

FINAL TECHNICAL MEMORANDUM

Date: April 11, 2022
To: Jack Varozza, City of Roseville
From: John Gard & Madeline Harriott, Fehr & Peers
Subject: ***Evaluation of Access and On-Site Circulation for West Roseville Marketplace***

RS22-4156

This memorandum presents the analysis and conclusions of our access and on-site circulation study for the proposed West Roseville Marketplace project to be located in the northeast quadrant of the Pleasant Grove Boulevard/Fiddymont Road intersection in Roseville, CA. The proposed project would consist of the following land uses:

- General commercial including grocery store – 68,772 square feet
- Sit down restaurant – 6,100 square feet
- Gas station – 16 vehicle fueling positions
- Coffee shop with drive-through window – 1,000 square feet

The analysis focuses on the following two time periods:

- Weekday PM Peak Hour: peak 60-minute period between 4 and 6 PM. Normally, this is the busiest hour of travel on City roadways.
- Sunday AM Peak Hour: The project would share a driveway with the Pleasant Grove Community Church located directly to the east. This time period reflects conditions during a Sunday service at the church.

Project Site Plan

The project location is shown on **Figure 1** and the project site plan (*West Roseville Marketplace*, Nadel, February 2022) is shown on **Figure 2**. Access to the project site would be provided via four total driveways along Pleasant Grove Boulevard and Fiddymont Road. The following turning movements were assumed to be permitted (for analysis purposes) at each driveway (see Figure 2 for driveway locations):

- Driveway 1 – Left In & Right In/Right Out
- Driveway 2 – Right In/Right Out
- Driveway 3 – Right In/Right Out
- Driveway 4 – Full Access

Note that the project also includes a golf cart connection in its northeast corner to enable travel via this mode between the project site and the Sun City Roseville community located to the northeast.

Existing Conditions

Traffic counts were collected at the Pleasant Grove Boulevard/Driveway 4 intersection on the dates below. This driveway currently provides vehicular access to the Pleasant Grove Community Church. On Sundays, the church offers in-person religious services that begin at 10 AM.¹

- Sunday, February 4, 2022 from 9:30 to noon. The peak hour occurred from 10:30 – 11:30 AM.
- Wednesday, February 9, 2022 from 4 to 6 PM. The peak hour occurred from 4:45 – 5:45 PM.

Weather was dry and no unusual traffic conditions were observed on each count day. During the Sunday count, church services concluded shortly after 11 AM, which led to a surge in outbound traffic that lasted for about 15 minutes. The driveway's peak hour factor (PHF) was 0.33², which is indicative of a highly-peaked event.

Figure 3 shows the existing peak hour traffic volumes, lane configurations, and traffic control at this intersection. As shown, it is a four-way side-street stop-controlled intersection, which permits all movements. The south leg provides access to a drug store and small residential area.

Driveway 4 was recently modified (not by the City, but apparently by the church) to prohibit outbound left-turn movements onto Pleasant Grove Boulevard. This was accomplished by pavement markings and signage (see photo on following page). City staff directed that project impacts on existing traffic conditions should be evaluated for a condition that assumes the permitted operation at this driveway, which is to allow outbound left- and right-turns.

Weekday PM peak hour traffic volumes collected on February 9, 2022 were compared against volumes collected in February 2020 (i.e., prior to the COVID-19 pandemic). It was found that the new counts were greater than the 2020 counts. The increased traffic is attributable to substantial growth in residential on the west side of the City of Roseville.

As part of the traffic counts, maximum vehicle queues were observed at this intersection. Maximum observed queues and available storage are shown in **Table 1**. As shown, Driveway 4 experienced a maximum queue of 9 vehicles soon after church services concluded. The westbound left/u-turn lane experienced a maximum queue of 7 vehicles, which nearly filled up its 200 feet of storage. Much of this traffic was associated with church members who were performing u-turns (after turning right from a more easterly driveway) to head east on Pleasant Grove Boulevard.

¹ [Pleasant Grove Community Church - Home \(pgcc.church\)](https://www.pgcc.church)

² The PHF measures the degree of peaking within the peak hour. A PHF of 1.0 represents uniform flow across all four 15-minute periods, while a PHF of 0.25 indicates all travel occurred during a single 15-minute window. The PHF is an input into the traffic operations model described later.



Photo of Driveway 4 exit onto Pleasant Grove Boulevard. Note signage prohibiting outbound left-turns.

TABLE 1: MAXIMUM VEHICLE QUEUES AT PLEASANT GROVE BOULEVARD/DRIVEWAY 4 INTERSECTION					
Movement	Available Storage ¹	Sunday AM Peak Hour ²		Weekday PM Peak Hour ²	
		Traffic Volume	Maximum Vehicle Queue ³	Traffic Volume	Maximum Vehicle Queue ³
Eastbound Left/U-Turn	150 feet	Left: 2 U-Turn: 16	25 feet	Left: 3 U-Turn: 15	50 feet
Westbound Left/U-Turn	200 feet	Left: 28 U-Turn: 30 ^{4,5}	175 feet	Left: 36 U-Turn: 8	100 feet
Southbound Right	125 feet	59 ⁵	225 feet	4	25 feet

Notes:

¹ Based on review of aerial imagery.

² Based on traffic counts collected on Sunday, February 4, 2022 and Wednesday, February 9, 2022.

