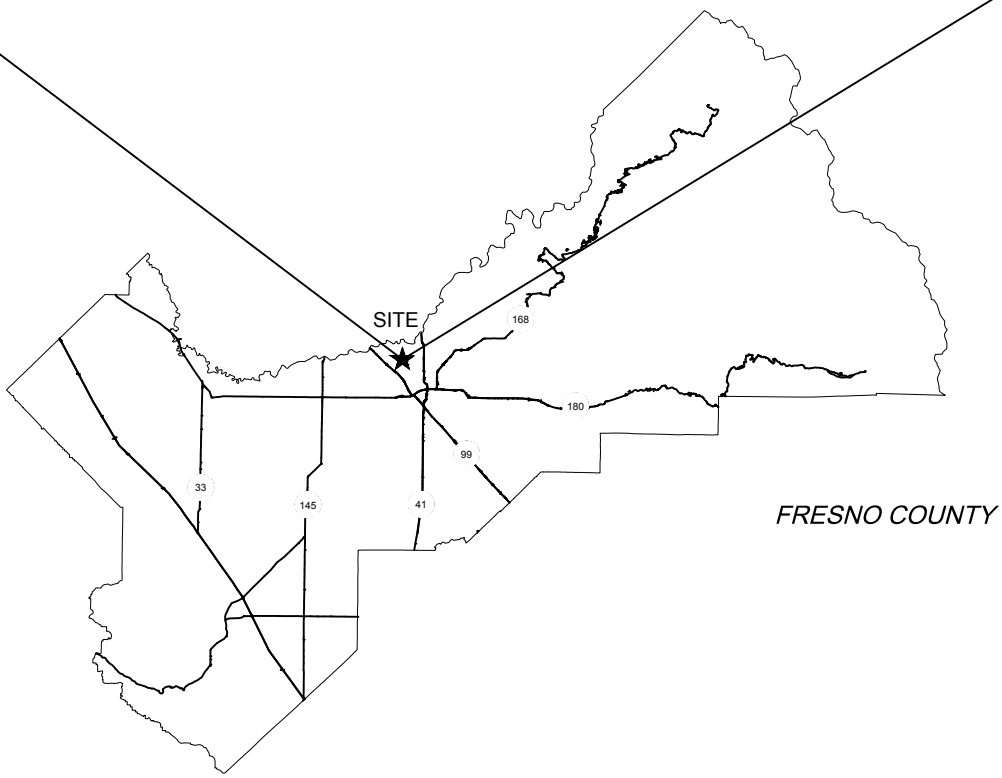
[1] City of Fresno Traffic Impact Study Report Guidelines, updated February 2, 2009

[2] City of Fresno Guidelines for Vehicle Miles Traveled Thresholds, adopted June 25, 2020

This report evaluates the following transportation issues:

- General Plan Consistency
    - Traffic Operations for Five Scenarios
        - Existing Conditions
        - Trip generation and distribution estimates for the project
        - Existing Plus Project Conditions
        - Future Conditions (Year 2042)
        - Future Plus Project Conditions
        - Future Plus Project Conditions, without Functional Classification Change of W Herndon Ave
- CEQA Compliance
    - Consistency with existing programs, plans, ordinances, or policies, including those associated with transit, pedestrian, and bicyclist access
    - Change in regional daily vehicle miles traveled (VMT) due to the project
    - Potential hazards resulting from queues
    - Emergency access around and near the project site





(##) - Study Intersections
(X) - Site Accesses

Site Vicinity Map
Fresno, California

Figure
1

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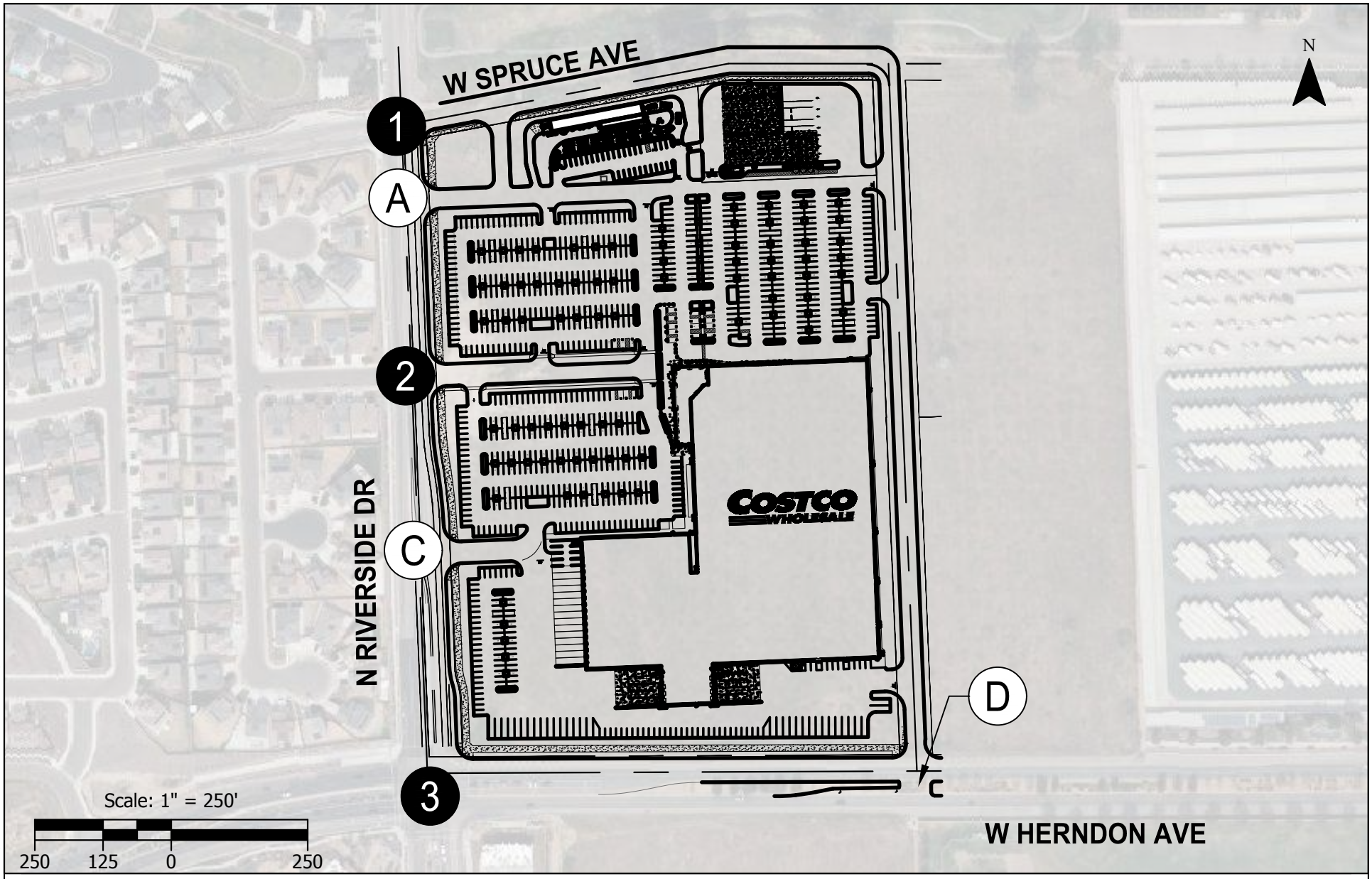

##- Study Intersections
ⓧ- Site Accesses

Recieved From: MG2 Engineering August 10, 2021

Proposed Site Plan
Fresno, California

Figure
2

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Section 2

General Plan Consistency Assessment

GENERAL PLAN CONSISTENCY ASSESSMENT

The general plan consistency, or non-CEQA, section of this report includes analyses for the following:

- Existing Conditions
- Trip generation and distribution estimates for the project
- Existing Plus Project Conditions
- Future Conditions (Year 2042)
- Future Plus Project Conditions
- Future Plus Project Conditions, without Functional Classification Change of W Herndon Ave

The following study intersections were selected for traffic operations evaluation based on land use and circulation conditions near the project site and access to the proposed development:

1. N Riverside Dr & W Spruce Ave
2. N Riverside Dr & W Fir Ave (Plus Project scenarios only)
3. N Riverside Dr & W Herndon Ave
4. N Golden State Blvd & W Herndon Ave
5. SR 99 NB off-ramp & W Herndon Ave
6. N Parkway Dr & W Herndon Ave

EXISTING CONDITIONS

The Existing Conditions analysis identifies the site conditions and current operational and geometric characteristics of the study intersections as well as transit services, bicycle, and pedestrian facilities near the project site.

ROADWAY NETWORK

State Route 99 (SR 99), or Golden State Highway, is a north-south freeway traversing the Central Valley. It connects to I-5 near Wheeler Ridge to the south and ends at SR 36 near Red Bluff to the north. In Fresno, SR 99 has six lanes. In the study area, the nearest interchange is at W Herndon Ave.

W Herndon Ave is an east-west super arterial with four to six lanes and a raised planted median. The posted speed limit is 45 mph.

N Riverside Dr is a north-south roadway with two lanes north of W Herndon Ave (collector) and four lanes south of W Herndon Ave (arterial). Adjacent to the project frontage, a raised median exists to the south of W Fir Ave, and a two-way left-turn lane exists to the north of W Fir Ave. The posted speed limit is 40 mph. N Riverside Dr becomes W Bullard Ave south of N Veteran Blvd.

W Spruce Ave is an east-west collector street with two lanes west of N Riverside Dr and four lanes within the residential development east of the project site. The road does not connect through from N Riverside Dr, along the north perimeter of the project site, to the residential development to the east. The road may connect through in the future, contingent up on development of other parcels. The posted speed limit is 40 miles per hour (mph) to the east with unposted speed limit to the west. W Spruce Ave provides access to residential areas around the project site.

Pedestrian Facilities

A multiuse path is available on the north side of W Herndon Ave starting east of the project site and continuing to the east, but sidewalk is not present on the north side of the street along the project site to N

Riverside Dr. No sidewalk is present on the south side of W Herndon Ave to the east of N Riverside Dr. West of N Riverside Dr, sidewalk is present on the north side of W Herndon Ave for approximately 350', then discontinues. Sidewalk is continuously present on the south side of W Herndon Ave west of N Riverside Dr in the vicinity of the project site.

Sidewalks area present on the west side of N Riverside Dr, both north and south of W Herndon Dr. Sidewalks are nor present along the project frontage (east side) of N Riverside Dr. They are present on the east side of N Riverside Dr to the south of W Herndon Ave for approximately 500'.

The N Riverside Dr/W Herndon Ave signalized intersection has marked crosswalks on the west and south legs with pedestrian signal heads serving those crosswalks. These two crosswalks feature curb ramps with high-visibility truncated dome pads.

Bicycle Facilities

Bicycle facilities are categorized into four types, as described below:

Class I Bikeway (Bike Path). Also known as a shared path or multi-use path, a bike path is a paved right-of-way for bicycle travel that is completely separate from any street or highway.

Class II Bikeway (Bike Lane). A striped and stenciled lane for one-way bicycle travel on a street or highway. This facility could include a buffered space between the bike lane and vehicle lane and the bike lane could be adjacent to on-street parking.

Class III Bikeway (Bike Route). A signed route along a street where the bicyclist shares the right-of-way with motor vehicles. This facility can also be designated using a shared-lane marking (sharrow).

Class IV Bikeway (Separated Bike Lane). A bikeway for the exclusive use of bicycles including a separation required between the separated bikeway and the through vehicular traffic. The separation may include, but is not limited to, grade separation, flexible posts, inflexible physical barriers, or on-street parking.

Existing bicycle facilities in the study area include:

- Class I bikeway on Herndon Ave from Spruce Ave to west of Hayes Ave
- Class I bikeway on Herndon Ave west of Riverside Dr
- Class II bike lane on N Riverside Dr from W Herndon Ave to the Carnegie Ave
- Class II bike lane on N Hayes Ave from W Herndon Ave to W Spruce Ave
- Class II bike lane on W Spruce Ave from N Sandrini Ave to W Herndon Ave
- Class II bike lane on Veterans Blvd from W Wathen Ave to N Hayes Ave

Transit Service

The Fresno Department of Transportation (DOT) provides public bus service known as FAX in Fresno. Two bus lines operate near the project site: 3 and 20. The 3 line runs between the Marketplace at El Paseo (the commercial development on the southwest quadrant of the N Riverside Dr/W Herndon Ave intersection) and the Clovis Community College/Herndon area, which is east of the project site. Service frequency is approximately every 15 minutes between 5:00 AM and 9:00 PM on weekdays and 9:30 AM to 7:00 PM on weekends. The 20 line operates between the Marketplace at El Paseo and Fresno City College, which is just north of downtown. Buses operate on approximately 45 minutes headways between 5:30 AM and 10:00 PM on weekdays and 6:30 AM to 7:30 PM on weekends. Relative to the project site, the closest bus stops for both lines are located on N Riverside Dr in front of the Marketplace at El Paseo.

ANALYSIS METHODOLOGY

Intersection Operations Analysis Methodology and Levels of Service

"Level of service" describes the operating conditions experienced by users of a facility. LOS is a quantitative stratification of a performance measure or measures representing quality of service. The

measures used to determine LOS for transportation system elements are called service measures. The Highway Capacity Manual (HCM) defines six levels of service, ranging from A to F, for each service measure or combination of service measures. The service measures to define the LOS of intersections are control delay and volume-to-capacity (V/C) ratio. Control delay alone is used to characterize LOS for the entire intersection or an approach. Control delay and volume-to-capacity ratio are used to characterize LOS for a lane group (e.g., all northbound lanes approaching an intersection).

Table 1 and Table 2 present the relationship of average delay to level of service for signalized intersections and stop control intersections, respectively.

Table 1: Signalized Intersection Level of Service Definitions

Average Delay Per Vehicle (Seconds)	LOS	Description of Traffic Conditions
≤10.0	A	This level is typically assigned when the volume-to-capacity ratio is low and either progression is exceptionally favorable, or the cycle length is very short.
>10.0 and ≤20.0	B	This level is typically assigned when the volume-to-capacity ratio is low and either progression is highly favorable, or the cycle length is short. More vehicles stop than with LOS A.
>20.0 and ≤35.0	C	This level is typically assigned when progression is favorable, or the cycle length is moderate. Individual cycle failures (i.e., one or more queued vehicles are not able to depart as a result of insufficient capacity during the cycle) may begin to appear at this level. The number of vehicles stopping is significant, although many vehicles still pass through the intersection without stopping.
>35.0 and ≤55.0	D	This level is typically assigned when the volume-to-capacity ratio is high and either progression is ineffective, or the cycle length is long. Many vehicles stop and individual cycle failures are noticeable.
>55.0 and ≤80.0	E	This level is typically assigned when the volume-to-capacity ratio is high, progression is unfavorable, and the cycle length is long. Individual cycle failures are frequent.
≤80.0	F	This level is typically assigned when the volume-to-capacity ratio is very high (greater than 1.0), progression is very poor, and the cycle length is long. Most cycles fail to clear the queue.

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

Table 2: Stop-Controlled Intersection Level of Service Definitions

Average Delay Per Vehicle (Seconds)	LOS
≤10.0	A
>10.0 and ≤15.0	B
>15.0 and ≤25.0	C
>25.0 and ≤35.0	D
>35.0 and ≤50.0	E
>50.0	F

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

All intersection level of service evaluations used the peak 15-minute flow rate during the weekday AM and PM and Saturday midday peak hours. Using the peak 15-minute flow rate ensures that this analysis is based on a reasonable worst-case scenario. For this reason, the analysis reflects conditions that are only likely to occur for 15 minutes out of each peak hour. Intersection analysis was conducted using the operational methodology outlined in the HCM 6th Edition (Transportation Research Board, Washington, D.C., 2016) at all intersections, as operationalized by Synchro software version 10.

The City of Fresno has a level of service standard of LOS D for signalized and stop-controlled intersections, as implemented by the City's Traffic Impact Study Report Guidelines.[3]

Analysis Inputs

Synchro 10 software was used to conduct the traffic operations analysis. The following inputs were utilized in this analysis:

Signal Timing

The City and Caltrans provided signal timing on August 16, 2021 for the following intersections:

1. N Riverside Dr & W Herndon Ave (City)
2. N Golden State Blvd & W Herndon Ave (City)
3. SR 99 NB off-ramp & W Herndon Ave (Caltrans)
4. N Parkway Dr & W Herndon Ave (City)

For all analysis scenarios, the existing signal timing was utilized. Signal optimization was applied only under mitigation scenarios, as outlined under the mitigation description.

Pedestrian Volumes

Vehicular turning movement and pedestrian counts were collected at the study intersections on September 23 and 25, 2021. The pedestrian volumes collected were utilized in Synchro as conflicting pedestrian movement volumes and number of pedestrians calls for signalized intersections. In addition to utilizing the pedestrian volumes, the pedestrian signal timing was utilized to model traffic signal operations.

Peak Hour Factor

Existing and Existing Plus Project analyses used intersection-specific peak hour factors (PHFs) collected in the field. For all future year scenarios, the PHF was increased to 0.92 if the existing PHF was lower than 0.92. PHFs observed at or above 0.92 were maintained for future year scenarios. As traffic patterns change and volumes increase, a more consistent traffic flow can be expected. Increasing the PHF provides a conservative analysis of the future traffic flow being more consistent across the entirety of a peak hour.

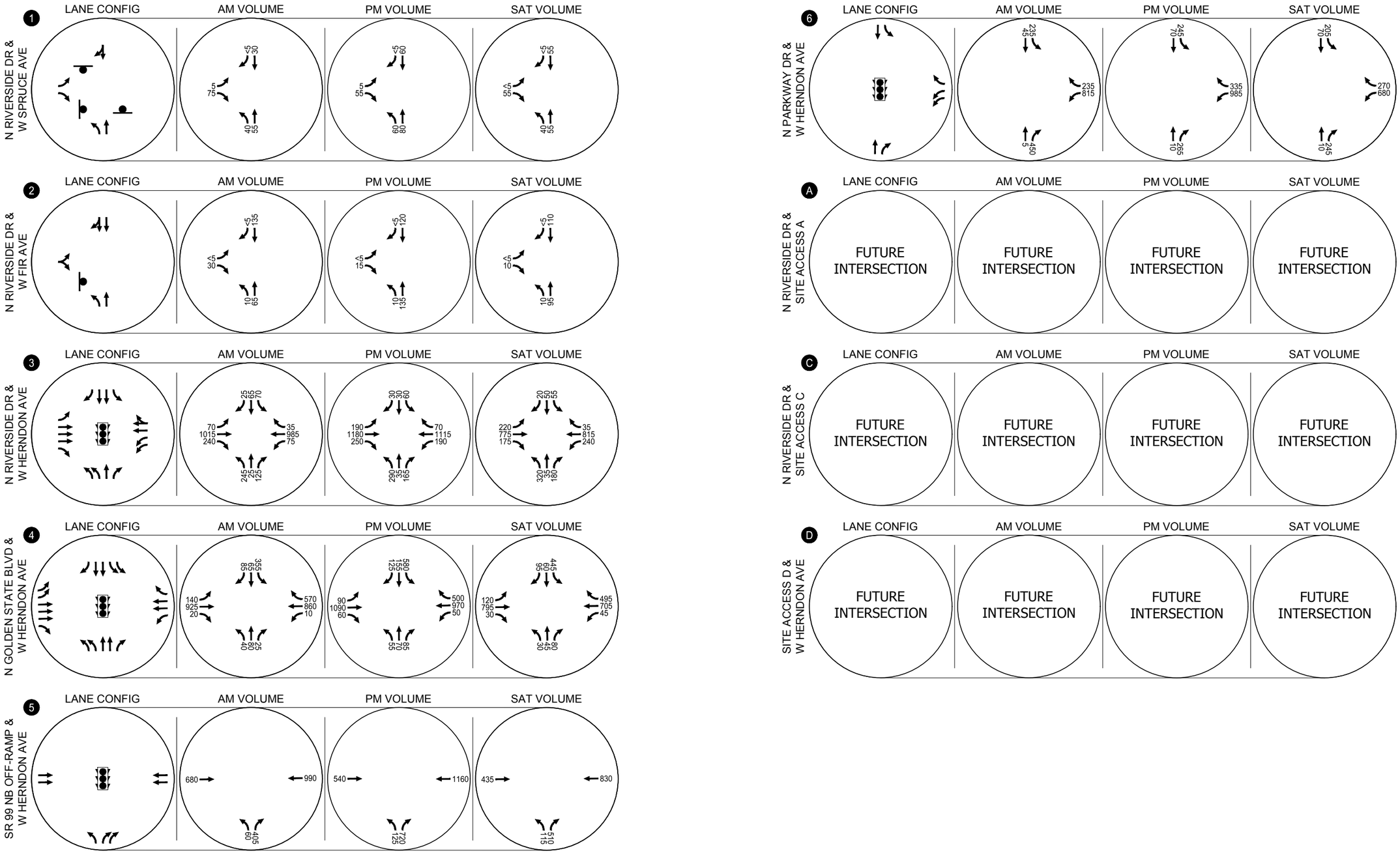
Future Volume Development

Future volumes for 2042 cumulative conditions without the project were developed using the Fresno COG travel demand model. The land uses in the travel model were checked to ensure that the project was not already included in the 2042 model forecast. Volumes for the AM and PM peak hours on each intersection approach were extracted from the model for the years 2019 and 2042. The 2042 adjusted forecasts were calculated for each intersection approach by adding the growth increment between the 2019 and 2042 model volumes to the counts collected in September 2021. If this incremental adjustment would result in a negative forecast on an intersection approach, the forecast volume was instead calculated as the traffic count times the ratio of the 2042 model volume to the 2019 model volume Then, the approach growth rate was calculated using the adjusted 2042 model volumes and the 2021 turning movement counts. For each intersection approach, the 2042 turn movements were calculated by multiplying the turning movement counts by the adjusted approach growth rates. The turn movements were then checked for continuity of flow between adjacent intersections. Model volume output files are included as Appendix Q.