³ 25 feet assumed per queued vehicle.

⁴ The heavy amount of u-turning traffic is primarily church-related. Motorists exited the easterly church driveway after services conclude and perform this u-turn (due to outbound left-turns being prohibited at Driveway 4).

⁵ These traffic volumes are highly peaked with nearly all trips occurring between 11:05 and 11:20 AM.

Source: Fehr & Peers, 2022.



Photo of queued vehicles exiting Driveway 4 after church services conclude.

Project Travel Characteristics

Trip Generation

Trip generation estimates for the proposed uses were calculated using trip rates published in the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021). **Tables 2** and **3** present the project trip generation for weekday PM peak hour and Sunday AM peak hour conditions, respectively. The 11th Edition contains a new land use category (821) called "Shopping Plaza" that is applicable for retail uses between 40,000 and 150,000 square feet. Notably, it includes a subcategory whereby the user specifies if a supermarket is present. Refer to **Appendix A** for screenshot from the ITE Trip Gen webapp. The trip generation estimate in Table 2 follows this recommended approach.

Some trips to the gasoline station will be made by grocery store customers already present on-site. In 2005, Fehr & Peers measured this internal trip-making at a Safeway Grocery Store / Fueling Center in Chico. That observation found almost 40% of gas station trips were made by Safeway customers. However, given the age of that count and its single data point, a reasonably conservative estimate of 25 percent of gas station trips being internal has been assumed in this study.

TABLE 2 PROPOSED PROJECT TRIP GENERATION – WEEKDAY PM PEAK HOUR								
Land Use	ITE Land Use Code	Quantity	Trip Rates ¹			Vehicle Trips		
			In	Out	Total	In	Out	Total
General Retail	821	68.8 ksf	4.3	4.7	9.0	298	323	621
Gas Station	944	16 vfp	7.0	7.0	14.0	112	112	224
High-Turnover (Sit Down) Restaurant	932	6.1 ksf	5.6	3.4	9.0	34	21	55
Coffee/Donut Shop with Drive through Window	937	1 ksf	20.0	20.0	40.0	20	20	40
Gross Trips						464	476	940
Internal Trips ²						-28	-28	-56
Pass-By Trips ³						-222	-222	-444
New Vehicle Trips						214	226	440
Notes:								
¹ Trip rates from the <i>Trip Generation Manual, 11th Edition</i> (Institute of Transportation Engineers, 2021).								
² Assumes 25% of gas station trips are made by grocery store customers.								
³ The following pass-by percentages were applied based on data in the <i>Trip Generation Manual, 11th Edition</i> (Institute of Transportation Engineers, 2021):								
- General Retail: 40%								
- Gas Station: 70%								
- Sit-Down Restaurant: 40%								
- Coffee/Donut Shop with Drive through Window: 57%								
ksf = thousand square feet. vfp = vehicle fueling positions.								
Source: Fehr & Peers, 2022.								

These tables also display the percentage of trips that are new versus ‘pass-by’. A pass-by trip is made by a motorist who enters the site to shop or receive services, while en-route to a different primary destination. These trips are already present on the adjacent street. However, they do add trips to the project driveways. It is important that the traffic assignments consider new and pass-by trips separately because they have different origins/destinations and travel patterns.

After accounting for internal trips, the project would generate approximately 880 new and pass-by trips during the weekday PM peak hour. Half of those trips would be pass-by with the other half being new.

TABLE 3 PROPOSED PROJECT TRIP GENERATION – SUNDAY AM PEAK HOUR								
Land Use	ITE Land Use Code	Quantity	Trip Rates ¹			Vehicle Trips		
			In	Out	Total	In	Out	Total
General Retail	821	68.8 ksf	3.3	2.6	5.9	225	182	407
Gas Station	944	16 vfp ²	9.3	9.3	18.6	102	102	204
High-Turnover (Sit Down) Restaurant	932	6.1 ksf	12.9	10.0	22.9	79	61	140
Coffee/Donut Shop with Drive through Window	937	1 ksf	35.2	33.6	68.8	35	34	69
Gross Trips						441	379	820
Internal Trips ³						-25	-25	-50
Pass-By Trips ³						-106	-106	-212
New Vehicle Trips						310	248	558
Notes:								
¹ Trip rates derived from the <i>Trip Generation Manual, 11th Edition</i> (Institute of Transportation Engineers, 2021). Sunday AM peak hour occurs from 10:30 – 11:30 AM. Note that trip generation rates are not provided for all categories for this time period. In some instances, “Sunday peak hour of generator” is provided, which was used. In other instances, no Sunday data was provided, and thus it was necessary to apply ratios of the percent of average weekday/Sunday daily traffic during this study period.								
² Assumes 25% of gas station trips are made by grocery store customers.								
³ The following pass-by percentages were applied based on conditions specific to weekends (i.e., no commute travel and less adjacent street traffic to draw pass-by from):								
<ul style="list-style-type: none"> - General Retail: 15% - Gas Station: 40% - Sit-Down Restaurant: 25% - Coffee/Donut Shop with Drive through Window: 33% 								
ksf = thousand square feet. vfp = vehicle fueling positions.								
Source: Fehr & Peers, 2022.								

During the Sunday AM peak hour, the project would generate approximately 770 new and pass-by trips, which is 13% lower than the project’s weekday PM peak hour trip generation. A greater percentage of Sunday AM peak hour trips would be new trips.

Trip Distribution/Assignment

The distribution of project trips is expected to be proportional to the distribution of residences within a certain distance of the project site. Restaurants and grocery stores are generally lacking in West Roseville (i.e., west of Fiddymment Road), though a retail center (anchored by a Raleys) is currently being constructed at the Blue Oaks Boulevard/Fiddymment Road intersection. The closest established retail centers are along Woodcreek Oaks Boulevard at Blue Oaks Boulevard (including the nearest Safeway) and Pleasant Grove Boulevard. Thus, the proposed retail center would be the closest site to a large number of new residences situated west of Fiddymment Road. Studies by the United States Department of Agriculture (USDA)³ found that retail shoppers typically drive an average of four miles to reach their preferred shopping location. The research also found that not all shoppers choose to visit the closest store to their residence.

To further inform the expected trip distribution, the following two evaluations were conducted:

1. The project was added to the City’s base year (2020) travel demand model and a select zone traffic assignment was performed. An estimated 26% of project trips would be distributed to/from the east along Pleasant Grove Boulevard.
2. Travel behavior during the Sunday traffic count at Pleasant Grove Community Church was reviewed. Among motorists departing the church after services concluded, about 30% headed eastbound on Pleasant Grove Boulevard. A fair percentage of these trips are likely destined for residences (i.e., similar destination as retail).

Table 4 displays the project’s estimated trip distribution under near-term conditions. These percentages consider the above trip distribution aspects.

TABLE 4	
PROPOSED PROJECT TRIP DISTRIBUTION	
Trip Distribution	Percentage
Fiddymment Road North of Pleasant Grove Boulevard	20%
Fiddymment Road South of Pleasant Grove Boulevard	30%
Pleasant Grove Boulevard West of Fiddymment Road	25%
Pleasant Grove Boulevard East of Project Site	25%
Total	100%
Notes: Source: Fehr & Peers, 2022.	

³ [5 Things the USDA Learned From Its First National Survey of Food Access – Streetsblog USA](#)

New trips were assigned to project driveways based on the trip distribution percentages in Table 4 and permitted driveway movements. Pass-by trip assignments considered the relative volume of traffic on each public street, and ease of performing pass-by movements. It should be noted that u-turns are permitted on the westbound approach of the Pleasant Grove Boulevard/Fiddymment Road intersection.

Figure 4 displays the Sunday AM peak hour and weekday PM peak hour traffic volumes at the four project driveways under existing plus project conditions. During the PM peak hour, 185 vehicles would turn left or right from Driveway 4 onto Pleasant Grove Boulevard, which is a four-lane arterial with a posted speed limit of 45 miles per hour carrying 2,325 vehicles. This volume would far exceed the applicable traffic volumes to satisfy the Peak Hour Volume warrant for consideration of a traffic signal.

Traffic Operations at Driveway 4/Pleasant Grove Blvd. Driveway

The Pleasant Grove Boulevard/Driveway 4 intersection was analyzed using a SimTraffic micro-simulation model, which employs procedures from the *Highway Capacity Manual, 6th Edition* (Transportation Research Board, 2016). SimTraffic is a more appropriate analysis method than a deterministic model (such as synchro) because it considers the effects of platooned arrivals and provides more accurate estimates of vehicle queuing.

In addition to including the subject intersection, the SimTraffic model also includes the signalized Pleasant Grove Boulevard/Fiddymment Road and Pleasant Grove Boulevard/Sun City Lane intersections, which are situated 650 feet to the west and 3,000 feet to the east, respectively, from the subject intersection⁴. These two intersections create gaps in traffic due to their signal operations, but also result in large platoons of vehicles during which it is not possible to turn out of the project driveway. Per City standards, a 1.0 peak hour factor (PHF, see footnote on page 2 for definition) was utilized to analyze weekday PM peak hour conditions. During the Sunday AM peak hour, Driveway 4 was measured to have a 0.33 PHF, while Pleasant Grove Boulevard had an approximate 0.85 PHF. SimTraffic models must utilize a single PHF. Through iterative testing, it was determined that use of a 0.75 system PHF would best replicate conditions exiting the driveway while also properly modeling through travel on Pleasant Grove Boulevard. Note that it was necessary to reassign some existing church trips to reflect outbound left-turns at Driveway 4 being permitted.

Table 5 shows traffic operations results at the Pleasant Grove Boulevard/Driveway 4 intersection under existing and existing plus project conditions (see **Appendix B** for technical calculations). This table indicates that under existing plus project conditions, Driveway 4 would operate at LOS F and have maximum queues that would far exceed the available storage (see screen capture on following page).

⁴ Measured from the centerline of each intersection.