[3] City of Fresno Traffic Impact Study Report Guidelines, updated February 2, 2009

EXISTING TRAFFIC CONDITIONS

Peak hour intersection turning movement counts were collected on September 23, 2021 during weekday AM and PM peak periods (7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM, respectively) and September 25, 2021 during the Saturday midday peak period (11:00 AM – 2:00 PM) while local schools were in session and there were no inclement weather conditions. As coordinated with the City during the scoping process for this transportation study, the 2021 collected counts were used to develop Existing Conditions traffic volumes for the study. The peak hours were identified as the worse four consecutive 15-minute periods during the AM and PM peak periods on weekdays and Saturdays described above. The existing intersection turn movement peak hour traffic volumes are shown in Figure 3. The figure also depicts the intersection lane configurations and traffic controls at each intersection.



- STOP SIGN
- TRAFFIC SIGNAL

Year 2021 Existing Lane Configurations, Traffic Control Devices and Traffic Volumes
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure 3

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Table 3 presents the existing traffic operations at the study intersections. The results indicate that all study intersections are operating at LOS D or better for all peak hours, except the N Riverside Dr/W Herndon Ave intersection (#3), which operates at LOS E during the weekday PM peak hour.

Appendix B includes the Synchro reports for Existing Conditions.

Table 3: Existing Conditions, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
1	N Riverside Dr/W Spruce St	AWSC	AM	7.9	A
			PM	8.0	A
			SAT	7.9	A
2	N Riverside Dr/W Fir Ave	TWSC	AM	9.0	A
			PM	8.7	A
			SAT	8.7	A
3	N Riverside Dr/W Herndon Ave	Signal	AM	28.8	C
			PM	***72.7***	***E***
			SAT	31.8	C
4	N Golden State Blvd/ W Herndon Ave	Signal	AM	28.7	C
			PM	33.6	C
			SAT	29.3	C
5	SR 99 NB Off-Ramp/ W Herndon Ave	Signal	AM	15.0	B
			PM	24.0	C
			SAT	19.4	B
6	N Parkway Dr/W Herndon Ave	Signal	AM	25.4	C
			PM	22.3	C
			SAT	18.7	B

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- **Bolded and italicized** indicate intersections operating beyond the City of Fresno standard.
- AWSC: All-Way Stop Control
- TWSC: Two-Way Stop Control
- Average delay in seconds/vehicle is reported for signalized and stop control intersections. For TWSC intersections the worst approach delay is reported.

Crash History Evaluation

Kittelson investigated the history of crashes at the study intersections. In reviewing crash data for the five-year period of 2016-2020,[4] Kittelson found there were nine reported crashes in total amongst the six study intersections. Four crashes caused property damage only, four crashes caused minor injuries, and one crash caused severe injury. Table 4 presents a summary of reported crashes by severity and location. None of the reported crashes involved a pedestrian or bicyclist.

[4] Transportation Injury Mapping System online crash database, https://tims.berkeley.edu/, Statewide Integrated Traffic Records System (SWTIRS) online crash database

Table 4: Crashes by Location and Severity, 2016-2020

No.	Location	PDO*	Minor Injury	Severe Injury
1	N Riverside Dr/W Spruce St			
2	N Riverside Dr/W Fir Ave			
3	N Riverside Dr/W Herndon Ave	2	2	
4	N Golden State Blvd/W Herndon Ave	1		
5	SR 99 NB Off-Ramp/W Herndon Ave	1		
6	W Herndon Ave/N Parkway Dr		2	1

Source: TIMS and SWITRS, 2022
*PDO = property damage only

PROPOSED PROJECT

As described above, the proposed project is the relocation of an existing Costco wholesale retail facility situated at 4500 W Shaw Ave. The project would consist of a relocated retail facility, relocated market delivery operation (MDO), 32-position fuel station, and car wash in a 22.4-acre parcel located at the northeast corner of the intersection of N Riverside Dr and W Herndon Ave.

SITE CIRCULATION ANALYSIS

Costco warehouse and MDO delivery truck inbound access is accommodated at Site Access C on N Riverside Dr. Outbound access is accommodated at Site Access D on W Herndon Ave. If Site Access D were not approved as part of the project, then outbound warehouse and MDO trucks would circulate north along the private drive east of the warehouse to W Spruce Ave. Fuel delivery truck inbound access is accommodated at the private drive from W Spruce Ave. Outbound access is accommodated at Site Access A on N Riverside Dr. The proposed site plan provides adequate lane width and curb radii to accommodate warehouse, MDO, and fuel delivery trucks within the site and at the above-named site access points.

COSTCO WAREHOUSE TRIP CHARACTERISTICS

Costco Warehouse facilities are open to members only and operate seven days a week. Typically, the warehouse building is open to members on weekdays between the hours of 10:00 AM and 8:30 PM. Weekend operating hours open to members are typically from 9:30 or 10:00 AM to 6:00 PM. The warehouses are typically closed on major holidays. Costco Gasoline fuel stations co-located on the site are typically open seven days a week between 5:00 AM and 10:00 PM.

Trip data has been collected at Costco Warehouses across the United States and documented that they typically generate higher traffic volumes than other commercial land uses with similar building sizes. In addition to the number of trips, the Costco trip generation database also documents trip type based on member survey information that provides the percentage of primary, pass-by, and diverted trips, as further described below.

- Primary Trips: an entirely new trip on the roadway system for the express purpose of driving to and from Costco
- Pass-by Trips: existing trips that are on roadways adjacent to the site, which allow motorists to turn into the Costco development and continue to their ultimate destination when their shopping is concluded
- Diverted Trips: existing trips on nearby roadways in which a motorist decides to drive out-of-direction for a distance to stop at Costco, and when their shopping is concluded, continues to their trip to the ultimate destination.

This report assesses the impacts of pass-by and diverted trip impacts at the study intersections. Typically, pass-by trips have an impact only at the site-access driveways, whereas the impact of diverted trips could extend through additional study area intersections beyond the site access points (diverted trips are typically modeled similar to net new trips at many or all of the study area intersections). Diverted and pass-by trips were considered together with engineering judgment to identify how these two trip characteristics should be applied to the project. Recognizing the context of the project site relative to key transportation corridors, this study assumes that all diverted trips would divert from SR 99, N Golden State Blvd, or the Marketplace shopping center at the southwest quadrant of the N Riverside Dr/W Herndon Ave intersection, thereby utilizing the same distribution pattern as net new trips at the site.

Warehouse, Fuel Station, and Car Wash Trip Generation

The warehouse with fuel station and car wash trip rates summarized herein rely on data collection conducted at Costco sites located across the western region of the United States. The trip studies were completed using industry standard engineering practices consistent with guidance within the Institute of Transportation Engineers (ITE) standard reference, Trip Generation Manual, 10th Edition. These cordon surveys were conducted between 2011 and 2021 and include 16 surveys of Costco warehouses with fuel stations in California, Arizona, Oregon, Utah, and Washington. The Costco buildings surveyed range in size between 144,252 sf and 166,451 sf, with an average size of 152,719 square feet, had fuel stations with 20 to 30 fueling positions, and one of which had a car wash. As a result, the Costco trip generation rates inherently account for Costco fuel station and car wash trips within the overall rate. Table 5 summarizes trip characteristics for the weekday AM, weekday PM, and weekend midday peak hours.

Table 5: Trip Characteristics for Costco Warehouse with Fuel Station and Car Wash, Weekday AM, Weekday PM & Weekend Midday Peak Hours

Land Use	Weekday Daily Trip Rate (per KSF)	Weekday AM Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)			Weekday PM Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)			Weekend Daily Trip Rate (per KSF)	Weekend Midday Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)		
		Total	In	Out	Total	In	Out		Total	In	Out
Costco Warehouse W/ Fuel Station and Car Wash	95.18	2.29	54%	46%	8.23	46%	54%	118.31	11.13	49%	51%
Primary Trips	No Data	No Data			57%			No Data	62%		
Pass-by Trips	No Data	No Data			21%			No Data	23%		
Diverted Trips	No Data	No Data			22%			No Data	15%		

Source: Kittelson & Associates, Inc., 2023

MDO Trip Generation

MDOs are Costco's last-mile facilities for big and bulky items. At these facilities, there is a daily morning delivery of large goods, organization of the goods, and loading of last-mile trucks for delivery to members' homes. Delivery of goods using larger trucks dispatched to the MDO occurs well before 6:00 AM daily. Two MDO on-site employee shifts are utilized: one from 6:00 AM to 2:00 PM, the other from 12:00 PM to 8:00 PM. Delivery teams arrive at the MDO site in a personal vehicle around 6:45 AM, load their last-mile trucks, and depart. The delivery teams return to the MDO site between 3:00 PM and 6:00 PM, depending on the time required to complete all deliveries, to unload remaindered materials for recycling, and depart after concluding their workday. The MDO delivery trucks are stored on-site overnight.

Costco's existing MDO serving the greater Fresno area operates today at 3688 E Central Ave and is served by 23 on-site employees and approximately 10 delivery trucks with two-person teams, each of which makes one daily roundtrip of deliveries to members' homes. Two days per week, the MDO has one additional truck make three round trips to another warehouse.

The project includes relocating the MDO operations to a 49,996-sf space on the project site. The relocated MDO will be served by the same on-site and delivery employees working at the existing MDO location. No measured trip data were available for the existing MDO facility at the time this report was prepared. Accordingly, MDO trips were estimated two ways: considering anticipated MDO operations and using nationally available trip data.

The operations of an MDO translate to the following trips generated during weekday AM, weekday PM, and weekend midday peak hours:

- Weekday AM Peak Hour
  - Delivery employees arriving (22 inbound trips)
  - Delivery trucks departing for last-mile deliveries and to other warehouse (11 outbound trips)
- Weekday PM Peak Hour
  - Delivery trucks returning (11 inbound trips)
  - On-site employees return from potential break off-site (conservatively estimate 23 inbound trips)
  - Delivery truck to other warehouse departing (1 outbound trip)
- Weekend Midday Peak Hour
  - On-site employees arriving (23 inbound trips)
  - Delivery truck to other warehouse arriving (1 inbound trip)
  - On-site employees leaving (23 outbound trips)
  - Delivery truck to other warehouse departing (1 outbound trip)

Table 6 presents the sum of these trips based on MDO operations. For comparison purposes, Kittelson also estimated trips for the MDO using ITE *Trip Generation Manual, 10th Edition* trip generation rates for Warehouse, Land Use Code 150, also summarized in Table 6.

Table 6: Trip Generation Estimates for MDO, MDO Operations-Based and ITE Warehouse Comparison

Land Use	ITE Code	Size	Weekday Daily Trip Rate (per KSF)	Weekday AM Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)			Weekday PM Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)			Weekend Daily Trip Rate (per KSF)	Weekend Midday Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)		
				Total	In	Out	Total	In	Out		Total	In	Out
Costco MDO	-	49,996 SF	230	33	22	11	35	34	1	230	48	24	24
Warehouse	150		87	8	7	1	9	2	7	8	2	2	0

Source: Kittelson & Associates, Inc., 2023

As presented in the table, use of ITE warehouse trip rates would underestimate the amount of trip expected to be generated by the MDO when the facilities operations are taken into consideration. Therefore, this study assumed the MDO operations-based trip generation to conduct the transportation analyses.

Project Trip Generation

Table 7 presents the overall project trip generation estimates based on proprietary Costco-specific data.

Table 7: Project Trip Generation Estimate

Land Use	Size	Weekday Daily Trip Rate (per KSF)	Weekday AM Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)			Weekday PM Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)			Weekend Daily Trip Rate (per KSF)	Weekend Midday Peak Hour of Adjacent Street Traffic Trip Rate (trips/1,000 sf)		
			Total	In	Out	Total	In	Out		Total	In	Out
Costco Warehouse w/ Fuel Station & Car Wash	191,346	18,212	439	238	201	1,576	732	844	22,638	2,130	1,040	1,090
Pass-by Trips*		(3,788)	(91)	(49)	(42)	(328)	(152)	(176)	(5,297)	(498)	(243)	(255)
Diverted Trips*		(4,038)	(97)	(52)	(45)	(349)	(162)	(187)	(3,305)	(311)	(152)	(159)
Net New Trips		10,386	251	137	114	899	418	481	14,036	1,321	645	676
MDO	49,996	230	33	22	11	35	34	1	230	48	24	24
Net New Trips		10,616	284	159	125	934	452	482	14,266	1,369	669	700

Source: Kittelson & Associates, Inc., 2023

*No data are available for daily and weekday AM peak hour pass-by and diverted trips through the Costco database. Kittelson applied the weekday PM rates to the weekday AM and daily trips and applied the weekend midday rates to the weekend daily trips.

As shown in Table 7, the project is estimated to generate 10,616 weekday daily net new trip ends. Of these, 284 are estimated to occur in the weekday AM peak hour (159 inbound / 125 outbound), 934 are estimated to occur in the weekday PM peak hour (452 inbound / 482 outbound). The project is estimated to generate 14,266 weekend daily net new trip ends. Of these, 1,369 are estimated to occur in the weekend midday peak hour (669 inbound / 700 outbound).

Warehouse Deliveries

Costco anticipates an average of about 10-13 Costco trucks a day delivering goods to the Costco warehouse. Costco fleet trucks typically measure up to approximately 70 feet long for double-axle trailers. Typical receiving time is from 2:00 AM to 1:00 PM, averaging two to three trucks per hour, with most of the deliveries completed before the mid-morning warehouse opening time. Deliveries to the warehouse are made primarily in Costco trucks from its freight consolidation facility (depot) in Tracy, CA. In addition to the Costco depot trucks, deliveries such as bread are expected to be made by local vendors using single unit trucks and/or single-axle trailers.

MDO Deliveries

Costco anticipates one daily delivery of large goods to the MDO facility. Typical receiving time is before 6:00 AM made primarily in Costco trucks from its freight consolidation facility (depot) in Tracy, CA.

Costco Gasoline Deliveries

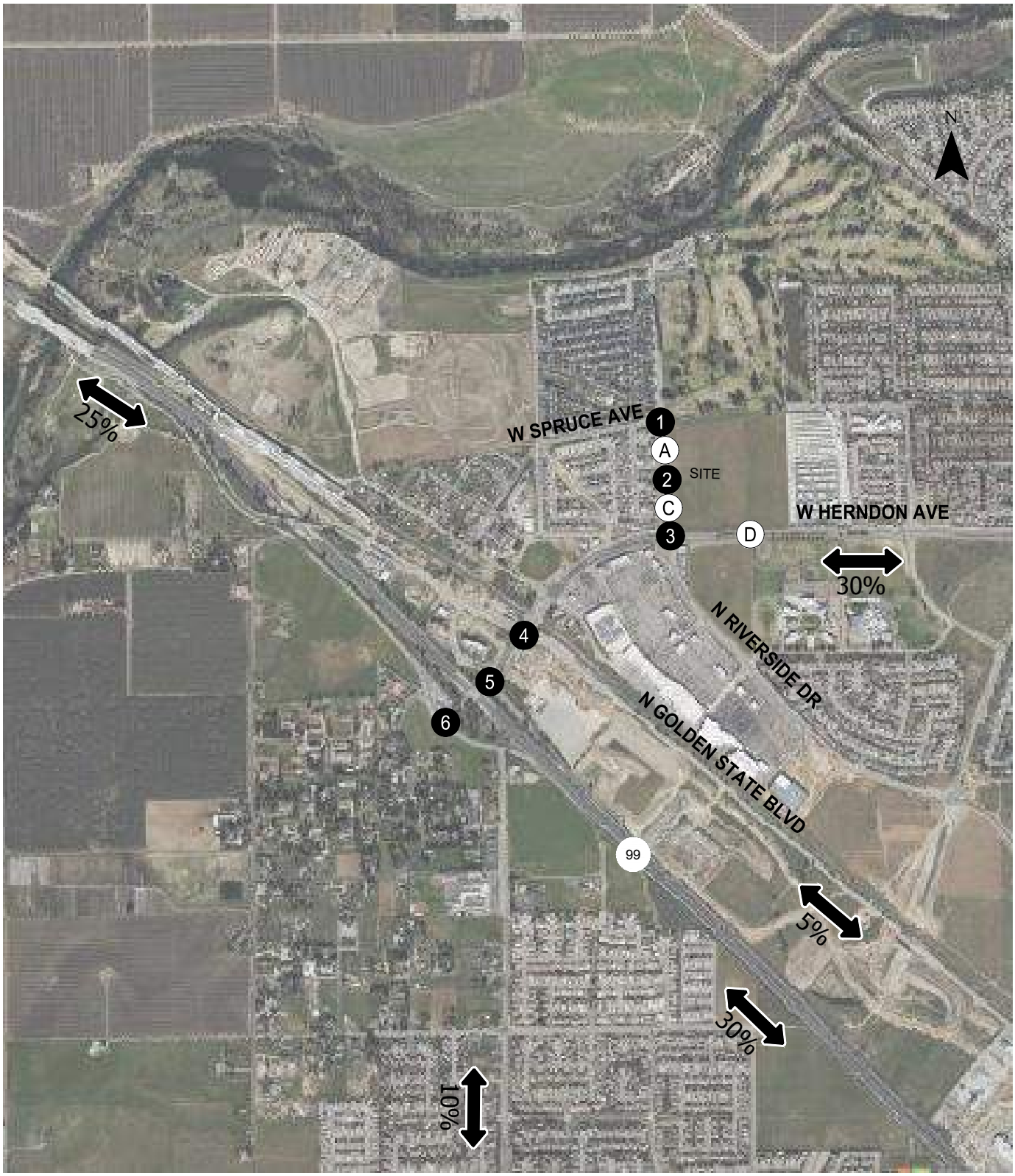
Costco anticipates that the Costco Gasoline fuel station will receive five to seven fuel deliveries per day on average. During busy holiday weeks, an additional delivery is often required during the day. These deliveries typically occur any time when the fuel station is open.

PROJECT TRIP DISTRIBUTION

The relocated Costco would be situated approximately 2.9 miles northwest of the existing Costco location on W Shaw Ave and 7.8 miles west of the North Fresno Costco, located on N Abby St. The project trip

distribution utilizes proprietary Costco transaction data for the existing warehouses at W Shaw Ave and N Abby St, proprietary market area data for the relocated warehouse, and Costco membership data, and it considers the roadway network.

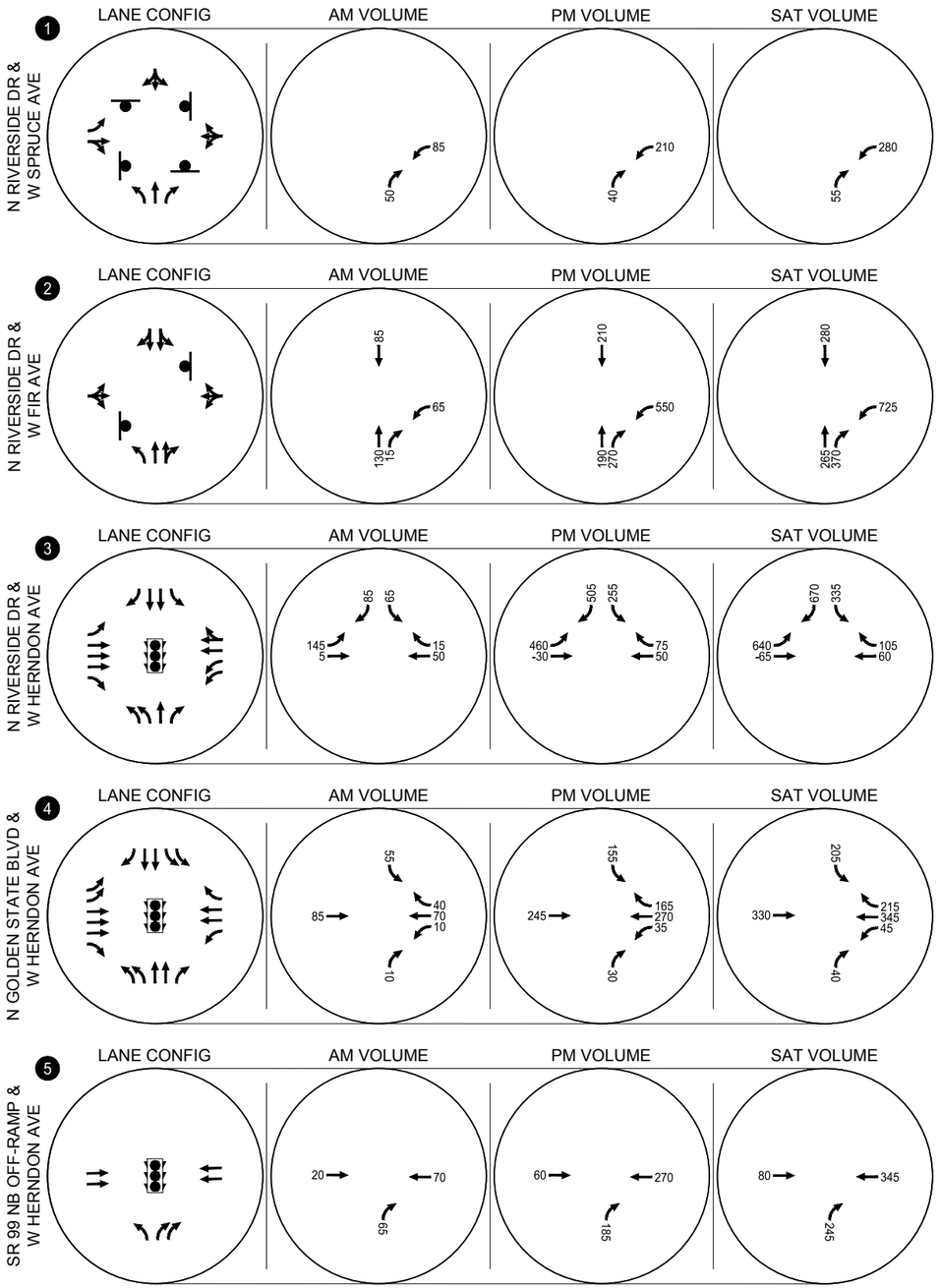
Figure 4 presents the project trip distribution. Figure 5 presents project trip volumes.



##- Study Intersections
XX% Trip Distribution Percentage

Project Trip Distribution
Fresno, California

Figure
4



- STOP SIGN
- TRAFFIC SIGNAL

Project Trip Volumes
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure
5

KITTELSON & ASSOCIATES

EXISTING PLUS PROJECT CONDITIONS

The potential effects of the project on existing traffic operations at the study intersections are discussed in this section. This analysis includes the reclassification of W Herndon Ave from an expressway to a super arterial. As an expressway, no direct site access is permitted onto the roadway. Under the reclassification scenario the site proposes an additional left-in, right-in, right-out intersection onto W Herndon Ave.

INTERSECTION OPERATIONS

Kittelson developed traffic volumes for Existing Plus Project conditions using an additive approach. Kittelson estimated vehicle trips generated by the project and added those trips to existing volumes on the roadway network to develop the volumes for the Existing Plus Project conditions. Existing Plus Project turning movement volumes are presented in Figure 6.

As shown in Table 8, all study intersections would operate within City standard of LOS D or better under Existing Plus Project conditions, except for the following:

- N Riverside Dr/W Fir Ave (Intersection 2)
    - PM Peak Hour (LOS F)
    - Saturday Midday Peak Hour (LOS F)
- N Riverside Dr/W Herndon Ave (Intersection 3)
    - AM Peak Hour (LOS E)
    - PM Peak Hour (LOS F)
    - Saturday Midday Peak Hour (LOS F)
- N Golden State Blvd/W Herndon Ave (Intersection 4)
    - PM Peak Hour (LOS E)
    - Saturday Midday Peak Hour (LOS E)

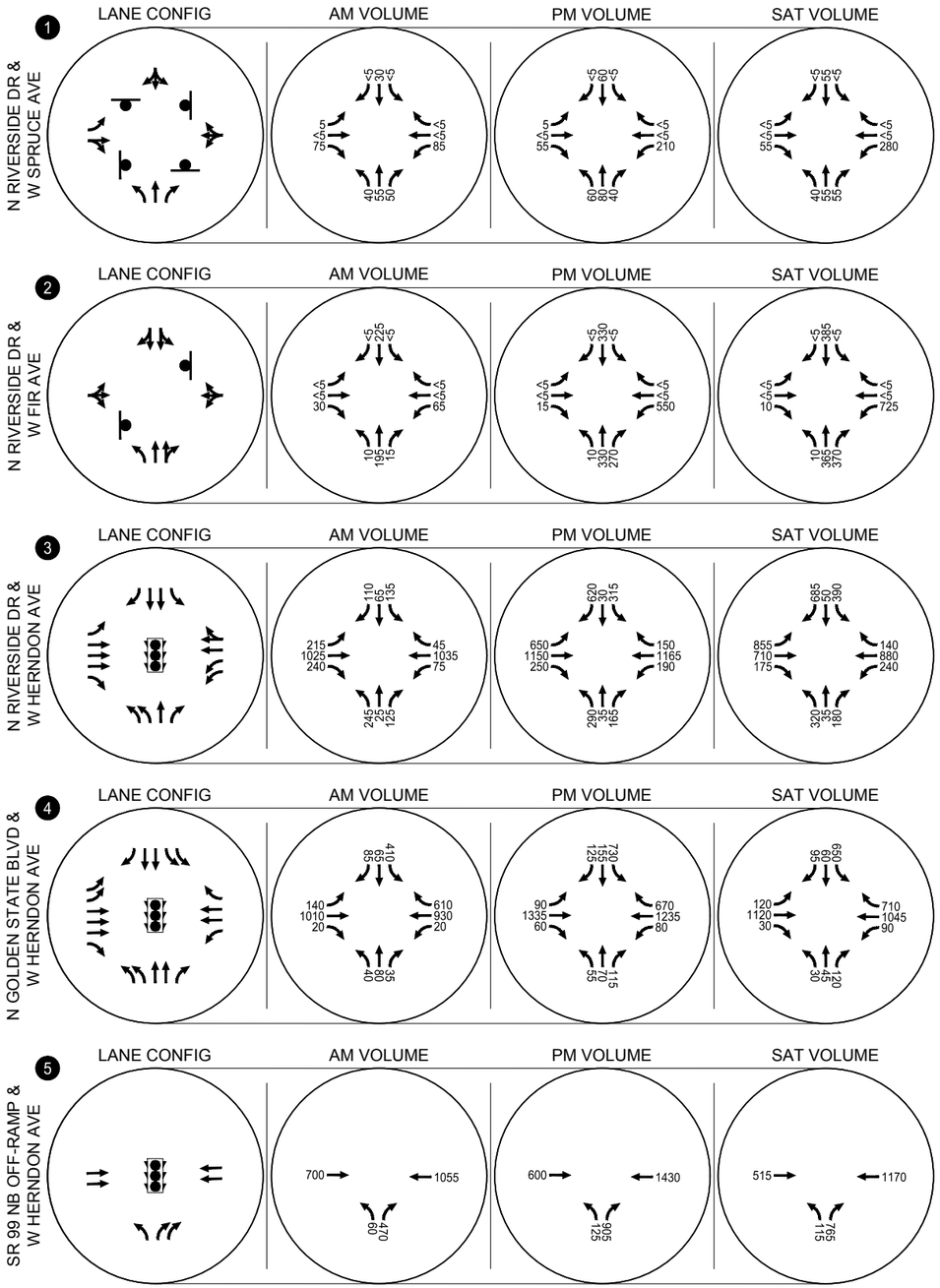
Appendix C includes Synchro output reports for Existing Plus Project conditions.

Table 8: Existing Plus Project Conditions, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
1	N Riverside Dr/ W Spruce Ave	AWSC	AM	8.7	A
			PM	10.3	B
			SAT	12.1	B
2	N Riverside Dr/ W Fir Ave	TWSC	AM	14.8	B
			PM	***>50***	***F***
			SAT	***>50***	***F***
3	N Riverside Dr/ W Herndon Ave	Signal	AM	***63.1***	***E***
			PM	***>80***	***F***
			SAT	***>80***	***F***
4	N Golden State Blvd/ W Herndon Ave	Signal	AM	34.2	C
			PM	***66.5***	***E***
			SAT	***70.8***	***E***
5	SR 99 NB Off-Ramp/ W Herndon Ave	Signal	AM	16.6	B
			PM	37.2	D
			SAT	26.3	C
6	N Parkway Dr/ W Herndon Ave	Signal	AM	26.1	C
			PM	25.8	C
			SAT	22.4	C
A	N Riverside Dr/ Site Access A	TWSC	AM	<1	A
			PM	<1	A
			SAT	<1	A
C	N Riverside Dr/ Site Access C	TWSC	AM	<1	A
			PM	<1	A
			SAT	<1	A
D	Site Access D/ W Herndon Ave	TWSC	AM	14.5	B
			PM	19.2	C
			SAT	16.4	C

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- **Bolded and italicized** indicate intersections operating beyond the City of Fresno standard.
- AWSC: All-Way Stop Control
- TWSC: Two-Way Stop Control
- Average delay in seconds/vehicle is reported for signalized and stop control intersections. For TWSC intersections the worst approach delay is reported.



- STOP SIGN
- TRAFFIC SIGNAL

Year 2021 Existing Plus Project Lane Configurations, Traffic Control Devices and Traffic Volumes
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure
6

KITTELSON & ASSOCIATES

DRIVEWAY OPERATIONS

Traffic operations were evaluated at the Costco site driveways on N Riverside Dr adjacent to the proposed site accesses using Synchro, applying HCM 6th Edition methodologies. In addition, left-turn and right-turn lane needs were analyzed with project volumes utilizing guidance from the *National Cooperative Highway Research Program's (NCHRP) Report 279: Intersection Channelization Design Guide* and *NCHRP Report 457: Evaluating Intersection Improvements: An Engineering Study Guide*. The analyses were conducted using Saturday midday volumes as they represented the highest volumes at the driveways.

Turn Lane Assessment

Turn lane opportunities were analyzed for the site accesses along N Riverside Dr and W Herndon Ave with the findings summarized in Table 9. *Appendix D* contains the turn lane analysis worksheets.

Table 9: Existing Plus Project, Turn Lane Analysis Results

No.	Intersection	Proposed Access Type	Turn Lane	Threshold Met
2	N Riverside Dr/ W Fir Ave	Full-Movement Two-Way Stop-Controlled	NB Right Turn Lane	***Yes***
			SB Left Turn Lane	No
A	N Riverside Dr/ Site Access A	Right-In Right-Out Stop-Controlled	NB Right Turn Lane	No
C	N Riverside Dr/ Site Access C	Right-In, Right-Out Stop-Controlled	NB Right Turn Lane	***Yes***
D	Site Access D/ W Herndon Ave	Left-In, Right-In, Right-Out Stop Controlled	WB Right-Turn Lane	***Yes***
			EB Left-Turn Lane	***Yes***

Source: Kittelson & Associates, Inc., 2023

N Riverside Dr at W Fir Ave and at Site Access C satisfy the right-turn thresholds with Existing Plus Project traffic volumes.

The curb-to-curb width at N Riverside Dr for the northbound approach at W Fir Ave is about 60 feet, with a 5-foot bike lane, two 11-foot southbound travel lanes, an 11.5-foot northbound left turn lane, and an 18.5-foot northbound lane. A northbound right-turn lane can be accommodated if the roadway is widened onto the project site.

The curb-to-curb width at N Riverside Dr for the northbound approach at Site Access C is about 65 feet, with a 5-foot bike lane, 11-foot southbound travel lanes, a concrete median, and about 30 feet of asphalt in the northbound direction. A northbound right-turn lane may be accommodated if the median is moved, and/or the roadway is widened onto the project site.

While Site Accesses A and C meet the threshold for a right-turn lane, the project already will construct a second northbound travel lane along the project frontage between W Herndon Ave and W Spruce Ave. At W Spruce Ave, there is not a second receiving lane to the north of the intersection. Therefore, the second northbound lane would function as a right-turn lane at the intersection and would not carry through traffic. Given the lower speeds expected on the section of N Riverside Dr along the project frontage and the absence of a second receiving lane to the north of W Spruce Ave, the second northbound lane constructed as part of the project could accommodate right-turn traffic entering the project site while through traffic uses the inner lane.

SIGNAL WARRANTS

The *Manual on Uniform Traffic Control Devices* (MUTCD) identifies nine warrants for traffic signal installation. The first three volume-based warrants (#1-Eight Hour, #2-Four Hour, #3-Peak Hour) were evaluated based on traffic volumes for Existing Plus Project conditions. *Appendix E* contains the signal warrants worksheets.

Table 10: Existing Plus Project Conditions, Signal Warrants

No.	Intersection	Proposed Access Type	Warrant	Threshold Met
1	N Riverside Dr/ W Spruce Ave	PM	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	No
		SAT	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	No
2	N Riverside Dr/ W Fir Ave	PM	#1 - Eight-Highest	***Yes***
			#2 – Four-Hour	***Yes***
			#3 – Peak Hour	***Yes***
		SAT	#1 - Eight-Highest	***Yes***
			#2 – Four-Hour	***Yes***
			#3 – Peak Hour	***Yes***
D	Site Access D/ W Herndon Ave	PM	#1 – Eight Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	***Yes***
		SAT	#1 – Eight Highest	***Yes***
			#2 – Four Hour	***Yes***
			#3 – Peak Hour	***Yes***

Source: Kittelson & Associates, Inc., 2023

For N Riverside Dr/W Fir Ave, the threshold for warrants 1, 2, and 3 are met on a weekday and Saturday. Based on this finding and the proposed location of the primary full-access driveway to the project site at this intersection, it is recommended that a signal be installed at this location.

For Site Access D on W Herndon Ave, the threshold for warrant 3 is met on a weekday and the threshold for warrants 1, 2, and 3 are met on Saturday. Given the proximity of Site Access D to the signalized N Riverside Dr/W Herndon Ave intersection (800' to the east), the minor access characterization of Site Access D, and that the intersection is expected to operate within City standard, installation of a signal is not recommended at this location.

95TH PERCENTILE QUEUES

An analysis of 95th percentile queue lengths was performed using Synchro software version 10. Queue lengths are presented in Table 11 for the Existing peak hours. The longest queue present during any of the three peak hours is shown in the table. The study intersections were found to mostly have sufficient storage to contain the 95th percentile queue lengths. Exceptions to this are:

- **N Riverside Dr/W Fir Ave (Intersection 2):** The queue for exiting the project site (westbound approach) is predicted to extend well within the site during the Saturday midday peak hour.
- **N Riverside Dr/W Herndon Ave (Intersection 3):** Northbound left, southbound left, southbound right, and eastbound left movements are predicted to exceed available capacity during the PM peak hour.
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Southbound left, eastbound through, and westbound right are predicted to exceed available capacity during the PM peak hour.

Appendices B, C, and F contain queue length summary reports for the different scenarios.

Table 11: Existing Plus Project Conditions, 95th Percentile Queues

No.	Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
1	N Riverside Dr/ W Spruce Ave	Storage	150	375	100		-		80	225			575	
		Existing SAT	25	25	-		25		25	25			-	
		Existing + Project SAT	25	25	25		25		25	25			125	
2	N Riverside Dr/ W Fir Ave	Storage	225	250			375			225			700	
		Existing SAT	25	-			25			25			-	
		Existing + Project SAT	25	25			25			25			***>1,000***	
		Existing + Project SAT with Improvements	25	175			125			25			575	
3	N Riverside Dr/ W Herndon Ave	Storage	225	-	225	325	-	100	225	-	275	225	-	
		Existing PM	***275***	75	50	100	25	25	250	300	50	100	600	
		Existing + Project PM	***275***	50	50	***625***	25	***625***	***1,325***	375	50	150	950	
		Existing + Project PM with Improvements	***275***	75	50	***450***	25	***500***	***450***	375	50	150	875	25
4	N Golden State Blvd/ W Herndon Ave	Storage	150	300	150	275	600	175	250	500	350	150	325	325
		Existing PM	50	50	75	***300***	75	50	50	300	25	75	***450***	275
		Existing + Project PM	50	50	100	***425***	75	50	50	425	25	100	***700***	***550***
		Existing + Project PM with Improvements	50	75	100	***475***	100	50	75	500	25	150	***750***	***400***
5	SR 99 NB Off Ramp/ W Herndon Ave	Storage	275	-	650		-			500			550	
		Existing PM	125	-	175		-			200			325	
		Existing + Project PM	100	-	300		-			200			375	
6	N Parkway Dr/ W Herndon Ave	Storage	-	500	150	125	300	-		-		500	-	175
		Existing PM	-	25	50	250	50	-		-		150	-	25
		Existing + Project PM	-	25	50	250	50	-		-		375	-	150
A	N Riverside Dr/ Site Access A	Storage		-			-			-			700	
		Existing SAT		-			-			-			-	
		Existing + Project SAT		-			-			-			25	
C	N Riverside Dr/ Site Access C	Storage		-			-			-			300	
		Existing SAT		-			-			-			-	
		Existing + Project SAT		-			-			-			25	
D	Site Access D/ W Herndon Ave	Storage		-		-	-	1000	100	-	-		-	
		Existing SAT		-		-	-	-	-	-	-		-	
		Existing + Project SAT		-		-	-	25	25	-	-		-	

Source: Kittelson & Associates, Inc. 2023
Intersections analyzed using HCM 6 methodologies
Queue lengths reported in feet (rounded to the nearest vehicle length)
Intersections shaded in gray represent locations where queue lengths would exceed storage.

RECOMMENDED OFF-SITE IMPROVEMENTS

The following improvements in conjunction with site development would mitigate the Existing Plus Project traffic operations to a level that satisfies City intersection performance requirements.

- **N Riverside Dr/W Fir Ave (Intersection 2):** Signalize intersection.
- **N Riverside Dr/W Herndon Ave (Intersection 3):** Restripe existing eastbound approach to include second eastbound left turn lane. Extend eastbound left-turn lane an additional 150 feet, repurposing the raised median in the roadway cross section. Add southbound right-turn overlap to traffic signal.
    - **Note:** A revision of the signal timing to change all left turns from protected only to protected-permitted would mitigate the intersection to a level that satisfies performance requirements. However, the City does not support protected-permitted left-turns for this location.
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Revise signal phasing to optimize green-time allocation relative to anticipated volumes. For the westbound approach, the queue would extend past the N Weber Ave intersection. To reduce queue blockage of the intersection, "DO NOT BLOCK" pavement markings are recommended for the full width of N Weber Ave. On the north leg, reconstruct the median to extend the southbound dual left-turn pocket as far north as possible without interfering with the existing northbound left-turn pocket at W Kathryn Ave.

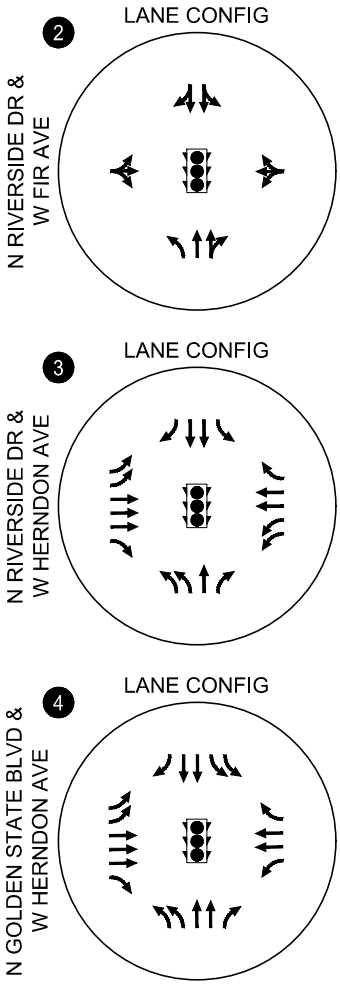
Table 12 presents the operations at the intersections with the recommended improvements. Figure 7 illustrates the resultant lane configurations and traffic control devices at the intersections with recommended geometric improvements. *Appendix F* contains Synchro output reports for the Existing Plus Project Conditions.