TABLE 5 PLEASANT GROVE BOULEVARD/DRIVEWAY 4 TRAFFIC OPERATIONS ¹							
Scenario	Time Period	Eastbound Left-Turn		Southbound Left-Turn		Southbound Right-Turn	
		Delay / LOS ²	Maximum Queue	Delay / LOS ²	Maximum Queue	Delay / LOS ²	Maximum Queue
Existing Conditions	Sunday AM Peak Hour	8 / A	25 feet	19 / C	75 feet ³	8 / A	75 feet ³
	Weekday PM Peak Hour	20 / C	25 feet	93 / F	25 feet	13 / B	25 feet
Existing Plus Project Conditions	Sunday AM Peak Hour	8 / A	100 feet	39 / E	150 feet	11 / B	100 feet
	Weekday PM Peak Hour	20 / C	100 feet	209 / F	175 feet	67 / F	450 feet ⁴

Notes:

1. Intersection analyzed using SimTraffic micro-simulation model.
2. For side-street stop-controlled intersections, LOS C/D cusp is 25 seconds, LOS D/E cusp is 35 seconds, and LOS E/F cusp is 50 seconds.
3. This is an underestimate of the actual maximum queue due to limitations in modeling different PHFs (see previous page). Queues during the Sunday AM peak hour under existing plus project conditions would be greater than shown here.
4. The lengthier right-turn queue represents the most distant wait location for a right-turning vehicle. This is caused in part by left-turning vehicles waiting to access the left-turn pocket.

Source: Fehr & Peers, 2022.

Under existing plus project conditions, vehicle queues in the eastbound left-turn lane on Pleasant Grove Boulevard at Driveway 4 would not exceed the 150 feet of available storage.

Based on this analysis, the following is recommended:

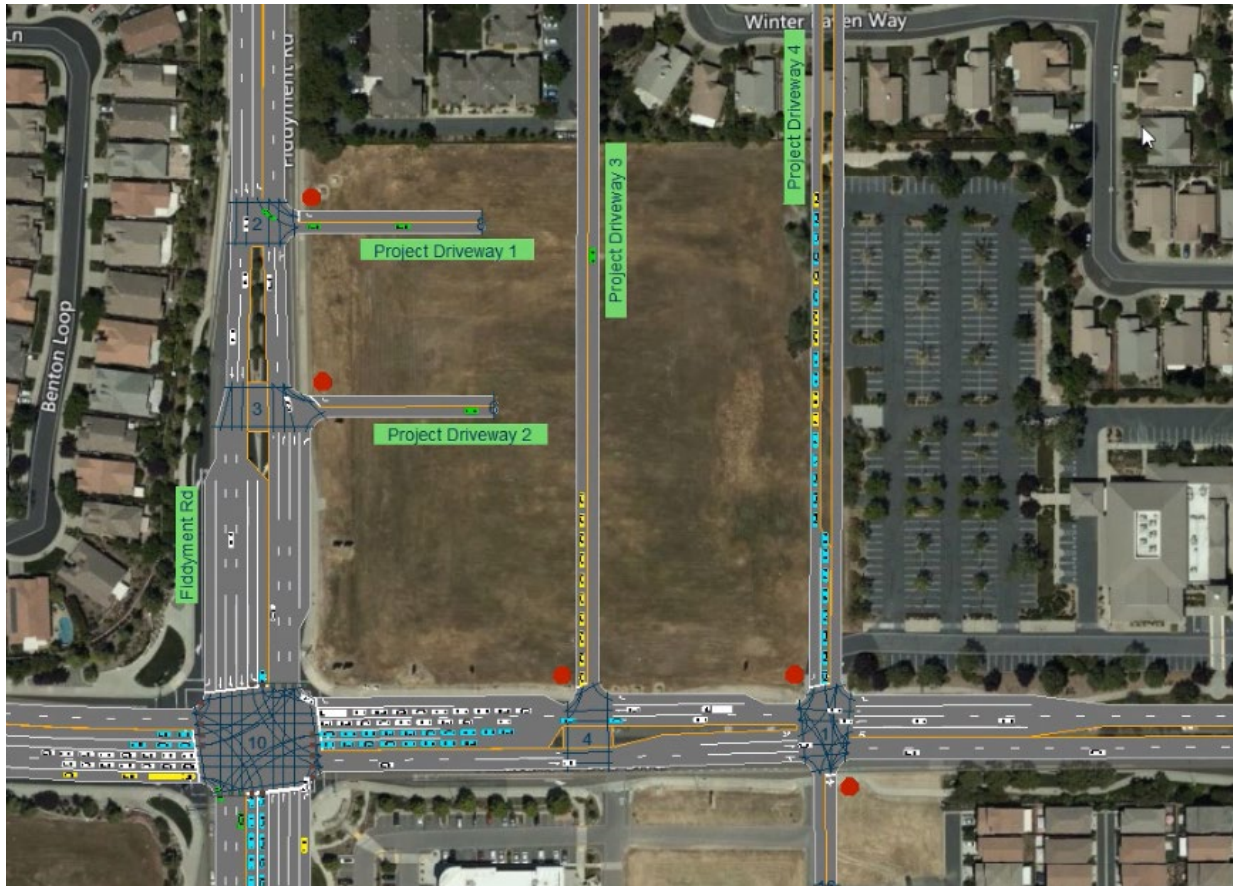
- Outbound movements at Driveway 4 should be restricted to right-turns by placing a gull-wing in the driveway median.

This recommendation would also prohibit left/through movements from the opposing driveway. SimTraffic was used to analyze how operations would change with the above modification. The southbound approach was found to improve to LOS D conditions with an average delay of 45 seconds per vehicle.