Table 12: Existing Plus Project Conditions with Off-Site Improvements, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
2	N Riverside Dr/W Fir Ave	Signal	AM	4.8	A
			PM	15.7	B
			SAT	44.3	D
3	N Riverside Dr/W Herndon Ave	Signal	AM	51.9	D
			PM	***86.0***	***F***
			SAT	***76.5***	***E***
4	N Golden State Blvd/W Herndon Ave	Signal	AM	34.2	C
			PM	45.2	D
			SAT	46.3	D

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro 10th Edition and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- Average delay in seconds/ vehicle is reported for signalized and stop control intersections.



Proposed Intersection Improvements
Fresno, California

Figure
7

FUTURE CONDITIONS

The future traffic conditions analysis forecasts how the study intersections would operate in the Year 2042 with the traffic generated by regional growth and development in the area assuming completion of planned transportation projects. regional growth and planned transportation improvements in the project area. Future volumes were developed using the Fresno Council of Governments (FCOG) transportation system model. The model provides expected future AM and PM traffic volumes. In the study area an additional State Highway interchange is planned to the south of W Herndon Ave and north of W Shaw Ave. This planned interchange results in lower traffic volumes within the immediate project vicinity. The future PM volumes from the model were used to develop the future Saturday midday volumes by applying the projected trip growth factors realized in the PM peak hour to the Saturday volumes.

INTERSECTION OPERATIONS

Traffic volumes for Future Conditions prior to project site development were developed using a compounded growth rate approach. Specifically, existing traffic volumes were multiplied by a compounded growth rate developed using the Fresno Coalition of Governments (Fresno COG) countywide travel demand model. Future peak hour turning movement volumes are presented in Figure 8.

As shown in Table 13, all study intersections are projected to operate acceptably at LOS D or better under Future Conditions, except under the following scenario:

- N Riverside Dr/W Herndon Ave (Intersection 3)
    - PM Peak Hour (LOS E)

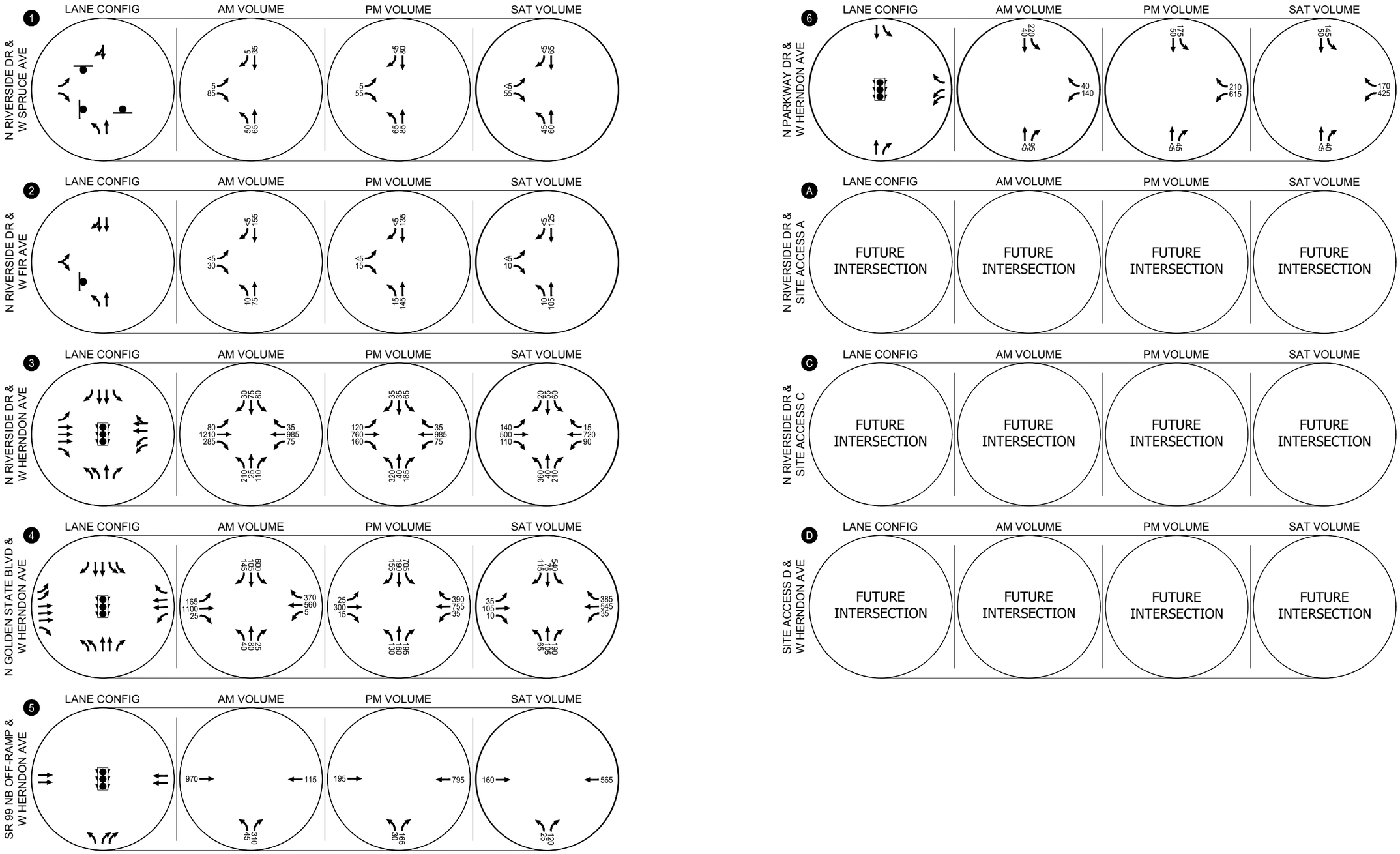
Appendix G includes Synchro output reports for Future Conditions.

Table 13: Future Conditions, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
1	N Riverside Dr/W Spruce Ave	AWSC	AM	7.9	A
			PM	8.1	A
			SAT	7.9	A
2	N Riverside Dr/W Fir Ave	TWSC	AM	8.9	A
			PM	8.8	A
			SAT	8.7	A
3	N Riverside Dr/W Herndon Ave	Signal	AM	25.8	A
			PM	***76.6***	***E***
			SAT	32.2	C
4	N Golden State Blvd/W Herndon Ave	Signal	AM	28.4	C
			PM	42.1	D
			SAT	34.6	C
5	SR 99 NB Off Ramp/W Herndon Ave	Signal	AM	15.1	B
			PM	10.5	B
			SAT	9.9	A
6	N Parkway Dr/W Herndon Ave	Signal	AM	26.1	C
			PM	16.5	B
			SAT	15.2	B

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- **Bolded and italicized** indicate intersections operating beyond the City of Fresno standard.
- AWSC: All-Way Stop Control
- TWSC: Two-Way Stop Control
- Average delay in seconds/vehicle is reported for signalized and stop control intersections. For TWSC intersections the worst approach delay is reported.



- STOP SIGN
- TRAFFIC SIGNAL

Year 2042 Future Lane Configurations, Traffic Control Devices and Traffic Volumes
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure
8

KITTELSON & ASSOCIATES

FUTURE PLUS PROJECT CONDITIONS

The potential effects of the project on future traffic operations at the study intersections are discussed in this section. This analysis includes the reclassification of W Herndon Ave from an expressway to a major arterial. As an expressway, no direct site access is permitted onto the roadway. Under the reclassification scenario the site proposes an additional left-in, right-in, right-out intersection onto W Herndon Ave.

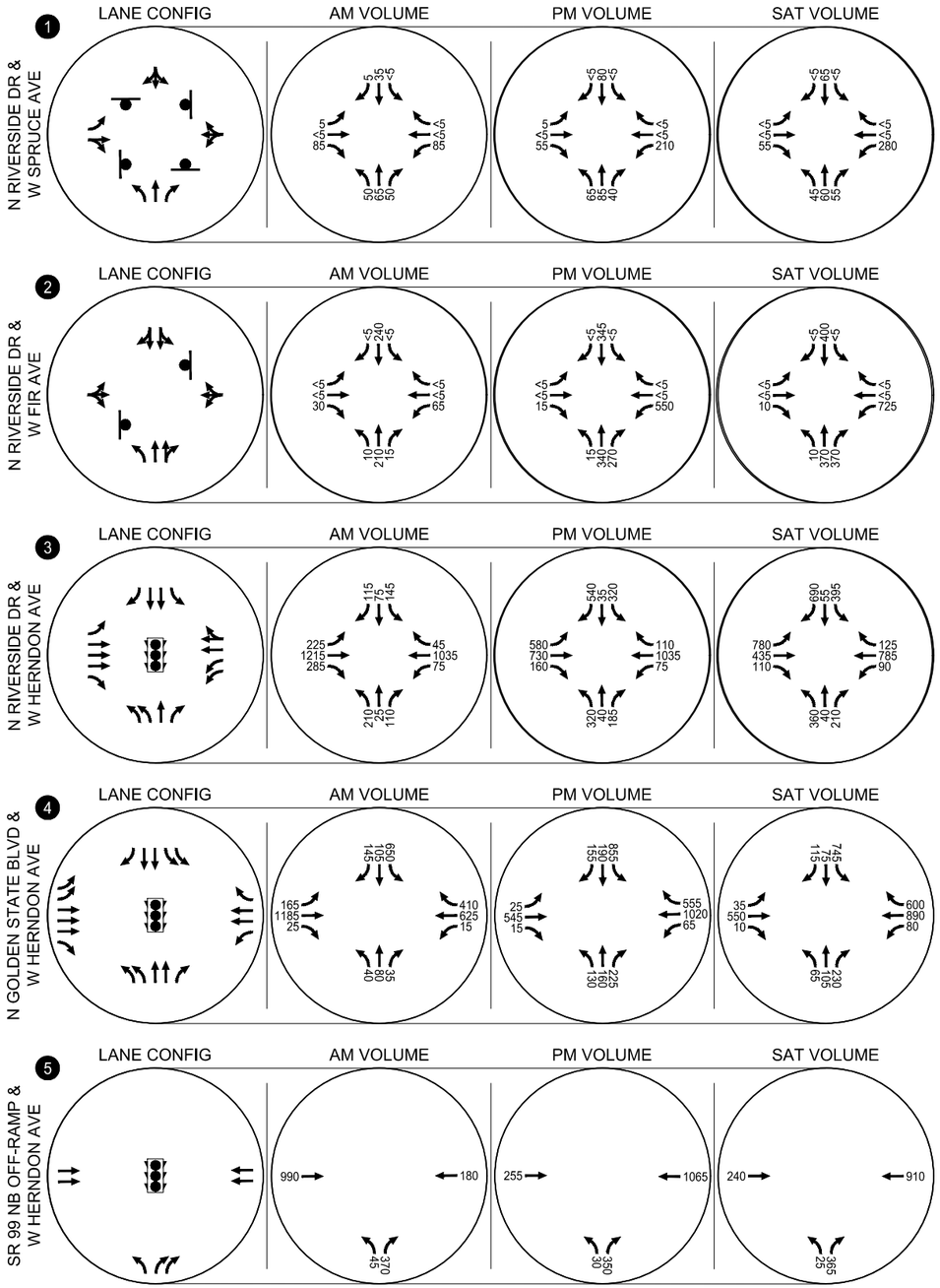
INTERSECTION OPERATIONS

Traffic volumes for Future Plus Project conditions were developed using an additive approach. Project trips were added to Future Conditions traffic on the roadway network to develop the volumes for the Future Plus Project with reclassification conditions. Future Plus Project with reclassification turning movement volumes for weekday AM, PM and Saturday peak hours are presented in Figure 9.

As shown in Table 14, the following study intersections would operate at unacceptable LOS during the analysis periods listed:

- N Riverside Dr/W Fir Ave (Intersection 2)
    - PM Peak Hour (LOS F)
    - Saturday Midday Peak Hour (LOS F)
- N Riverside Dr/W Herndon Ave (Intersection 3)
    - AM Peak Hour (LOS E)
    - PM Peak Hour (LOS F)
    - Saturday Midday Peak Hour (LOS F)
- N Golden State Blvd/W Herndon Ave (Intersection 4)
    - PM Peak Hour (LOS E)
    - Saturday Midday Peak Hour (LOS E)

Appendix H includes Synchro output reports for Future Plus Project conditions.



- STOP SIGN
- TRAFFIC SIGNAL

Year 2042 Future Plus Project Lane Configurations, Traffic Control Devices and Traffic Volumes
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure
9

KITTELSON & ASSOCIATES

Table 14: Future Plus Project Conditions, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
1	N Riverside Dr/W Spruce Ave	AWSC	AM	8.5	A
			PM	10.5	B
			SAT	11.7	B
2	N Riverside Dr/W Fir Ave	TWSC	AM	13.0	B
			PM	***>50***	***F***
			SAT	***>50***	***F***
3	N Riverside Dr/W Herndon Ave	Signal	AM	***56.9***	***E***
			PM	***>80***	***F***
			SAT	***>80***	***F***
4	N Golden State Blvd/W Herndon Ave	Signal	AM	31.4	C
			PM	***76.2***	***E***
			SAT	***68.9***	***E***
5	SR 99 NB Off Ramp/W Herndon Ave	Signal	AM	16.1	B
			PM	14.7	B
			SAT	15.6	B
6	N Parkway Dr/W Herndon Ave	Signal	AM	23.9	C
			PM	16.4	B
			SAT	16.9	B
A	N Riverside Dr/Site Access A	TWSC	AM	<1	A
			PM	<1	A
			SAT	<1	A
C	N Riverside Dr/Site Access C	TWSC	AM	<1	A
			PM	<1	A
			SAT	<1	A
D	Site Access D/W Herndon Ave	TWSC	AM	14.5	B
			PM	15.4	C
			SAT	13.9	B

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- **Bolded and italicized** indicate intersections operating beyond the City of Fresno standard.
- AWSC: All-Way Stop Control
- TWSC: Two-Way Stop Control
- Average delay in seconds/vehicle is reported for signalized and stop control intersections. For TWSC intersections the worst approach delay is reported.

FUTURE DRIVEWAY OPERATIONS

Traffic operations at the Costco site driveways on N Riverside Dr and W Herndon Ave adjacent to the proposed site accesses were also evaluated with the revised site access for the weekday AM, PM and Saturday midday peak hours.

Turn Lane Assessment

Turn lane opportunities were analyzed for the site accesses along N Riverside Dr and W Herndon Ave. The warrant analysis used the AASHTO Green Book. The warrants were developed using Saturday midday volumes as they represented the highest volumes at the driveways. Appendix I contains the turn lane warrants worksheets.

Table 15 shows the results of the turn lane analysis at the site access locations.

Table 15: Future Plus Project Conditions, Turn Lane Analysis Results

No.	Intersection	Proposed Access Type	Turn Lane	Threshold Met
2	N Riverside Dr/ W Fir Ave	Full-Movement Two-Way Stop-Controlled	NB Right Turn Lane	**Yes**
			SB Left Turn Lane	No
A	N Riverside Dr/ Site Access A	Right-In Right-Out Two-Way Stop-Controlled	NB Right Turn Lane	No
C	N Riverside Dr/ Site Access C	Right-In, Right-Out Two-Way Stop-Controlled	NB Right Turn Lane	**Yes**
D	Site Access A/ W Herndon Ave	Left-In, Right-In, Right-Out Two-Way Stop-Controlled	WB Right Turn Lane	**Yes**
			EB Left Turn Lane	**Yes**

Source: Kittelson & Associates, Inc., 2023

Like the Existing Plus Project condition, N Riverside Dr at W Fir Ave and at Site Access C meet the right-turn assessment with Future Plus Project traffic volumes.

In addition, westbound right turn and eastbound left turn lane warrants are also met at Site Access A and W Herndon Ave. Currently, the curb-to-curb right of way on W Herndon Ave at the proposed site access is approximately 95 feet, with 5 12-foot travel lanes (3 eastbound and 2 westbound lanes) and a 25-foot median. Turn lanes can likely be accommodated on W Herndon Ave while maintaining current lane widths if the median is removed.

SIGNAL WARRANTS

The MUTCD 8-hour, 4-hour and peak hour traffic signal warrants were analyzed for the Future Plus Project conditions. Results are presented in Table 16. *Appendix J* contains the signal warrants worksheets.

Table 16: Future Plus Project Conditions, Signal Warrants

No.	Intersection	Peak Hour	Warrant	Threshold Met
1	N Riverside Dr/W Spruce Ave	PM	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	No
		SAT	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	No
2	N Riverside Dr/W Fir Ave	PM	#1 - Eight-Highest	***Yes***
			#2 – Four-Hour	***Yes***
			#3 – Peak Hour	***Yes***
		SAT	#1 - Eight-Highest	***Yes***
			#2 – Four-Hour	***Yes***
			#3 – Peak Hour	***Yes***
D	Site Access D/W Herndon Ave	PM	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	***Yes***
		SAT	#1 - Eight-Highest	***Yes***
			#2 – Four-Hour	***Yes***
			#3 – Peak Hour	***Yes***

Source: Kittelson & Associates, Inc., 2023

Like the Existing Plus Project conditions, warrants 1, 2, and 3 are met for N Riverside Dr and W Fir Ave under Future Plus Project conditions. Therefore, it is recommended that a signal be installed at this location. Warrants are not met at any additional locations.

For Site Access D on W Herndon Ave, the threshold for warrant 3 is met on a weekday and the threshold for warrants 1, 2, and 3 are met on Saturday. Given the proximity of Site Access D to the signalized N Riverside Dr/W Herndon Ave intersection (800' to the east), the minor access characterization of Site Access D, and that the intersection is expected to operate within City standard, installation of a signal is not recommended at this location.

95TH PERCENTILE QUEUES

An analysis of 95th percentile queue lengths was performed using Synchro software version 10. Queue lengths presented in Table 17 for the Existing peak hours. The longest queue present during any of the three peak hours is shown in the table. The study intersections were found to mostly have sufficient storage to contain the 95th percentile queue lengths. Exceptions to this are:

- **N Riverside Dr/W Fir Ave (Intersection 2):** Westbound approach: expected to exceed available capacity on Saturdays
- **N Riverside Dr/W Herndon Ave (Intersection 3):** Northbound left, southbound left, southbound right, and eastbound left movements: expected to exceed available capacity during the PM peak hour
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Southbound left, eastbound through, and westbound right: expected to exceed available capacity during the PM peak hour

All intersections and movements that exceed the storage capacity under Future Conditions with reclassification also exceed the storage capacity under Existing Plus Project conditions. No new movements exceed the storage capacity.

Appendices G, H and K contain queue length summary reports for the different scenarios.

Table 17: Future Plus Project Conditions, 95th Percentile Queues

No.	Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
1	N Riverside Dr/ W Spruce Ave	Storage	150	375	100		-		80	225			575	
		Future SAT	25	25	25		25		25	25			-	
		Future + Project SAT	25	25	25		25		25	25			75	
2	N Riverside Dr/ W Fir Ave	Storage	225	250			375			225			700	
		Future SAT	25	-			-			25			-	
		Future + Project SAT	25	-			25			25			***>1000***	
		Future + Project SAT with Improvements	25	150			125			25			525	
3	N Riverside Dr/ W Herndon Ave	Storage	225	-	225	325	-	100	225	-	275	225	-	
		Future PM	***325***	75	75	125	50	25	175	175	50	50	475	
		Future + Project PM	***325***	75	75	***675***	25	***650***	***1225***	225	50	75	775	
		Future + Project PM with Improvements	175	75	75	***400***	25	550	***675***	200	50	50	700	25
4	N Golden State Blvd/ W Herndon Ave	Storage	150	300	150	275	600	175	250	400	350	150	325	325
		Future PM	75	100	125	***400***	100	50	25	75	25	50	325	50
		Future + Project PM	75	100	200	***550***	100	50	25	***150***	25	100	***500***	325
		Future + Project PM with Improvements	75	125	150	***450***	100	50	25	***150***	25	100	***500***	***125***
5	SR 99 NB Off-Ramp/ W Herndon Ave	Storage	275	-	650		-			500			550	
		Future PM	50	-	50		-			25			25	
		Future + Project PM	50	-	50		-			25			150	
6	N Parkway Dr/ W Herndon Ave	Storage	-	500	150	125	300	-		-		500	-	175
		Future PM	-	25	25	175	25	-		-		50	-	25
		Future + Project PM	-	25	25	175	50	-		-		275	-	75
A	N Riverside Dr/ Site Access A	Storage		-			-			-			700	
		Existing SAT		-			-			-			-	
		Existing + Project SAT		-			-			-			25	
B	N Riverside Dr/ Site Access C	Storage		-			-			-			300	
		Existing SAT		-			-			-			-	
		Existing + Project SAT		-			-			-			25	
C	Site Access D/ W Herndon Ave	Storage		-			1000		100	-	-			
		Existing SAT		-			-		-	-	-			
		Existing + Project SAT		-			25		25	-	-			

Source: Kittelson & Associates, Inc. 2023
Intersections analyzed using HCM 6 methodologies
Queue lengths reported in feet (rounded to the nearest vehicle length)
Intersections shaded in gray represent locations where queue lengths would exceed storage.