It is further noted that additional analysis and/or discussions are needed regarding the long-term feasibility of maintaining the existing eastbound left-turn lane at Driveway 4. This is being driven by the projected increase in traffic on westbound Pleasant Grove Boulevard and expected worsening of operations at the Fiddymet Road/Pleasant Grove Boulevard intersection. According to the most recent 2035 forecasts and operations analysis from the *Transportation Impact Study for the City of*

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Roseville Housing Element Update (Fehr & Peers, May 2021), this intersection is expected to operate at LOS F during the weekday AM peak hour and LOS E during the weekday PM peak hour. The westbound approach is expected to experience a 78% increase in PM peak hour traffic between now and 2035. This could potentially cause westbound traffic to spill back beyond Driveway 4, making eastbound left-turns difficult to perform.



Screen capture of SimTraffic model under existing plus project weekday PM peak hour conditions. Driveway storage lengths have been expanded so to capture all delays and queuing that would occur.

Review of Project Access

We reviewed the project site plan with respect to the following:

1. Evaluation of proposed left-turn ingress lane on Fiddymment Road at Driveway 1
2. Consistency of project driveway design with applicable City standards
3. Estimation of maximum queue lengths for outbound movements at driveways
4. Review of internal circulation

1. Evaluation of Proposed Left-Turn Ingress Lane on Fiddymment Road at Driveway 1

We analyzed the feasibility of a southbound left-turn ingress lane on Fiddymment Road at Driveway 1. Potential constraints include both the width of the median and sight distance limitations.

Figure 5 shows the sight distance analysis results. As shown, removal of landscaping in a portion of the median from south of the left-turn pocket to the beginning of the southbound left-turn lanes approaching Pleasant Grove Boulevard is required to ensure that a motorist in the left-turn lane would have an adequate line of sight of oncoming traffic.⁵

Figure 5 shows that the left-turn lane would be constructed with a 10-foot lane width and a 1.5-foot raised median. The current median is slightly less than this 11.5-foot width. Thus, minor restriping/narrowing of the southbound travel lanes is required in the turn lane vicinity⁶. Although more detailed engineering studies are required, this evaluation has determined that it appears possible to maintain at least 11-foot through lane widths in this area.

The southbound left-turn lane would have a maximum queue of 100 feet (see **Appendix B**). The City standard 200-foot left-turn lane design is recommended.

2. Consistency of Project Driveway Design with Applicable City standards

The following standards contained in the *City of Roseville Design and Construction Standards (2021)* are applicable to the project site plan review. Each standard is followed by an evaluation of the project's compliance with it and any site access recommendations.

- *No portion of a driveway shall be allowed within a separate bus turnout, including tapers.*
Evaluation: Driveway 2 on Fiddymment Road would be situated 240 feet north of Pleasant Grove Boulevard at the very north end of the transition taper of the existing bus turnout. This driveway placement is consistent with Standard Drawing ST-46 of the City's *Design and Construction Standards*. A continuous pull bus turnout / right-turn deceleration lane is required per Case 1 of Drawing ST-48 of the City's *Design and Construction Standards*.
- *Driveways shall be at least 250 feet apart on arterial streets.*
Evaluation: Driveways 1 and 2 on Fiddymment Road would be spaced 225 feet apart, which is less than the applicable standard. This driveway appears to have been placed in this location to avoid two large electrical vaults that would need to be relocated if Driveway 1 had been placed 25 feet to the north to achieve this standard. It would not be possible to relocate

⁵ Sight distance adequacy determined using a 55 mph design speed and applying the American Association of State Highway Transportation officials (AASHTO, 2018) Case F methodology (see Figure 5).

⁶ Although excess pavement exists on the east side of the median, this needs to remain to accommodate the inside lane drop and transition starting just north of Pleasant Grove Boulevard.

Driveway 2 further south due to the existing bus turnout. The City Engineer will need to decide whether this non-standard driveway spacing is acceptable.

- *Driveways on arterial streets approaching signalized intersections shall be at least 185 feet from the intersection and restricted to right-turns only.*

Evaluation: Driveway 3 on Pleasant Grove Boulevard would be situated 220 feet east of Fiddymment Road and restricted to right-turns only by a raised median. This standard is met.

- *Right-turn deceleration lanes shall be provided at driveways when:*
 - *the driveway is located on an arterial,*
 - *the right-turn ingress volume is expected to exceed 50 vehicles per hour,*
 - *there is ample room to fit a deceleration lane, and*
 - *the travel speed of the roadway equals or exceeds 45 mph.*

A right-turn curb flare shall be provided when these conditions are met but the right-turn volume is between 10 and 50 vehicles per hour. There may be cases where some of the criteria are met, but City staff may still require a deceleration lane in the interest of safety.

Evaluation: According to Figure 4, Driveways 2, 3, and 4 would each serve at least 50 right-turning vehicles per hour, while Driveway 1 would serve between 10 and 50 vehicles. Additionally, they are located on arterial streets with 45 mph posted speed limits. According to the project site plan, a landscape setback would be provided along the project frontage, which implies there would be ample room to fit the deceleration lanes. Accordingly, the following is recommended:

1. Construct a continuous right-turn deceleration/acceleration lane on westbound Pleasant Grove Boulevard beginning 185 feet east of Driveway 4 and connecting to the existing right-turn lane at Fiddymment Road. There is presently a right-turn curb flare at Driveway 4. The project applicant may need to work with the Pleasant Grove Community Church to ensure that the right-turn lane can be constructed.⁷
2. Construct a right-turn curb flare at Driveway 1 on Fiddymment Road.