RECOMMENDED OFF-SITE IMPROVEMENTS

To improve upon intersection operations at locations that would operation beyond the standard, Kittelson recommends the following improvements:

- **N Riverside Dr/W Fir Ave (Intersection 2):** Signalize intersection.

- **N Riverside Dr/W Herndon Ave (Intersection 3):** Restripe existing eastbound approach to include second eastbound left turn lane. Extend eastbound left-turn lane an additional 150 feet, repurposing the raised median in the roadway cross section. Add southbound right-turn overlap to traffic signal.
    - **Note:** A revision of the signal timing to change the northbound and southbound left turns from protected only to protected-permitted would mitigate the intersection to a level that satisfies performance requirements. However, the City does not support protected-permitted left-turns for this location.
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Revise signal phasing to optimize green-time allocation relative to anticipated volumes. For the westbound approach, the queue would extend past the N Weber Ave intersection. To reduce queue blockage of the intersection, "DO NOT BLOCK" pavement markings are recommended for the full width of N Weber Ave. On the north leg, reconstruct the median to extend the southbound dual left-turn pocket as far north as possible without interfering with the existing northbound left-turn pocket at W Kathryn Ave.

Table 18 presents the operations at the intersections with the recommended improvements. *Appendix K* contains Synchro output reports.

Table 18: Future Plus Project with Reclassification Conditions with Off-Site Improvements, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
2	N Riverside Dr/W Fir Ave	Signal	AM	4.5	A
			PM	15.7	B
			SAT	29.9	C
3	N Riverside Dr/W Herndon Ave	Signal	AM	32.3	C
			PM	***73.7***	***E***
			SAT	***78.4***	***E***
4	N Golden State Blvd/W Herndon Ave	Signal	AM	31.4	C
			PM	49.4	D
			SAT	48.4	D

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- Average delay in seconds/vehicle is reported for signalized and stop control intersections.

FUTURE PLUS PROJECT CONDITIONS WITHOUT RECLASSIFICATION OF W HERNDON AVE

The Future Plus Project conditions without reclassification of W Herndon Ave analysis forecasts how the study intersections would operate with the traffic generated by the proposed project development and assumes no direct access were provided to W Herndon Ave. If W Herndon Ave remained an expressway, no direct site access would be permitted onto the roadway. Therefore, this analysis excludes the reclassification of W Herndon Ave from an expressway to a major arterial (which is assumed for the plus project conditions), and project trips that were routed to/from the Site Access D and W Herndon Ave location were redistributed to the other site accesses. The analysis includes quantification of the potential affects to traffic operations due to project traffic without the roadway reclassification.

INTERSECTION OPERATIONS

Traffic volumes for Future Plus Project conditions without reclassification of W Herndon Ave were developed using an additive approach. Project trips shown in Table 7 were added to Future Conditions traffic on the roadway network to develop the volumes for the Future Plus Project conditions without Reclassification of W Herndon Ave. Project-only volumes for this scenario for weekday AM, PM and Saturday peak hours are presented in Figure 10. Turning movement volumes for Future Plus Project conditions without reclassification of W Herndon Ave are presented in Figure 11.

As shown in Table 19, the following study intersections would operate at unacceptable LOS during the analysis periods listed under Future Plus Project conditions without reclassification of W Herndon Ave:

- N Riverside Dr/W Fir Ave (Intersection 2)
    - PM Peak Hour (LOS F)
    - Saturday Midday Peak Hour (LOS F)
- N Riverside Dr/W Herndon Ave (Intersection 3)
    - AM Peak Hour (LOS E)
    - PM Peak Hour (LOS F)
    - Saturday Midday Peak Hour (LOS F)
- N Golden State Blvd/W Herndon Ave (Intersection 4)
    - PM Peak Hour (LOS E)
    - Saturday Midday Peak Hour (LOS E)

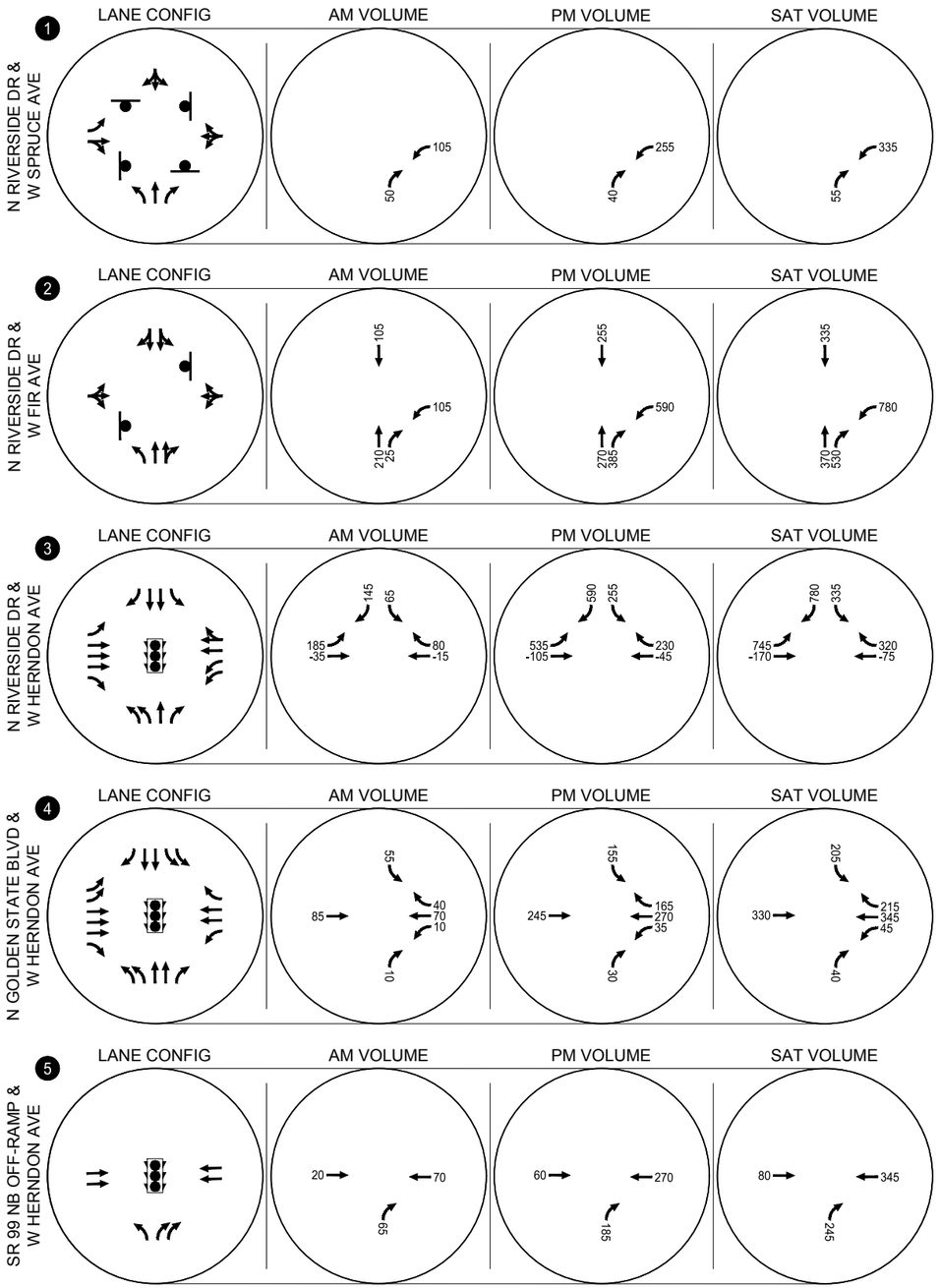
Appendix L includes Synchro output reports for Future Plus Project conditions without reclassification of W Herndon Ave.

Table 19: Future Plus Project Conditions without Reclassification of W Herndon Ave, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
1	N Riverside Dr/W Spruce Ave	AWSC	AM	8.7	A
			PM	11.4	B
			SAT	13.8	B
2	N Riverside Dr/W Fir Ave	TWSC	AM	16.1	C
			PM	***>50***	***F***
			SAT	***>50***	***F***
3	N Riverside Dr/W Herndon Ave	Signal	AM	***72.9***	***E***
			PM	***>80***	***F***
			SAT	***>80***	***F***
4	N Golden State Blvd/W Herndon Ave	Signal	AM	31.4	C
			PM	***76.2***	***E***
			SAT	***68.9***	***E***
5	SR 99 NB Off Ramp/W Herndon Ave	Signal	AM	16.1	B
			PM	14.7	B
			SAT	15.6	B
6	N Parkway Dr/W Herndon Ave	Signal	AM	23.9	C
			PM	16.4	B
			SAT	16.9	B
A	N Riverside Dr/Site Access A	TWSC	AM	<1	A
			PM	<1	A
			SAT	<1	A
C	N Riverside Dr/Site Access C	TWSC	AM	<1	A
			PM	<1	A
			SAT	<1	A

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used
-City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- **Bolded and italicized** indicate intersections operating beyond the City of Fresno standard
- AWSC: All-Way Stop Control
- TWSC: Two-Way Stop Control
- Average delay in seconds/vehicle is reported for signalized and stop control intersections. For TWSC intersections the worst approach delay is reported.

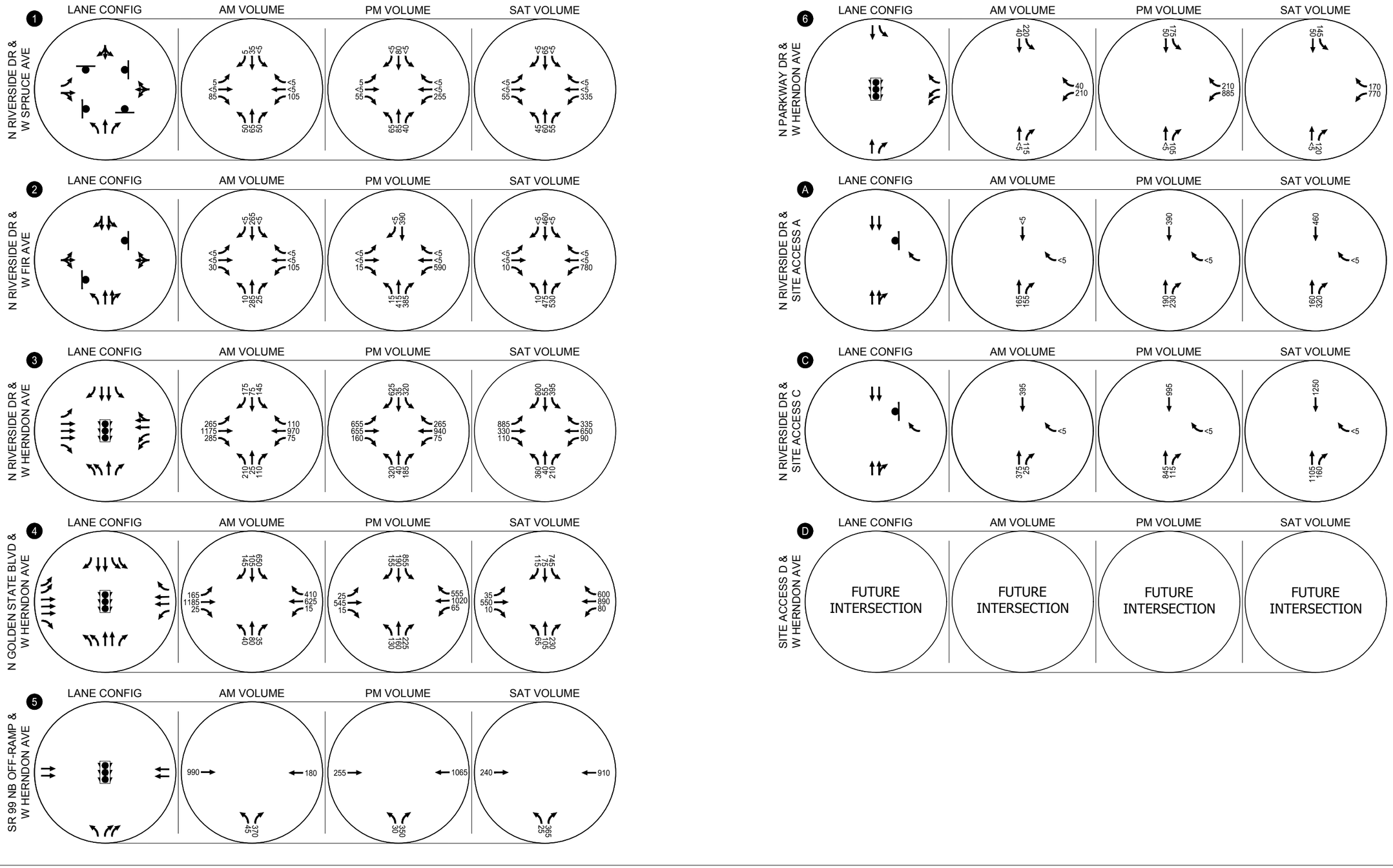


- STOP SIGN
- TRAFFIC SIGNAL

Project Trip Volumes Without Reclassification of W Herndon Ave
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure
10

KITTELSON & ASSOCIATES



- STOP SIGN
- TRAFFIC SIGNAL

Year 2042 Future Plus Project Without Reclassification of W Herndon Ave, Lane Configurations, Traffic Control Devices and Traffic Volumes
Weekday AM, Weekday PM and Weekend Midday Peak Hours
Fresno, California

Figure 11

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FUTURE DRIVEWAY CONSIDERATIONS

In addition to the operations analysis results presented in Table 14, the potential need for right and left turn lanes as well as signalization was evaluated for the three project driveways using the methodologies cited earlier in this report.

Turn Lane Assessment

Turn lane opportunities were analyzed for the site accesses along N Riverside Dr and W Herndon Ave using Saturday midday peak hour volumes as they represented the highest volumes projected at the driveways. *Appendix M* contains the turn lane analysis worksheets.

Table 20 shows the results of the turn lane analysis at the site access locations.

Table 20: Future Plus Project Conditions without Reclassification of W Herndon Ave, Turn Lane Analysis Results

No.	Intersection	Proposed Access Type	Turn Lane	Threshold Met
2	N Riverside Dr/ W Fir Ave	Full-Movement Two-Way Stop-Controlled	NB Right Turn Lane	**Yes**
			SB Left Turn Lane	No
A	N Riverside Dr/ Site Access A	Right-In Right-Out Two-Way Stop-Controlled	NB Right Turn Lane	**Yes**
C	N Riverside Dr/ Site Access C	Right-In, Right-Out Two-Way Stop-Controlled	NB Right Turn Lane	**Yes**

Source: Kittelson & Associates, Inc., 2023

Like the Existing Plus Project condition, N Riverside Dr at W Fir Ave and at Site Access C meet the right-turn warrant threshold under Future Plus Project conditions without reclassification of W Herndon Ave. Under Future Plus Project without Reclassification of W Herndon Ave conditions N Riverside Dr at Site Access A meet the right-turn warrant.

SIGNAL WARRANTS

The MUTCD 8-hour, 4-hour and peak hour traffic signal warrants were analyzed for the Future Plus Project conditions without reclassification of W Herndon Ave. *Appendix N* contains the signal warrants worksheets.

Table 21: Future Plus Project Conditions without Reclassification of W Herndon Ave, Signal Warrants

No.	Intersection	Proposed Access Type	Warrant	Threshold Met
1	N Riverside Dr/ W Spruce Ave	PM	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	No
		SAT	#1 - Eight-Highest	No
			#2 – Four-Hour	No
			#3 – Peak Hour	No
2	N Riverside Dr/ W Fir Ave	PM	#1 - Eight-Highest	**Yes**
			#2 – Four-Hour	**Yes**
			#3 – Peak Hour	**Yes**
		SAT	#1 - Eight-Highest	**Yes**
			#2 – Four-Hour	**Yes**
			#3 – Peak Hour	**Yes**

Source: Kittelson & Associates, Inc., 2023

Like the Existing Plus Project conditions, warrants 1, 2, and 3 are met for N Riverside Dr and W Fir Ave under Future Plus Project conditions without reclassification of W Herndon Ave. Based on this finding and the proposed location of the primary full-access driveway to the project site at this intersection, it is recommended that a signal be installed at this location.

95TH PERCENTILE QUEUES

Projected 95th percentile queues are presented in Table 22 for the Existing Plus Project conditions. The longest queue projected during the three peak hours is shown in the table for each movement reported. The following projected 95th percentile queues exceed the available storage:

- **N Riverside Dr/W Fir Ave (Intersection 2):** Westbound approach: expected to exceed available capacity on Saturday midday peak hour
- **N Riverside Dr/W Herndon Ave (Intersection 3):** Northbound left, southbound left, southbound right, and eastbound left movements: expected to exceed available capacity during the PM peak hour
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Southbound left, eastbound through, and westbound right: expected to exceed available capacity during the PM peak hour

All intersections and movements that exceed the storage capacity under Future Conditions also exceed the storage capacity under Existing Plus Project conditions. No new movements exceed the storage capacity relative to Existing Plus Project conditions.

Appendices G, L and O contain queue length summary reports for the different scenarios.

Table 22: Future Plus Project Conditions without Reclassification of W Herndon Ave, 95th Percentile Queues

No.	Intersection	Scenario	Northbound			Southbound			Eastbound			Westbound		
			Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
1	N Riverside Dr/Spruce Ave	Storage	150	375	100		-		80	225			575	
		Future SAT	25	25	25		25		25	25			-	
		Future + Project SAT	25	25	25		25		25	25			100	
2	N Riverside Dr/Fir Ave	Storage	225	250			375			225			700	
		Future SAT	25	-			-			25			-	
		Future + Project SAT	25	25			25			25			***>1,000***	
		Future + Project SAT with Improvements	25	150			100			25			600	
3	N Riverside Dr/Herndon Ave	Storage	225	-	225	325	-	100	225	-	275	225	-	
		Future PM	***325***	75	75	125	50	25	175	175	50	50	475	
		Future + Project PM	***325***	75	75	***650***	25	***825***	***>1,000***	200	50	65	850	
		Future + Project PM with Improvements	175	75	75	***400***	25	650	***400***	175	50	75	650	150
4	Golden State Blvd/Herndon Ave	Storage	150	300	150	275	600	175	250	400	350	150	325	325
		Future PM	75	100	125	***400***	100	50	25	75	25	50	325	50
		Future + Project PM	75	100	200	***550***	100	50	25	***150***	25	100	***500***	325
		Future + Project PM with Improvements	75	125	150	***450***	100	50	25	***150***	25	100	***500***	***125***
5	SR 99 NB Off-Ramp/Herndon Ave	Storage	275	-	650		-			500			550	
		Future PM	50	-	50		-			25			25	
		Future + Project PM	50	-	50		-			25			150	
6	N Parkway Dr/Herndon Ave	Storage	-	500	150	125	300	-		-		500	-	175
		Future PM	-	25	25	175	25	-		-		50	-	25
		Future + Project PM	-	25	25	175	50	-		-		275	-	75

Source: Kittelson & Associates, Inc. 2020
Intersections analyzed using HCM 6 methodologies
Queue lengths reported in feet (rounded to the nearest vehicle length)
Intersections shaded in gray represent locations where queue lengths would exceed storage.

RECOMMENDED OFF-SITE IMPROVEMENTS

The following improvements are recommended in conjunction with project development to address project trip effects to traffic operations and to restore acceptable operations to respective intersections:

- **N Riverside Dr/W Fir Ave (Intersection 2):** Signalize intersection.
- **N Riverside Dr/W Herndon Ave (Intersection 3):** Restripe existing eastbound approach to include second eastbound left turn lane. Extend eastbound left-turn lane an additional 150 feet, repurposing the raised median in the roadway cross section. Add southbound right-turn overlap to traffic signal.
    - **Note:** A revision of the signal timing to change the northbound and southbound left turns from protected only to protected-permitted would mitigate the intersection to a level that satisfies performance requirements. However, the City does not support protected-permitted left-turns for this location.
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Revise signal phasing to optimize green-time allocation relative to anticipated volumes. For the westbound approach, the queue

would extend past the N Weber Ave intersection. To reduce queue blockage of the intersection, "DO NOT BLOCK" pavement markings are recommended for the full width of N Weber Ave. On the north leg, reconstruct the median to extend the southbound dual left-turn pocket as far north as possible without interfering with the existing northbound left-turn pocket at W Kathryn Ave.

Table 23 presents the operations at the intersections with the recommended improvements. *Appendix O* contains Synchro output reports.

Table 23: Future Plus Project Conditions without Reclassification of W Herndon Ave with Off-Site Improvements, Intersection Operations

No.	Location	Control	Peak Hour	Delay	LOS
2	N Riverside Dr/W Fir Ave	Signal	AM	5.2	A
			PM	20.7	C
			SAT	47.4	D
3	N Riverside Dr/W Herndon Ave	Signal	AM	33.7	C
			PM	***73.2***	***E***
			SAT	***78.2***	***E***
4	N Golden State Blvd/W Herndon Ave	Signal	AM	30.6	C
			PM	49.4	D
			SAT	48.4	D

Source: Kittelson & Associates, Inc., 2023

Note:
- Synchro Version 10 and HCM 6th Edition methodology were used.
- City of Fresno LOS Standard D for Signalized and Unsignalized Intersections
- **Bolded and italicized** indicate intersections operating beyond the City of Fresno standard.
- AWSC: All-Way Stop Control
- TWSC: Two-Way Stop Control
- Average delay in seconds/vehicle is reported for signalized and stop control intersections. For TWSC intersections the worst approach delay is reported.

Section 3
CEQA Compliance Assessment

CEQA COMPLIANCE ASSESSMENT

The transportation impact analysis identifies the degree to which regional vehicle miles traveled may change and how the study area's transportation system is expected to operate when the project is operational. The expected transportation-related effects of the project were examined considering the following:

- Consistency with existing programs, plans, ordinances, or policies
- Change in regional daily vehicle miles traveled (VMT) due to the project
- Transit, pedestrian, and bicyclist access to and near the project site
- Emergency access around and near the project site

This analysis includes both effects that would result in potentially significant impacts under CEQA guidelines and non-CEQA effects associated with traffic operations on the transportation network.

CEQA SIGNIFICANCE CRITERIA

The project's impact is not considered to be significant unless it would:

a. Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities.

b. Conflict or be inconsistent with CEQA Guideline section 15064.3, subdivision (b).

c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

d. Result in inadequate emergency access.

Significance criterion "b" is related to the implementation of vehicle-miles traveled (VMT) as the primary performance metric.

The City of Fresno's CEQA guidelines for VMT thresholds identify the following threshold for significant impacts for developments such as the project:

- A retail project that results in a net increase of regional VMT

CONSISTENCY WITH PLANS AND PROGRAMS

The City of Fresno has jurisdiction over City streets and City-operated traffic signals. Caltrans has jurisdiction over State facilities and on- and off-ramp intersections with local streets. The County of Fresno has jurisdiction over streets in unincorporated areas, as well as County expressways. Kittelson reviewed the applicable programs, plans, ordinances, and policies that pertain to the project's potential impacts on the transportation system.

STATE REGULATORY FRAMEWORK

Senate Bill 743

Adopted on September 27, 2013, SB 743 directs the California Office of Planning and Research (OPR) to administer new CEQA guidance for jurisdictions that removes automobile vehicle delay and LOS from CEQA analysis and replaces it with VMT analysis or other measures that "promote the reduction of

greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses," to be used as a basis for determining significant transportation impacts.

REGIONAL REGULATORY FRAMEWORK

Fresno County Council of Governments

The Fresno County Council of Governments (Fresno COG) is a voluntary association of local governments and a regional planning agency composed of 16 member agencies, including the City of Fresno. The purpose of the Fresno COG is to establish a consensus on the transportation and land use needs of the Fresno County area and to further action plans for issues in the region. The current regional transportation plan (RTP) was adopted in 2018. The 2022 RTP is under development at the time this report is being prepared. The RTP addresses GHG emission reductions and other air emissions related to transportation, with the goal of preparing for future growth sustainably.

Fresno County Transportation Authority and Measure C

The Fresno County Transportation Authority (FCTA) is a regional agency that was created to administer the voter-passed Measure C program in 1986. Measure C was a 20-year program that achieved a half-cent sales tax for transportation expenditures and infrastructure. After its 20-year duration, the program was extended in 2006 for another 20 years. The FCTA established goals and core values for using these funds for building roads, expanding the bicycling network, expanding the transit network and transit services, and supporting vanpools and ride hailing services.

Fresno County Congestion Management Process

The Fresno County Congestion Management Process (CMP) is an effective systematic and regionally acceptable approach for managing congestion. Its responsibilities are to provide information on transportation system performance and assess alternative strategies for alleviating congestion and improving mobility. The CMP has identified a CMP network that includes SR 41 from the SR 99 interchange to the Madera/Fresno County line, SR 99 from the Madera/Fresno County line to the Jensen Ave interchange, SR 168 from the SR 180 interchange to the W Herndon Ave interchange, and SR 180 from the SR 99 interchange to the SR 168 interchange.

LOCAL REGULATORY FRAMEWORK

City of Fresno Active Transportation Plan

The City of Fresno's Active Transportation Plan, adopted in March 2017, provides a comprehensive guide outlining the vision for active transportation in Fresno. The plan lays out specific goals to improve bicycle access and connectivity in Fresno. These goals include the following:

- Equitably improve the safety and perceived safety of walking and bicycling in Fresno
- Increase walking and bicycling trips in Fresno by creating user-friendly facilities
- Improve the geographical equity of access to walking and bicycling facilities in Fresno
- Fill key gaps in Fresno's walking and bicycling network

Complete Streets Policy

The City's Complete Streets Policy was adopted by the City Council on October 10, 2019, to guide the implementation of the City's complete streets and multimodal objectives and policies within the Fresno General Plan. The City has integrated complete streets designs into its policies in compliance with Assembly Bill 1358.

SB 743 Implementation Policies

The City has initiated its incorporation of SB 743 goals into transportation policies in the in-progress General Plan update. Policies that address development of multimodal networks, reductions in greenhouse gases, and increasing diversity of land use have been developed in the General Plan.

IMPACT FINDING

The project would be consistent with the applicable plans policies and programs and would not conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. Therefore, the impact of the project would be ***less than significant***.

CHANGE IN REGIONAL VMT

This section discusses the analysis methodologies, data, and findings associated with the expected change in regional VMT that would result from the project.

ANALYSIS METHODOLOGIES AND DATA

The VMT analysis includes:

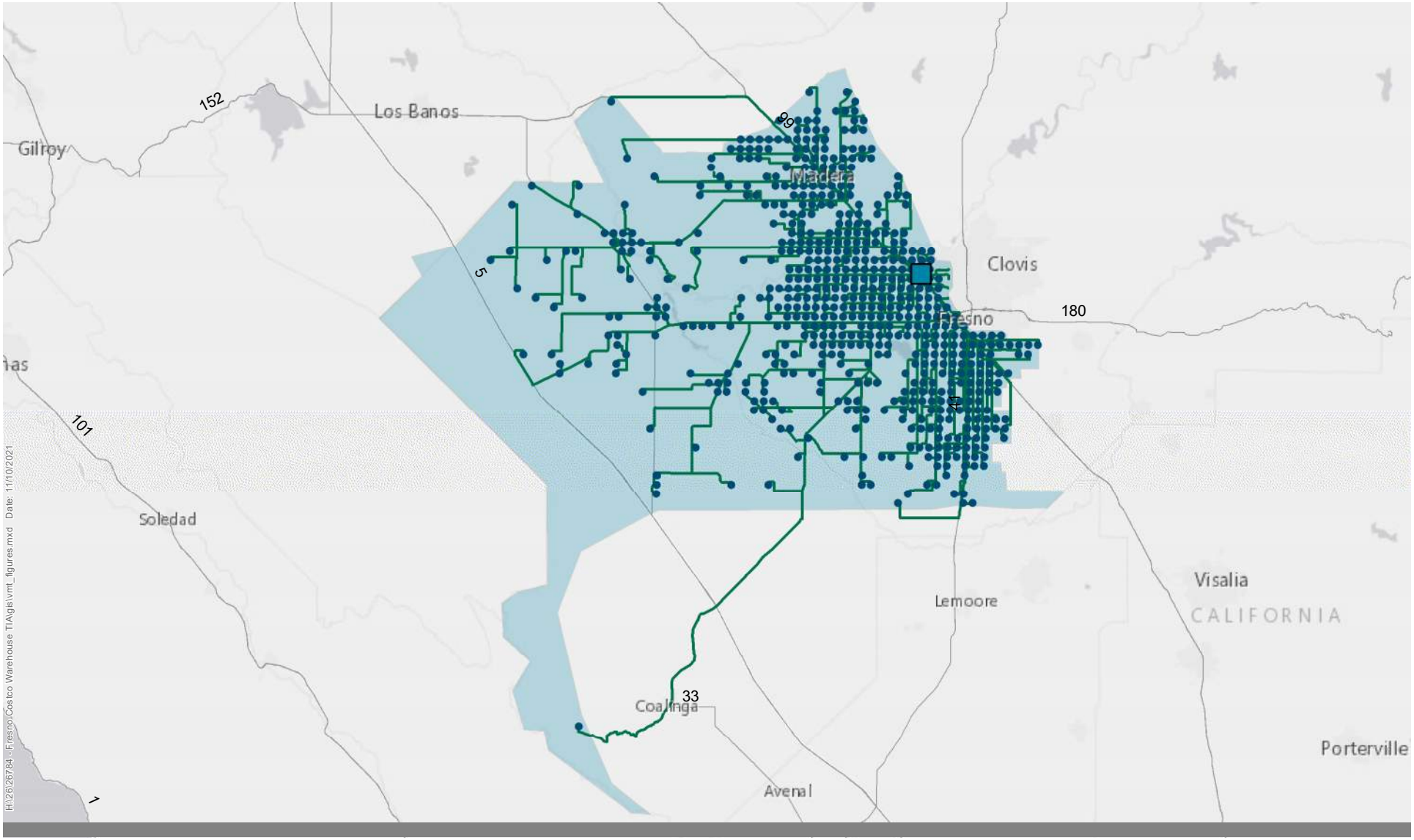
- Assessment of **project trip generation**
  - Including: members (accounting for primary and diverted member trips), warehouse employees, and fuel station employees for the existing and relocated Costcos, as well as car wash employees, MDO on-site employees, and MDO delivery employees for the relocated Costco
  - Excluding: members making pass-by trips, warehouse delivery trucks and fuel delivery trucks for the existing and relocated Costcos as well as MDO delivery truck from the depot and MDO delivery-to-members/other warehouse trucks for the relocated Costco
- Calculation of **member average primary trip length** based on Costco member approximate home locations
- Calculation of **member diverted trip lengths** based on expected diversion routes for the Costco site
- Calculation of **employee average trip lengths** based on the Fresno COG VMT Calculation Tool average employee trip lengths for the relevant transportation analysis zones (TAZs)
- Calculation of **MDO on-site and delivery employee average trip length** based on the Fresno COG VMT Calculation Tool average employee trip length for the relevant TAZs
- Calculation of **trips for an eventual shopping center use** that would backfill the vacated Shaw Costco warehouse
- Calculation of **average trip length for an eventual shopping center use**
- Calculation of **Shaw Costco fuel station trips** that would remain with the existing fuel station
- Calculation of **Shaw Costco fuel station average primary and diverted trip lengths**
- Calculation of overall expected **change in regional VMT** that would result from the project

Costco provided the following data for a typical month of sales at the existing Costco:

- Approximate home locations of Costco members who shopped during September 2019, grouped in 1-square-mile zones
- Number of visits to Costco in September 2019 by members in each 1-square-mile zone
- Market area of the existing Costco and projected market area of the relocated Costco

Member Average Primary Trip Lengths

Based on the trip generation of the existing Costco and relocated Costco, a portion of trips are made between Costco members' homes and Costco. These are characterized as primary trips. ArcGIS Online software was used to develop trip lengths between each 1-square-mile zone and the existing and proposed Costco locations. These zones and the travel routes to the existing and proposed Costco locations are presented in Figure 12 and Figure 13, respectively.



Legend

- Existing Fresno Costco (W Shaw Ave)
- Approximate Location of Member Households
- Routes to Existing Fresno
- Fresno Market Area

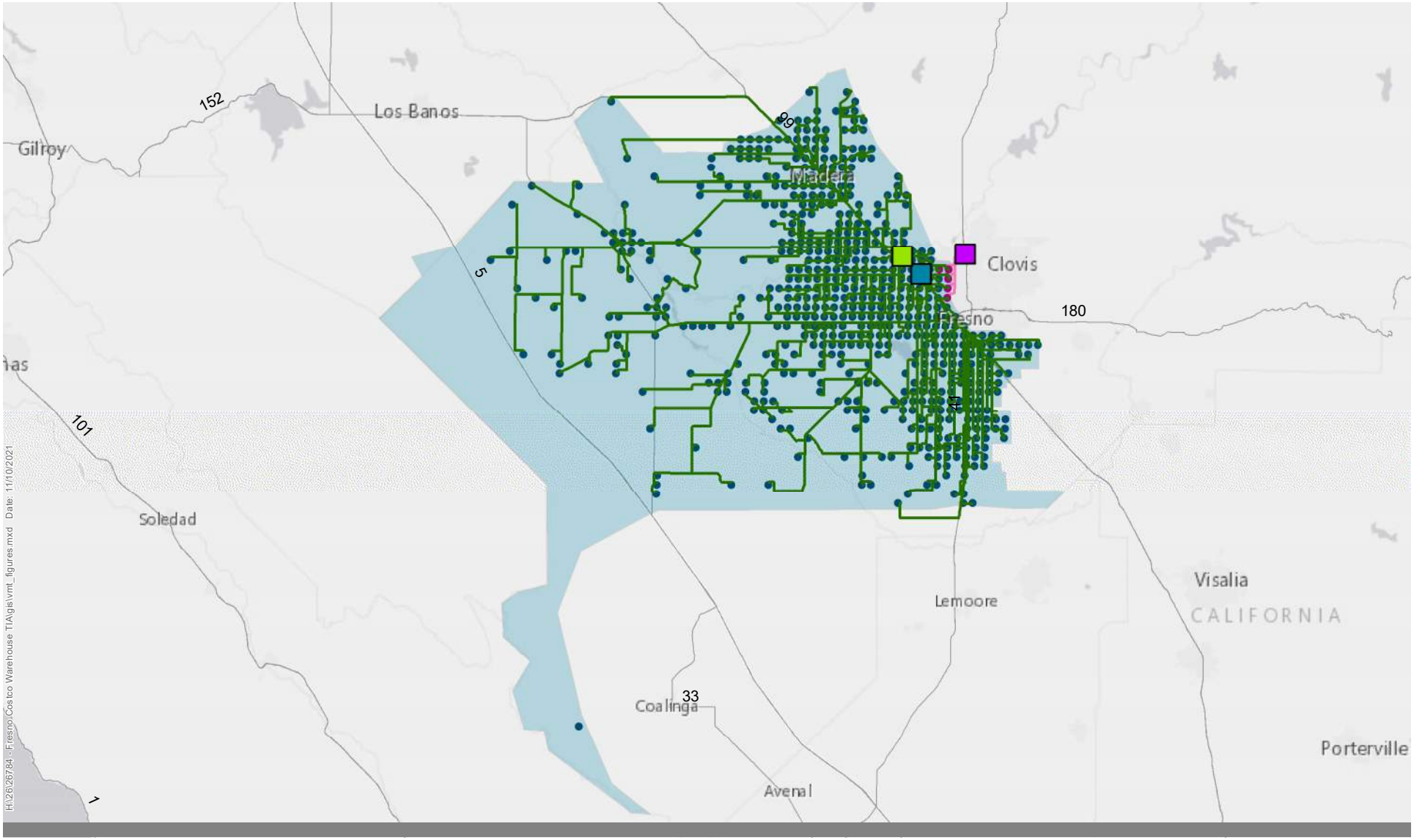
0 21 Miles

Figure 12

Travel Routes to Existing Costco (W Shaw Ave)

Fresno Costco Relocation

KITTELSON & ASSOCIATES



Legend

- Relocated Costco (N Riverside Ave)
- North Fresno Costco
- Existing Fresno Costco (W Shaw Ave)
- Approximate Location of Member Households, Members Shifting from Existing Costco (W Shaw Ave) to North Fresno Costco
- Relocated Fresno Market Area
- Travel Routes to Relocated Costco
- Travel Routes to North Fresno Costco
- Approximate Location of Member Households for Relocated Costco

0 21 Miles

Figure 13

KITTELSON & ASSOCIATES

Travel Routes to After Costco Relocation

Fresno Costco Relocation

Upon developing the trip lengths between the zones and the two Costco sites, a weighted average trip length to the existing Costco and a weighted average trip length to the proposed Costco were developed based on the number of member visits made to the existing Costco in September 2019 by members in each zone. In essence, the trip length from a zone with several member visits during the month would carry more "weight" than the trip length from a zone with few member visits when developing the weighted average trip length.

Costco membership projections forecast that nearly all existing members will shop at the new site. The exception is a small set of members of the existing Costco on W Shaw Ave who are expected to transition to shopping at the North Fresno warehouse on N Abby St following the relocation of the W Shaw Ave Costco to the N Riverside Dr location. These few member households that are expected to shift to North Fresno are shown in magenta on Figure 13. The respective 1-square-mile zones were excluded from developing the weighted average trip lengths of primary trips to the relocated Costco.

Member Diverted Trip Lengths

Based on the trip generation of the existing Costco and relocated Costco, a portion of trips to and from Costco are made by members who are traveling on the surrounding street network for some other primary travel purpose and who travel a short distance out of their way to access the site while en route to their primary destination. These are characterized as diverted trips. ArcGIS Online software was used to develop trip lengths for the following expected diversion routes to the existing and proposed Costco locations:

Existing Costco

- SR 99 (Golden State Highway)
- N Golden State Blvd
- Brawley Avenue

Relocated Costco

- SR 99 (Golden State Highway)
- N Golden State Blvd
- Marketplace at El Paseo

Diversion distances were calculated based on the path a vehicle would need to travel beyond their primary route to access the warehouse and then return to their original path to continue to their destination. Figure 14, Figure 15, and Figure 16 illustrate expected diversion routes for the existing Costco while Figure 17, Figure 18, and Figure 19 illustrate the expected diversion routes for the relocated Costco.

Warehouse, Fuel Station, and Car Wash Employee Average Trip Lengths

Based on the trip generation of the existing Costco and relocated Costco, a portion of trips to and from Costco are made by warehouse and fuel station employees for both locations, as well as by car wash employees for the relocated Costco. These are considered home-based trips and are not associated with where members live. The average employee trip lengths provided for the relevant TAZs in the Fresno COG VMT Calculation Tool were used for the analysis.

Costco provides a robust commute benefit to its employees. Costco provides carpool incentives, partners with local agencies to provide vanpool services, subsidizes transit passes, and provides secure bicycle storage and locker rooms for employees who bike to work.

MDO On-Site and Delivery Employee Average Trip Length

Based on the trip generation of the relocated Costco, a portion of trips to and from the new location are made by MDO on-site and delivery employees. Additionally, the same MDO on-site and delivery employees work today at the existing MDO facility. These are considered home-based trips and are not associated with where members live. The average employee trip lengths provided for the relevant TAZs in the Fresno COG VMT Calculation Tool were used for the analysis.

Shaw Building Backfill Retail Use Trips

Once Costco vacates the building in the shopping center on W Shaw Avenue (Shaw building) to relocate to the new building on W Herndon Avenue (Herndon building), the Shaw building will be available for another retail use. Since the Shaw building is part of an existing development that already has undergone environmental review, the next retail use to occupy and operate from the building would not undergo environmental review. Therefore, the trips and VMT being generated today at the Shaw building by the existing Costco are trips and VMT that exist in the region and, in essence, already have been approved to be generated by a use at this location in Fresno. To determine the anticipated change in regional VMT resulting from the project – which entails the relocation of the Shaw Costco warehouse and development of a new fuel station and car wash – the difference in VMT generated by the Shaw building use after another retail use occupies and operates from it must be computed.