⁷ While this recommendation is consistent with City standards, consideration should also be given to providing an off-street shared use (bicycle/pedestrian) facility beginning at the start of the deceleration lane, extending along the project frontage and terminating at Fiddymment Road. This would provide an “all ages and abilities” solution for bicycling along this section of Pleasant Grove Boulevard. Confident bicyclists could choose to remain in the Class II bike lane, while more timid riders could choose to use the Shared Use facility.

3. Maximum queue lengths for outbound movements at driveways

Table 6 displays the maximum expected vehicle queues at project driveways and their proposed throat depths according to the project site plan. Results are shown for weekday PM peak hour conditions as this is a more worst-case condition than Sunday AM peak hour due to greater levels of traffic on surrounding roadways. Refer to **Appendix B** for technical calculations.

TABLE 6: DRIVEWAY THROAT DEPTH REQUIREMENTS			
Driveway	Movement	Proposed Throat Depth¹	Maximum Vehicle Queue - Weekday PM Peak Hour
Driveway 1	Outbound Right	60 feet	50 feet
Driveway 2	Outbound Right	60 feet	75 feet
Driveway 3	Outbound Right	60 feet	175 feet
Driveway 4	Outbound Right	160 feet	175 feet

Notes:

- Per project site plan.
- Estimated using methodology described in *Estimation of Maximum Queue Lengths at Unsignalized Intersections* (ITE Journal, 2001) assuming outbound left-turns at Driveway 4 are prohibited.

Source: Fehr & Peers, 2022.

The following is recommended based on Table 6:

- Modify the project site plan to provide 175 feet of throat depth at Driveway 3 if possible. Alternatively, a design similar to what exists at the Safeway Shopping Center driveway on Woodcreek Oaks Boulevard (i.e., raised median in driveway with about 125 feet of throat depth along with a right in/out opening to the gas station) would be acceptable.

As part of these modifications, it would also be desirable to provide for more orderly ingress to access the gasoline fueling positions. According to the project site plan, the site exceeds the minimum required parking by 37 spaces. Thus, if several parking spaces near the gas station need to be removed to accomplish this, doing so would not cause the project to be non-compliant with applicable parking requirements.

The provided throat depth at Driveway 2 is 15 feet less than the maximum queue. No modifications to the site plan are recommended at this location given that the first internal intersection is sufficiently

wide to allow an incoming vehicle to navigate around the “last” queued outbound vehicle. Additionally, the northbound approach to this intersection will accommodate fuel delivery trucks.

The throat depth at Driveway 4 is also 15 feet less than the maximum queue. No modifications to the site plan are recommended here given the considerable width (49 feet) of the driveway. In fact, while it makes sense to maintain the 50-foot driveway width at Pleasant Grove Boulevard, the driveway could gradually narrow as it extends into the site.