The Shaw building comprises 133,944 square feet and is part of a shopping center with WinCo Foods and another strip commercial building with several smaller commercial businesses. Since a future retail use has not been identified for the Shaw building, the ITE Shopping Center (LU 820) trip rates would apply. The shopping center indeed is larger than 150,000 square feet, as the Shaw building alone comprises more than 130,000 square feet. Therefore, daily trip generation for a future retail use is computed using Shopping Center rates.

Table 24 presents the trip generation for additional shopping center use at the Shaw building after another retail use occupies and operates from the vacated Costco warehouse. As shown, a future retail use would be expected to generate 4,238 daily primary trips.

Table 24: Shaw Building Trip Generation (Shopping Center)

Land Use	Size	Unit	Weekday Daily	
			Rate	ADT
Shopping Center (ITE LU 820)	133.944	KSF	37.01	4,957
Pass-By Trips*			14.5%	719
Primary Trips				4,238

Source: Kittelson & Associates, Inc., 2023

Notes:
Source: ITE *Trip Generation Manual*, 11th Ed.
- Pass-by trips information from Trip Generation Manual appendices.
* Daily pass-by trip rate is assumed based on the ITE-provided PM peak hour pass-by trip rate of 29% divided by two since the PM peak hour may not as accurately represent pass-by activity over the course of the day.

Shaw Building Backfill Retail Use Average Trip Length

Kittelson used the Fresno COG countywide travel demand model to estimate the average length of trips to and from the future retail use at the Shaw building. Transportation analysis zone (TAZ) 559 comprises the shopping center. The travel demand model estimates 10,515 daily trips in TAZ 559 generating 78,580 VMT. These values correspond to an average trip length of 7.47 miles (78,580 ÷ 10,515 = 7.47). This average trip length is used to estimate the anticipated VMT of the future retail use at the Shaw building.

Shaw Costco Fuel Station Trips

As previously discussed, Kittelson maintains a database of trip characteristics for Costco Wholesale sites throughout North America, including specific trip information for Costco fuel stations. Kittelson developed a daily trip generation estimate for the Costco fuel station at the Shaw building based on trip data for nine representative Costco fuel stations in California. Table 25 presents the daily trip generation for the Shaw Costco fuel station after the warehouse relocation.

Table 25: Shaw Costco Fuel Station Trip Generation

Trip Type	Daily Trips
Total Trips	4,282
Pass-by	1,884
Diverted	728
Primary	1,670

Source: Kittelson & Associates, Inc., 2023

As presented in Table 25, the Shaw Costco fuel station is expected to generate 4,282 total daily trips, of which 1,670 would be primary trips and 728 would be diverted trips.

Shaw Costco Fuel Station Average Primary and Diverted Trip Lengths

The same member household location information used to develop member average primary trip lengths for the Herndon warehouse was used to develop average primary trip lengths to the Shaw Costco fuel station. ArcGIS Online software was used to develop trip lengths between each 1-square-mile zone and the Shaw Costco location.

Likewise, the same method used to develop member diverted trip lengths for the Herndon warehouse was used to develop diverted trip lengths to the Shaw location. ArcGIS Online software was used to develop trip lengths for the following expected diversion routes to the existing locations:

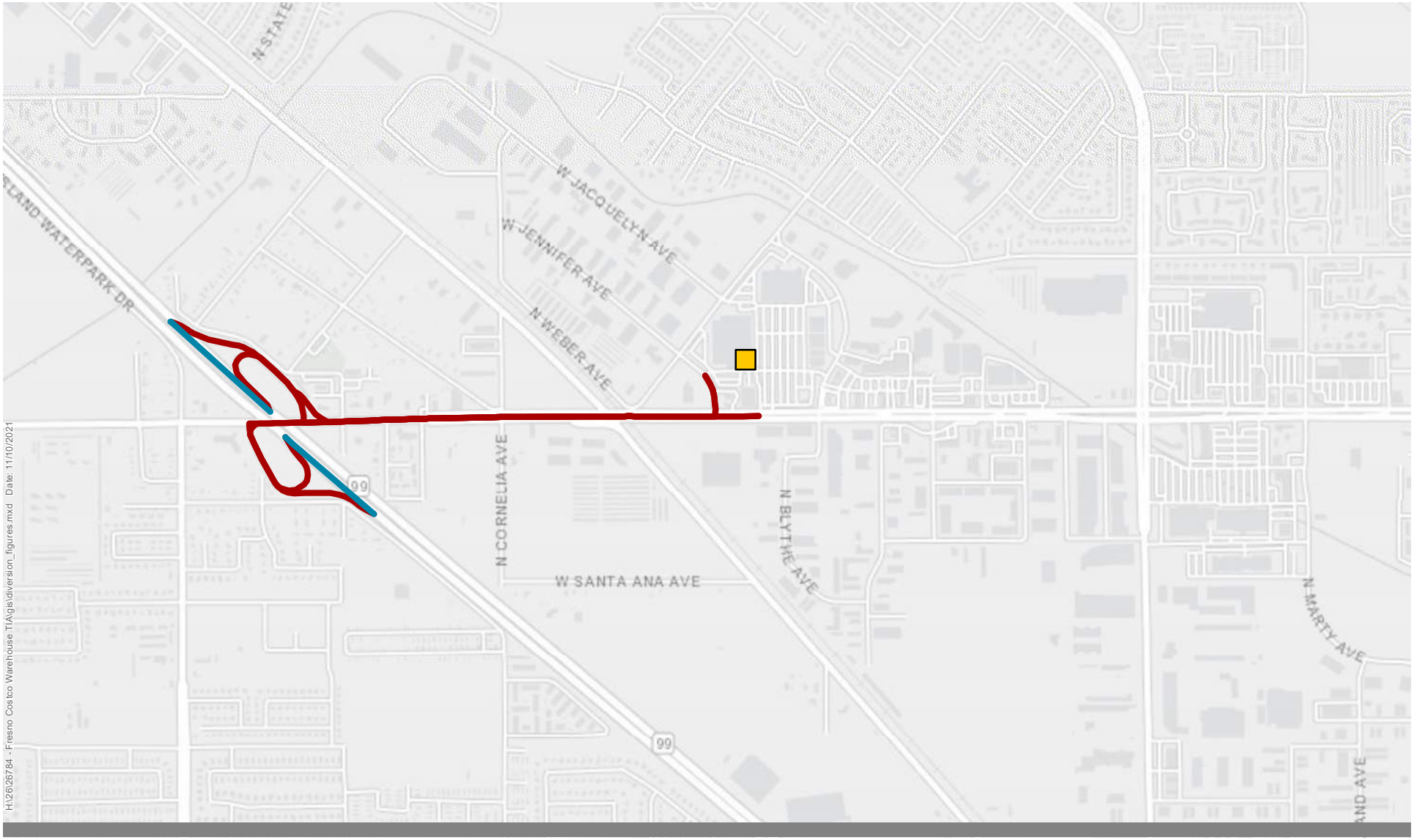
- SR 99 (Golden State Highway)
- N Golden State Blvd
- Brawley Avenue

Table 26 presents the primary and diverted trip lengths to the Shaw Costco fuel station.

Table 26: Diverted Trip Lengths, Shaw Costco Fuel Station

Trip Type	Miles
Primary	15.3
Pass-by	0.0
Diverted	1.6

Source: Kittelson & Associates, Inc., 2023



Legend

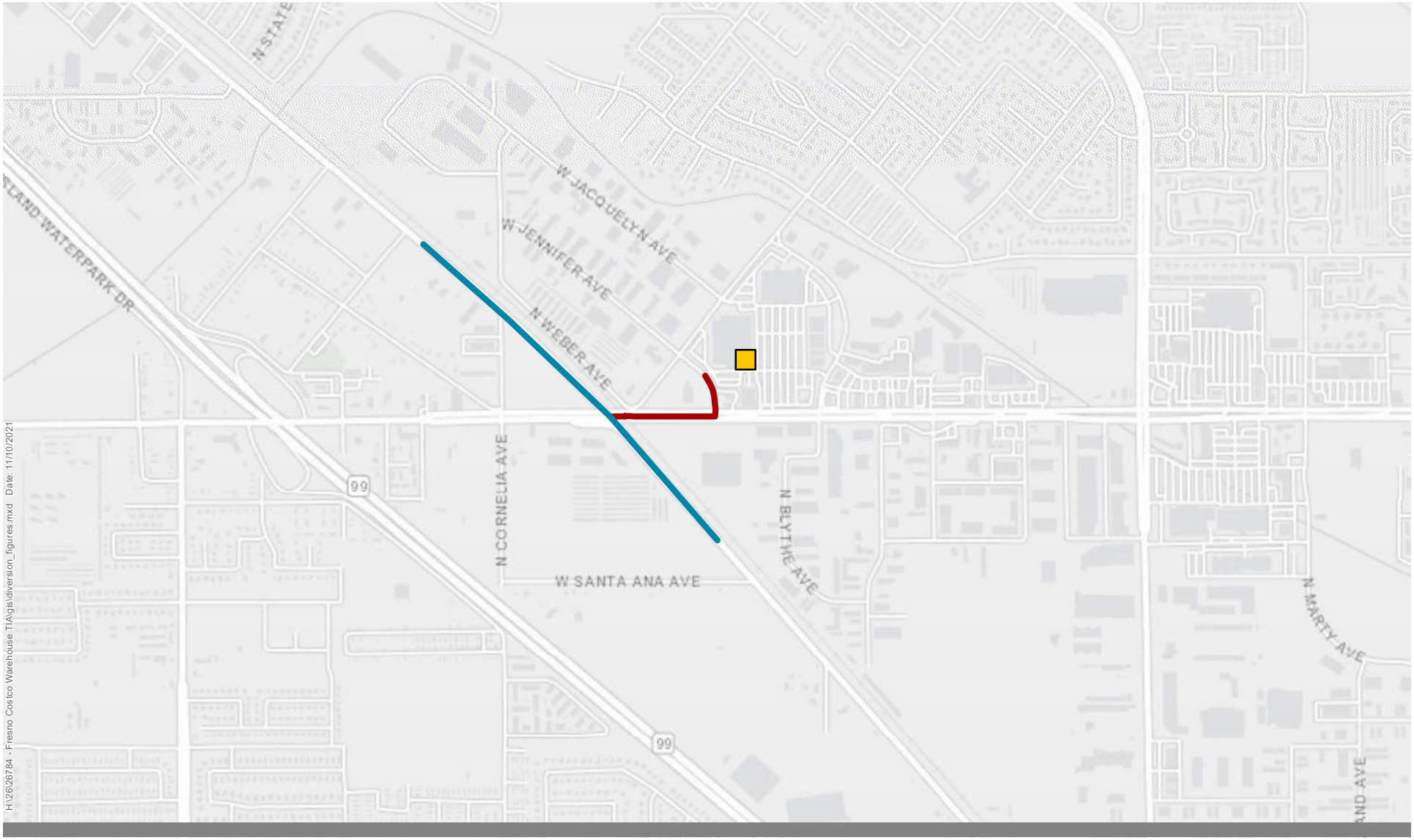
- Existing Costco (W Shaw Ave)
- Diverted Route
- Route Without Diversion

0 0.3 Miles

Figure 14

Existing Costco Diversion Routes
To/From SR 99
Fresno Costco Relocation

KITTELSON & ASSOCIATES



Legend

- Existing Costco (W Shaw Ave)
- Diverted Route
- Route Without Diversion

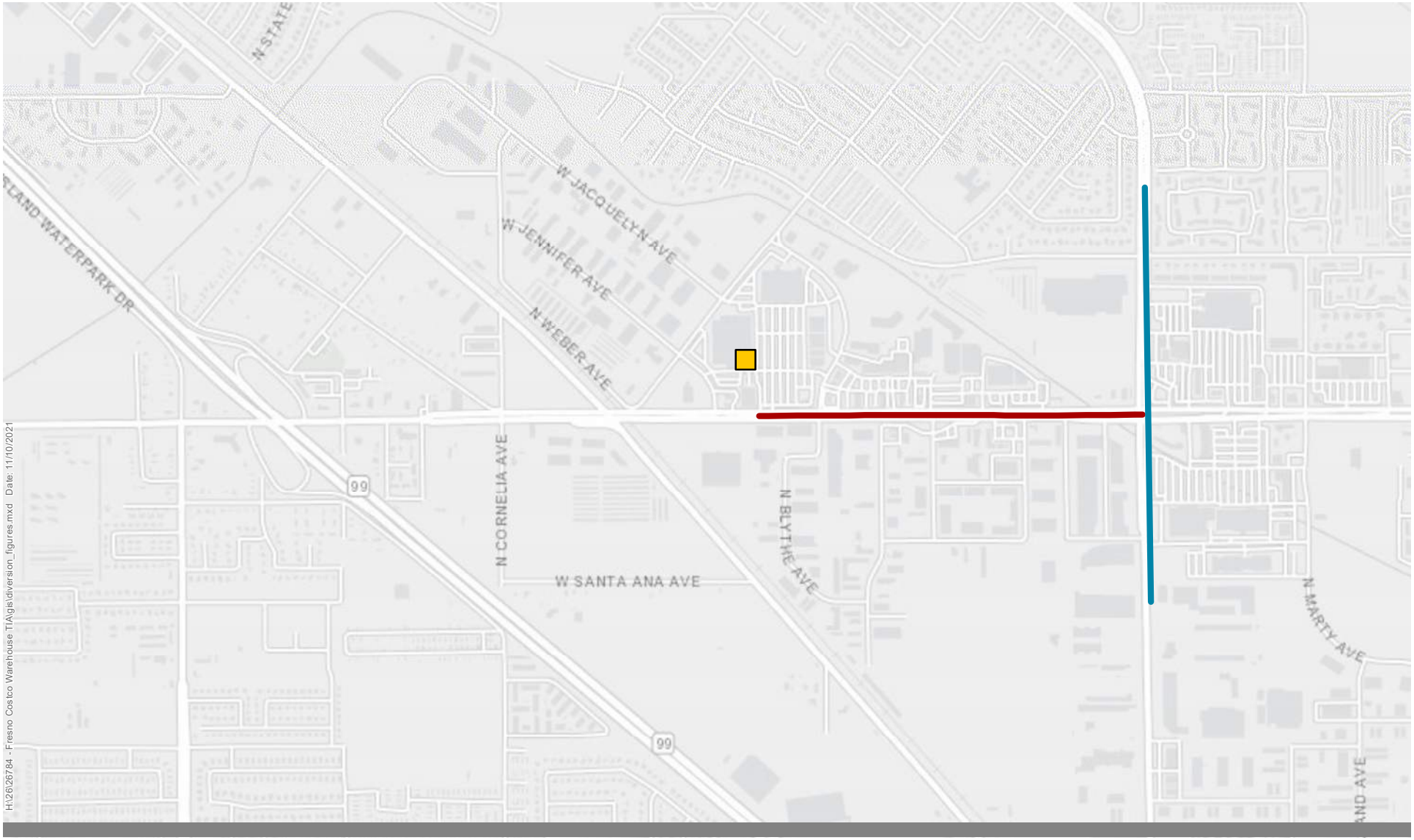
0 0.3 Miles

Figure 15

Existing Costco Diversion Routes To/From Golden State Boulevard

Fresno Costco Relocation

KITTELSON & ASSOCIATES



Legend

- Existing Costco (W Shaw Ave)
- Diverted Route
- Route Without Diversion

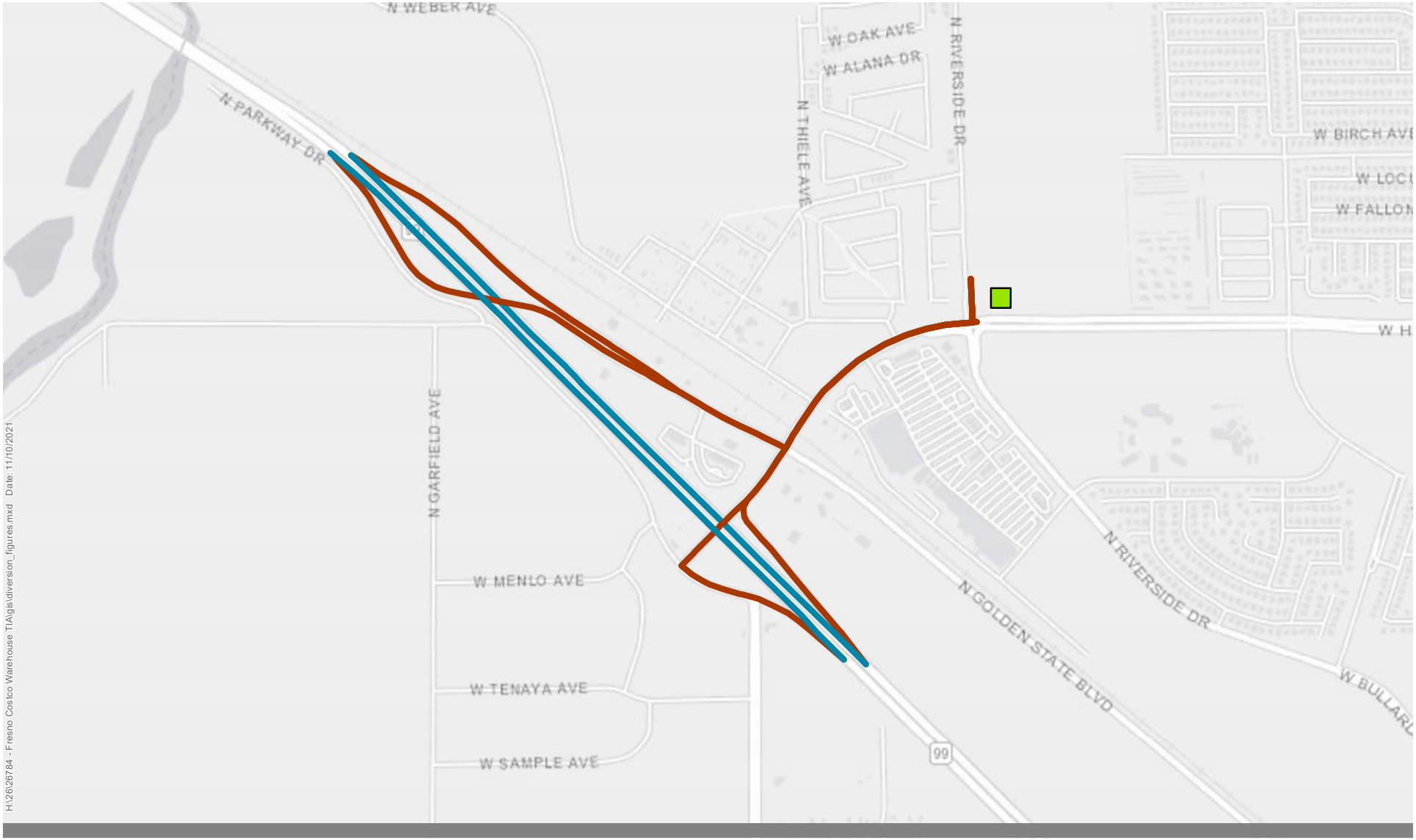
0 0.3 Miles

Figure 16

Existing Costco Diversion Routes To/From Brawley Avenue

Fresno Costco Relocation

KITTELSON & ASSOCIATES



Legend

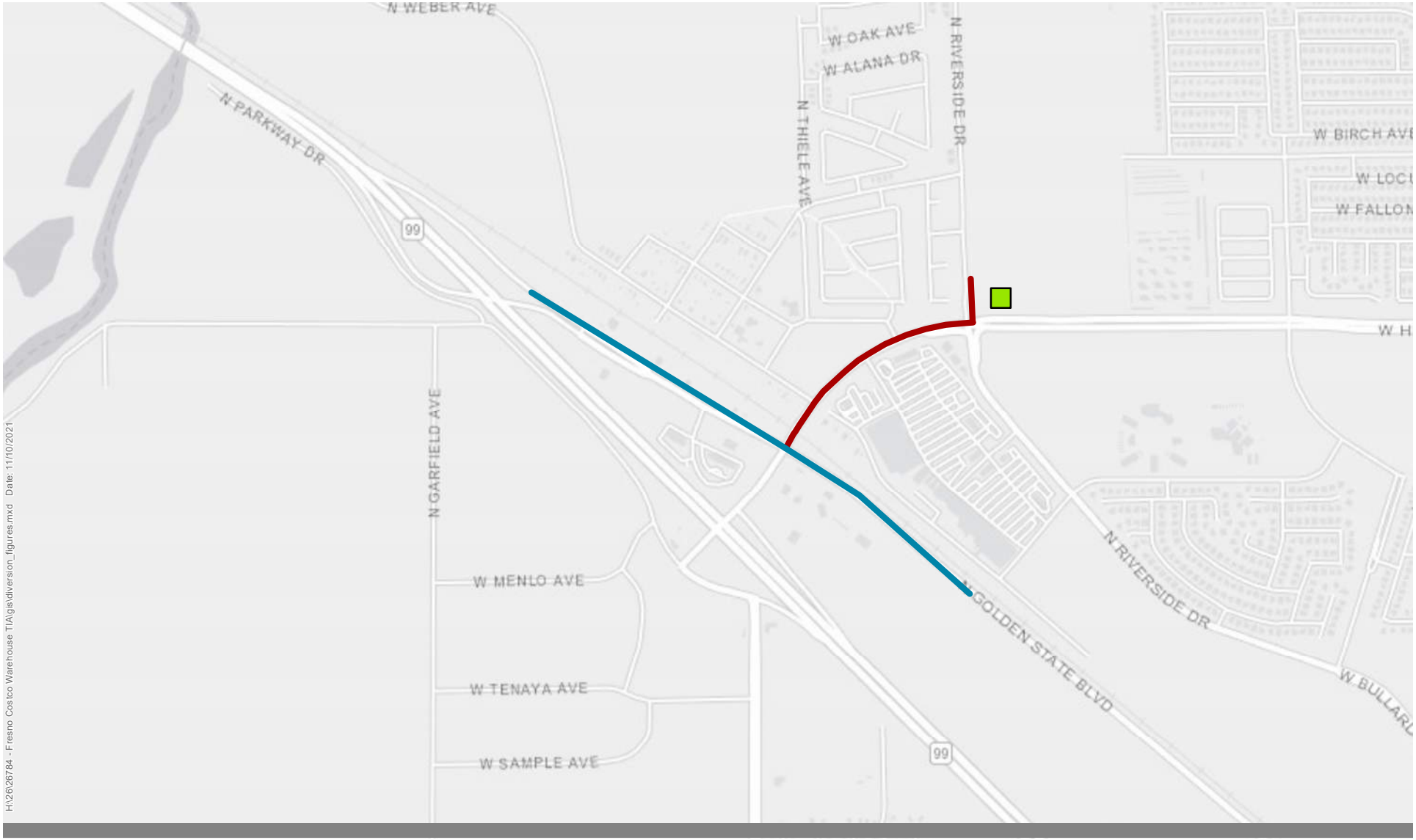
- Relocated Costco (N Riverside Ave)
- Diverted Route
- Route Without Diversion