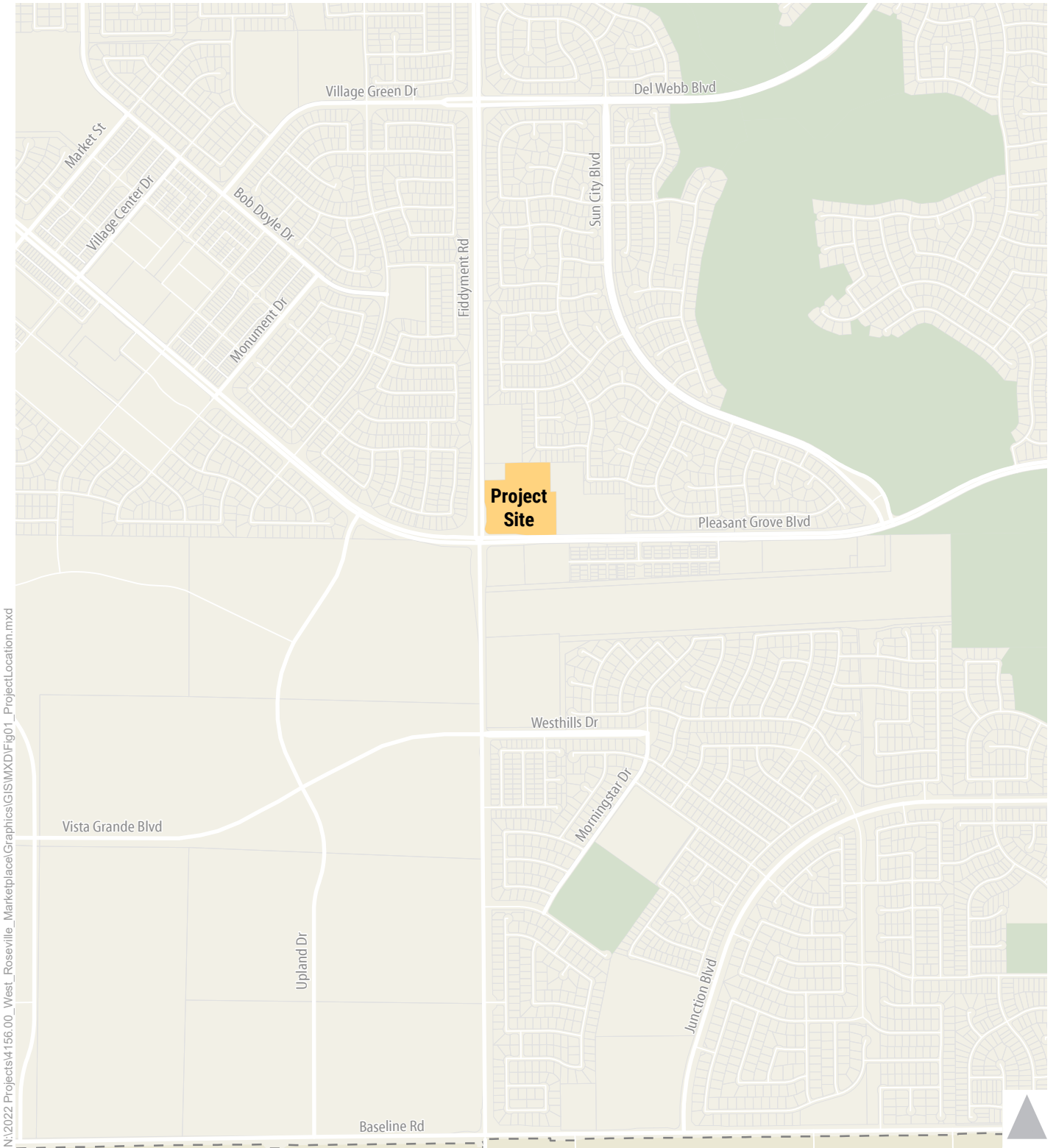
4. Review of Internal Circulation

Our review of the project site plan did not reveal any potential operational concerns. Drive aisles are properly aligned and have adequate widths. Overall circulation is intuitive. The major drive aisles have been designed to accommodate grocery store and gasoline delivery trucks. Trash enclosures are placed in convenient locations for garbage trucks.

However, at the conclusion of Sunday services, excess queuing would occur at Driveway 4. Specifically, motorists exiting the church parking lot would have difficulty entering Driveway 4 (from its side-street driveway) due to queued vehicles waiting to turn right onto Pleasant Grove Boulevard. To reduce the likelihood that exiting church traffic blocks the path of inbound motorists at Driveway 4, the following is recommended:

- Post “Do Not Block Intersection” signs at the Pleasant Grove Community Church Driveway approaching Driveway 4.
- Stripe “Do Not Block Intersection” pavement markings across the inbound lane on Driveway 4 at the Pleasant Grove Community Church Driveway.

Refer to **Figure 6** for study recommendations.