0 0.3 Miles

Figure 17

Relocated Costco Diversion Routes
To/From SR 99
Fresno Costco Relocation

KITTELSON & ASSOCIATES



Legend

- Relocated Costco (N Riverside Ave)
- Diverted Route
- Route Without Diversion

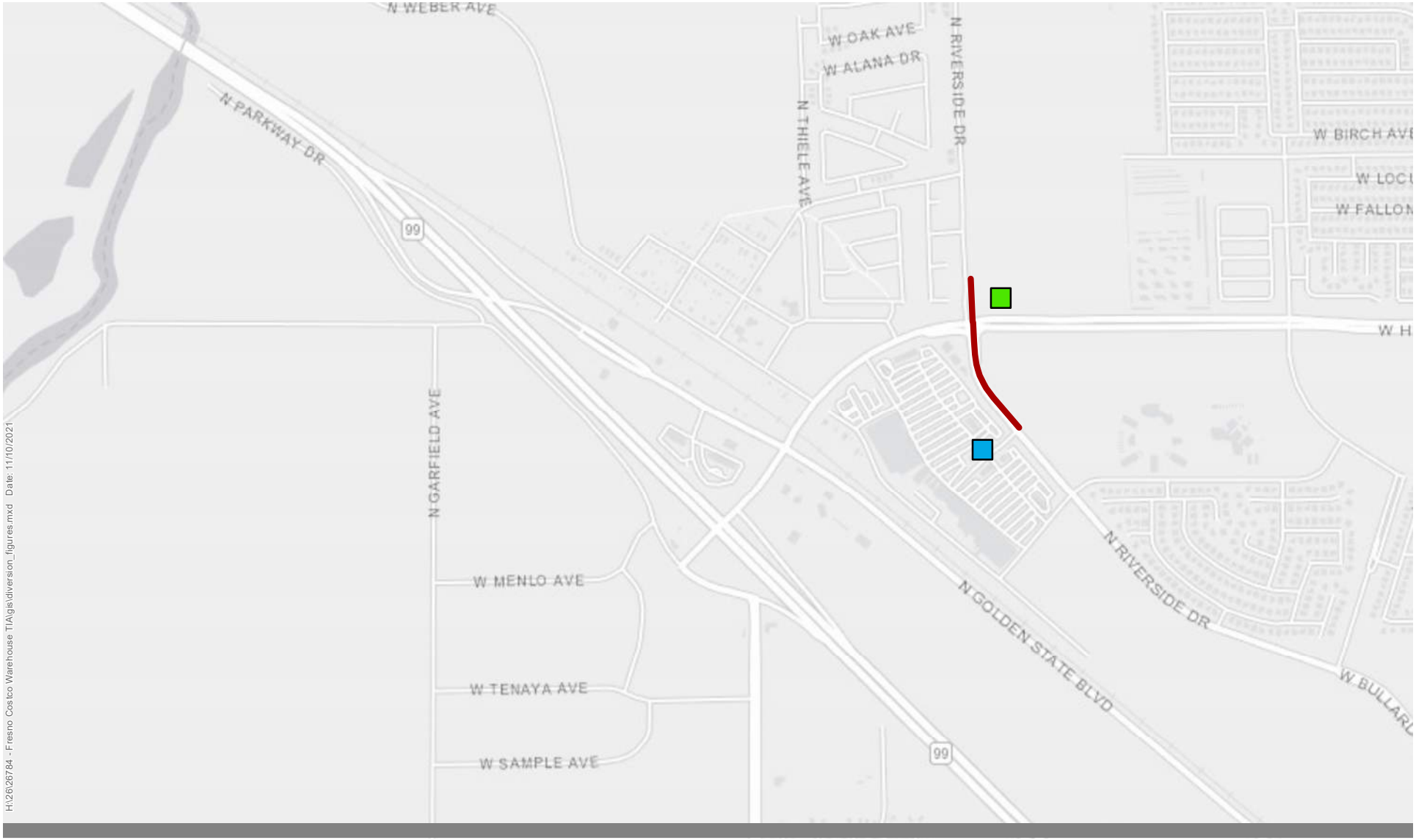
0 0.3 Miles

Figure 18

Relocated Costco Diversion Routes To/From Golden State Boulevard

Fresno Costco Relocation

KITTELSON & ASSOCIATES



Legend

- Relocated Costco (N Riverside Ave)
- Marketplace
- Diverted Route

0 0.3 Miles

KITTELSON & ASSOCIATES

Figure 19

Relocated Costco Diversion Routes
Marketplace at El Paseo
Fresno Costco Relocation

CHANGE IN REGIONAL VMT

VMT for the existing and relocated Costcos are computed by multiplying the number of each trip type by its associated trip length.

Existing Shaw Costco Daily VMT

Table 27 presents the weekday daily trips for each trip type for the existing Costco, the associated trip lengths, VMT for each trip type, and total daily VMT. As shown in the table, total daily VMT estimated for the existing Shaw Costco site is **120,083 miles**.

Table 27: Existing Costco VMT Summary

Trip Type	Weekday Daily Trips	Trip Length (miles)	Daily VMT
Members, Primary	7,001	15.3	106,943
Members, Pass-by	2,651	0.0	0
Members, Diverted	2,827	1.6	4,636
Warehouse & Fuel Station Employees	240	17.3	4,152
MDO Warehouse Employees	92	32.0	2,944
MDO Driver Employees	44	32.0	1,408
MDO Deliveries[1]	20	-	-
Fuel Truck Delivery[1]	10	128.0	-
Warehouse Truck Delivery[1]	20	128.0	-
Total	12,749	-	**120,083**

Source: Kittelson & Associates, Inc., 2023
[1] Delivery truck trips are excluded from the VMT calculation as good movement is not evaluated for identifying transportation impacts pursuant to CEQA.

Shaw Building Backfill Retail Use Daily VMT

Since the proposed project entails the Costco warehouse vacating the Shaw building to relocate to the Herndon building, the VMT associated with Costco at the Shaw building will be eliminated and a future unknown retail use is assumed to backfill the Shaw building, generating its own VMT. Table 28 presents the weekday daily primary trips for the Shaw building backfill retail use. As shown in the table, total daily VMT estimated for the existing Shaw building backfill retail use is **31,673 miles**.

Table 28: Shaw Building Backfill Retail Use Daily VMT

	Weekday Daily Trips	Trip Length (miles)	Daily VMT
Total	4,238	7.47	**31,673**

Source: Kittelson & Associates, Inc., 2023

Shaw Costco Fuel Station Daily VMT

The existing Shaw Costco fuel station is assumed to remain operational after the Costco warehouse vacates the building on the site and a future unknow retail use occupies and operates on the site. Table 29 presents the weekday daily trips for the Shaw Costco fuel station. As shown in the table, total daily VMT estimated for the existing Shaw Costco fuel station is **26,704 miles**.

Table 29: Shaw Costco Fuel Station Daily VMT

	Weekday Daily Trips	Trip Length (miles)	Daily VMT
Primary	1,670	15.3	25,510
Diverted	728	1.6	1,194
Fuel Station Total	4,282		**26,704**

Source: Kittelson & Associates, Inc., 2023

Relocated Herndon Costco Daily VMT

Table 30 presents the weekday daily trips for each trip type for the relocated Costco, the associated trip lengths, VMT for each trip type, and total daily VMT. As presented in the table, total daily VMT anticipated for the relocated Herndon Costco site is **191,032 miles**.

Table 30: Relocated Herndon Costco Daily VMT

Trip Type	Weekday Daily Trips	Trip Length (miles)	Daily VMT
Member Primary	10,046	17.3	173,528
Member Pass-by	3,788	0.0	0
Member Diverted	4,038	1.0	4,119
Warehouse, Fuel Station, + Car Wash Employees	300	30.7	9,210
MDO Warehouse Employees	92	30.7	2,824
MDO Driver Employees	44	30.7	1,351
MDO Deliveries[1]	20	-	-
Fuel Truck Delivery[1]	14	125.0	-
Warehouse Truck Delivery[1]	26	125.0	-
Total	18,368	-	**191,032**

Source: Kittelson & Associates, Inc., 2023
[1] Delivery truck trips are excluded from the VMT calculation as good movement is not evaluated for identifying transportation impacts pursuant to CEQA.

Net Change in Regional VMT

The anticipated VMT would be the difference in daily VMT at the Shaw property with the associated off-site MDO operations, due to changes in the retail use of the Shaw building and the Costco fuel station remaining operational, and the relocated Costco with on-site MDO operations. Table 31 presents the change in regional daily VMT resulting from the project. The change in regional daily VMT resulting from the project is **129,326 miles**.

Table 31: Overall Change in Regional Daily VMT with Relocated Costco Warehouse

Scenario	Daily VMT
Difference in Shaw Property VMT	-61,706
Existing Shaw Costco Daily VMT	*-120,083*
Shaw Building Backfill Retail Use	*31,673*
Shaw Costco Fuel Station	*26,704*
Relocated Herndon Costco Daily VMT	191,032
Change in Regional Daily VMT (Project VMT)	**129,326**

Source: Kittelson & Associates, Inc., 2023

IMPACT FINDING

With construction and operation of the Costco warehouse, regional daily VMT is estimated to increase by 129,326 miles. Therefore, the project impact would be ***significant***.

VMT MITIGATION

The California Air Pollution Control Officers Association (CAPCOA) first published a handbook in 2010 titled *Quantifying Greenhouse Gas Mitigation Measures Handbook* (GHG Handbook). The GHG Handbook was updated by the Sacramento Metropolitan Air Quality Management District and adopted by CAPCOA in December 2021.

The GHG Handbook is provided as a planning resource for agencies and developers. It includes a transportation section that discusses solutions to mitigate VMT by shifting modes of travel from single-occupancy vehicles to shared or active modes of transportation.

Most of the VMT mitigation measures that Costco can implement will be geared towards reducing employee trips. However, employee trips account for 436 daily trips (less than 2% of the total daily trips) and 13,385 VMT (approximately 7% of the daily VMT). Thus, VMT reductions from mitigation measures will be minimal.

Table 32: Trip Reduction Programs for Employees (Project/Site)

#	VMT Mitigation Measure	Percent Reduction	Notes
T-5, T-6	Implement Commute Trip Reduction Program	Up to 4% (voluntary) Up to 26% (mandatory)	CTR can be voluntary or mandatory. This must include measures T-7 through T-11.
T-7	Commute Trip Reduction Marketing	Up to 4%	
T-8	Provide Ridesharing Program	Up to 8%	Designate parking spaces for rideshare vehicles. Designated passenger loading and unloading and waiting areas.
T-9	Implement Subsidized or Discount Transit Program	Up to 5.5%	
T-10	Provide End-of-Trip Bicycle Facilities	Up to 4.4%	
T-11	Provide Employer-Sponsored Vanpool	Up to 20.4%	

Source: GHG Handbook

Costco provides a voluntary commute trip reduction program for employees that includes marketing, end-of-trip bicycle facilities, vanpool, and discounted transit. This can result in a 4% reduction in employee vehicle trips, reducing the project daily VMT by 535 miles or less than 0.5%. Even if Costco implemented a mandatory commute reduction program and 100% of employees were eligible, this would only result in a 3,480-mile decrease or less than 2% of project daily VMT.

The bulk of the daily VMT is driven by members shopping at the warehouse. While Costco is implementing neighborhood design improvements such as pedestrian network improvements and constructing bikeway facilities as part of the project, and in theory could implement bike-share or scooter-share on-site or implement transit-supportive roadway treatments, the nature of Costco's land use and business model has been shown to be auto-oriented. Members purchase items in bulk at Costco, making walking, biking, or transit trips to the warehouse impractical.

Costco will encourage employee carpooling, subsidize transit passes, and provide end-of-trip bicycle facilities for employees, which will mitigate a small share of employee VMT. However, the project VMT impact will remain ***significant***.

POTENTIAL HAZARDS RESULTING FROM QUEUES

Per the City's Traffic Impact Study Report Guidelines, the City does not have formally adopted guidelines on queuing criterion that establishes thresholds of significance for vehicle queues at intersections. For the purposes of this study, a vehicle queue that overflows the available storage for a turn pocket and blocking the adjacent travel lane or that queues to an upstream signal blocking through traffic is considered a potential safety hazard and would be considered a significant impact. Therefore, this study identifies a significant impact as occurring at locations where the project traffic would cause the queue length for a turn pocket to overflow its available storage compared to no project conditions or cause a queue to spillback into an upstream signalized intersection.

An analysis of 95th percentile queue lengths was performed using Synchro software version 10. Queue lengths for the AM, PM and Saturday midday peak hours were analyzed for all conditions. Most study intersections were found to have sufficient storage to contain 95th percentile queues with implementation of recommended off-site improvements. Exceptions to this are N Riverside Dr/W Herndon Ave (Intersection 3) and N Golden State Blvd/W Herndon Ave (Intersection 4). The recommended improvements at these locations are:

- **N Riverside Dr/W Herndon Ave (Intersection 3):** Restripe existing eastbound approach to include second eastbound left turn lane. Extend eastbound left-turn lane an additional 150 feet, repurposing the raised median in the roadway cross section. Add southbound right-turn overlap to traffic signal.
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Revise signal phasing to optimize green-time allocation relative to anticipated volumes. For the westbound approach, the queue would extend past the N Weber Ave intersection. To reduce queue blockage of the intersection, "DO NOT BLOCK" pavement markings are recommended for the full width of N Weber Ave. On the north leg, reconstruct the median to extend the southbound dual left-turn pocket as far north as possible without interfering with the existing northbound left-turn pocket at W Kathryn Ave.

IMPACT FINDING

Following construction of project off-site improvements, the southbound right-turn queue at N Riverside Dr/ W Herndon Ave would continue to exceed the available storage for the right-turn pocket and spill into the adjacent travel lane. This spillback condition would occur during the most congested period of the day and would not be a continuous condition. Constraints in the roadway cross section preclude widening the roadway to extend the right-turn pocket while also maintaining the upstream bike lane. Following construction of project off-site improvements, the southbound left-turn queue at the N Golden State Blvd/W Herndon Ave intersection may extend beyond the turn pocket and spill into the adjacent travel lane by approximately 50', depending on final construction of the improvement. This spillback condition would occur during the most congested period of the day and would not be a continuous condition. Therefore, the project impact would be ***less than significant***.

EMERGENCY ACCESS

Emergency vehicle access to the project site is accommodated at the driveways on N Riverside Dr and within the drive aisles in the parking lot and to the queue storage area of the fuel station. The intersection of N Riverside Dr/W Fir Ave serves as the primary access point for emergency vehicles to service the

warehouse and MDO facility. The intersection of N Riverside Dr/Site Access A provides emergency access to the northern portion of the site including the car wash and fuel station. The proposed site plan provides adequate lane width and curb radii to accommodate emergency vehicles. *Appendix P* provide turning templates for emergency vehicles on the site.

IMPACT FINDING

The project provides emergency access to and within the site via the driveways on N Riverside Dr, existing on-site easements, and on-site drive aisles. Therefore, the impact of the project on emergency access would be ***less than significant***.

CONCLUSIONS

Recommended project off-site improvements to the transportation network and environmental impacts are discussed in this section.

RECOMMENDED OFF-SITE IMPROVEMENTS

The project would result in traffic operations below the City's standard of LOS D at the N Riverside Dr/W Fir Ave two-way stop-controlled intersection, the N Riverside Dr/W Herndon Ave signalized intersection and the N Golden State Blvd/W Herndon Ave signalized intersection. Therefore, Kittelson recommends the following improvements in conjunction with project development to provide operations that satisfy City General Plan LOS standards:

- **N Riverside Dr/W Fir Ave (Intersection 2):** Signalize intersection.
- **N Riverside Dr/W Herndon Ave (Intersection 3):** Restripe existing eastbound approach to include second eastbound left turn lane. Extend eastbound left-turn lane an additional 150 feet, repurposing the raised median in the roadway cross section. Add southbound right-turn overlap to traffic signal.
    - **Note:** A revision of the signal timing to change the northbound and southbound left turns from protected only to protected-permitted would mitigate the intersection to a level that satisfies performance requirements. However, the City does not support protected-permitted left-turns for this location.
- **N Golden State Blvd/W Herndon Ave (Intersection 4):** Revise signal phasing to optimize green-time allocation relative to anticipated volumes. For the westbound approach, the queue would extend past the N Weber Ave intersection. To reduce queue blockage of the intersection, "DO NOT BLOCK" pavement markings are recommended for the full width of N Weber Ave. On the north leg, reconstruct the median to extend the southbound dual left-turn pocket as far north as possible without interfering with the existing northbound left-turn pocket at W Kathryn Ave.

PROJECT ENVIRONMENTAL IMPACTS

The CEQA compliance analysis resulted in the following impact findings.

Consistency with Plans, Policies, and Programs

The project would not conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. Therefore, the project impact would be ***less than significant***.

Regional VMT

With construction and operation of the Costco warehouse, regional daily VMT is estimated to be 129,326 miles. Costco provides a voluntary commute trip reduction program for employees that includes marketing, end-of-trip bicycle facilities, vanpool, and discounted transit. This can result in a 4% reduction in employee vehicle trips, reducing the project daily VMT by 535 miles or less than 0.5%. Therefore, the project impact would be ***significant***.

Potential Hazards Resulting from Queues

Following construction of project off-site improvements, the southbound right-turn queue at N Riverside Dr/ W Herndon Ave would continue to exceed the available storage for the right-turn pocket and spill into the adjacent travel lane. This spillback condition would occur during the most congested period of the day and would not be a continuous condition. Constraints in the roadway cross section preclude widening the roadway to extend the right-turn pocket while also maintaining the upstream bike lane. Following construction of project off-site improvements, the southbound left-turn queue at the N Golden State Blvd/W Herndon Ave intersection may extend beyond the turn pocket and spill into the adjacent travel lane by approximately 50', depending on final construction of the improvement. This spillback condition would occur during the most congested period of the day and would not be a continuous condition. Therefore, the project impact would be ***less than significant***.

Emergency Access

The project provides emergency access to and within the site via the driveways on N Riverside Dr, existing on-site easements, and on-site drive aisles. Therefore, the impact of the project on emergency access would be ***less than significant***.