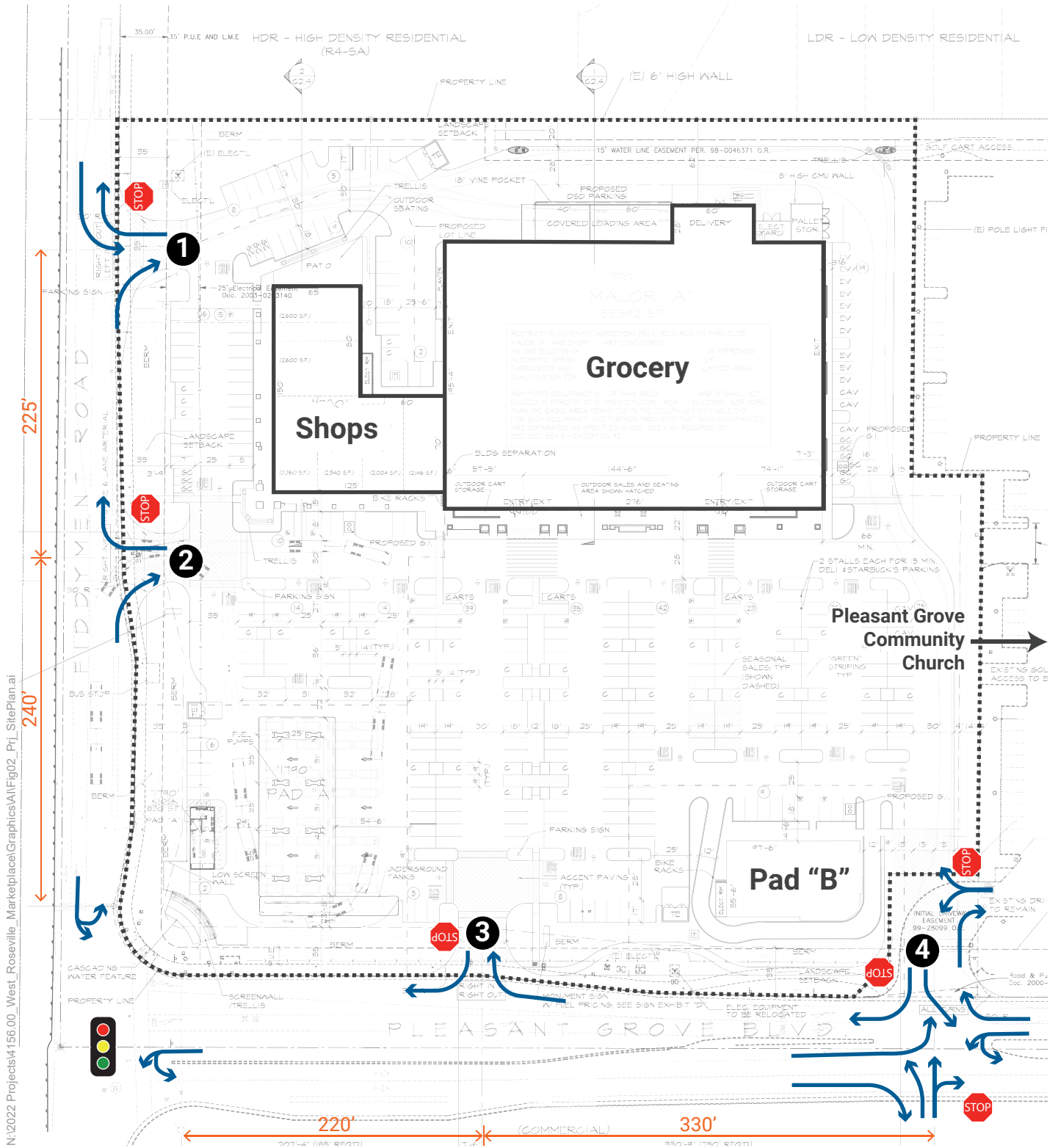


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- Project Site
- City Boundary
- Park/Open Space



Figure 1
Project Location



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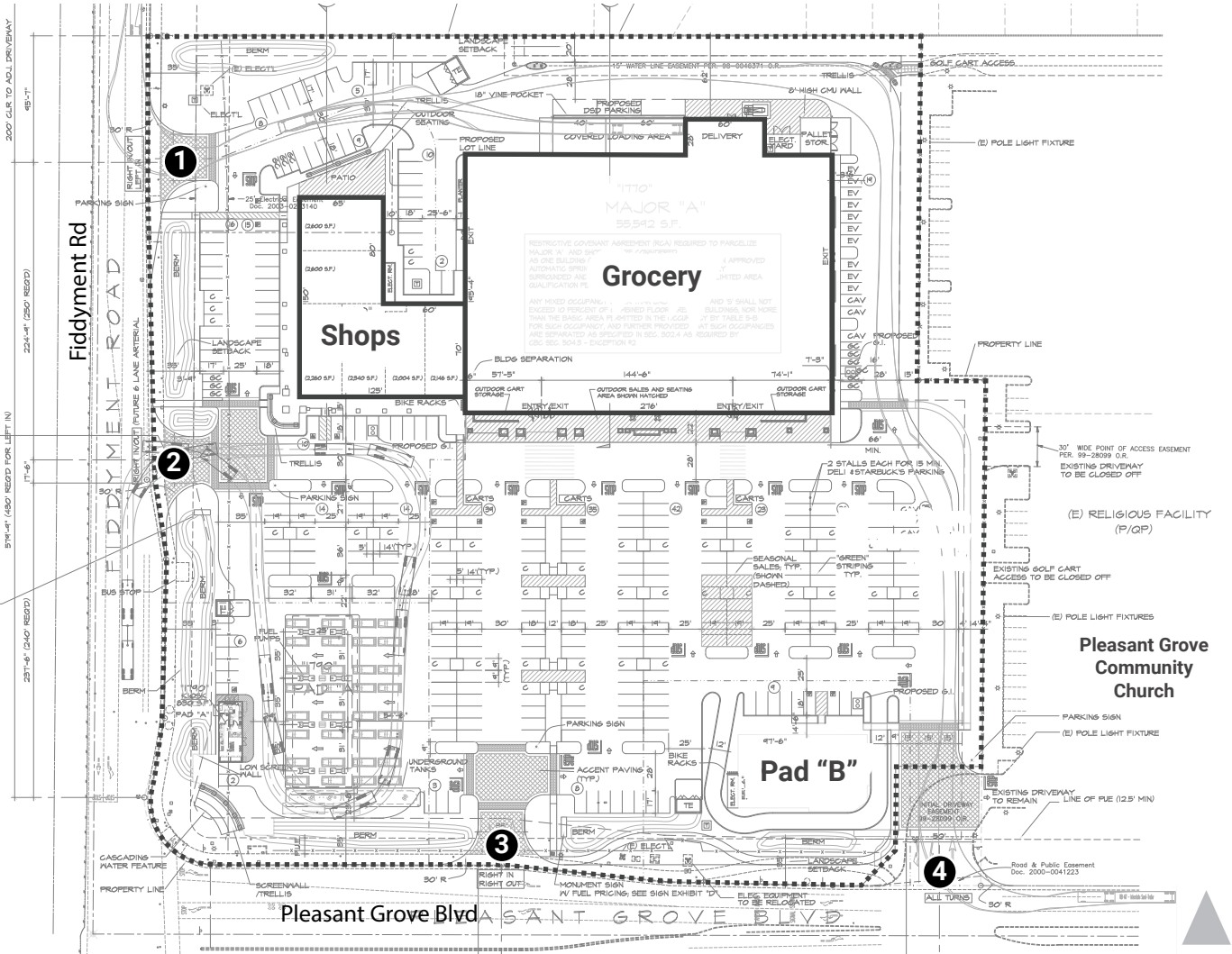
-  Stop Sign
-  Permitted Turning Movement
-  Traffic Signal
-  Driveway Number

Note: Driveway dimensions referenced from the centerline of the driveway to the near curb return of the adjacent intersection.



Figure 2
Project Site Plan





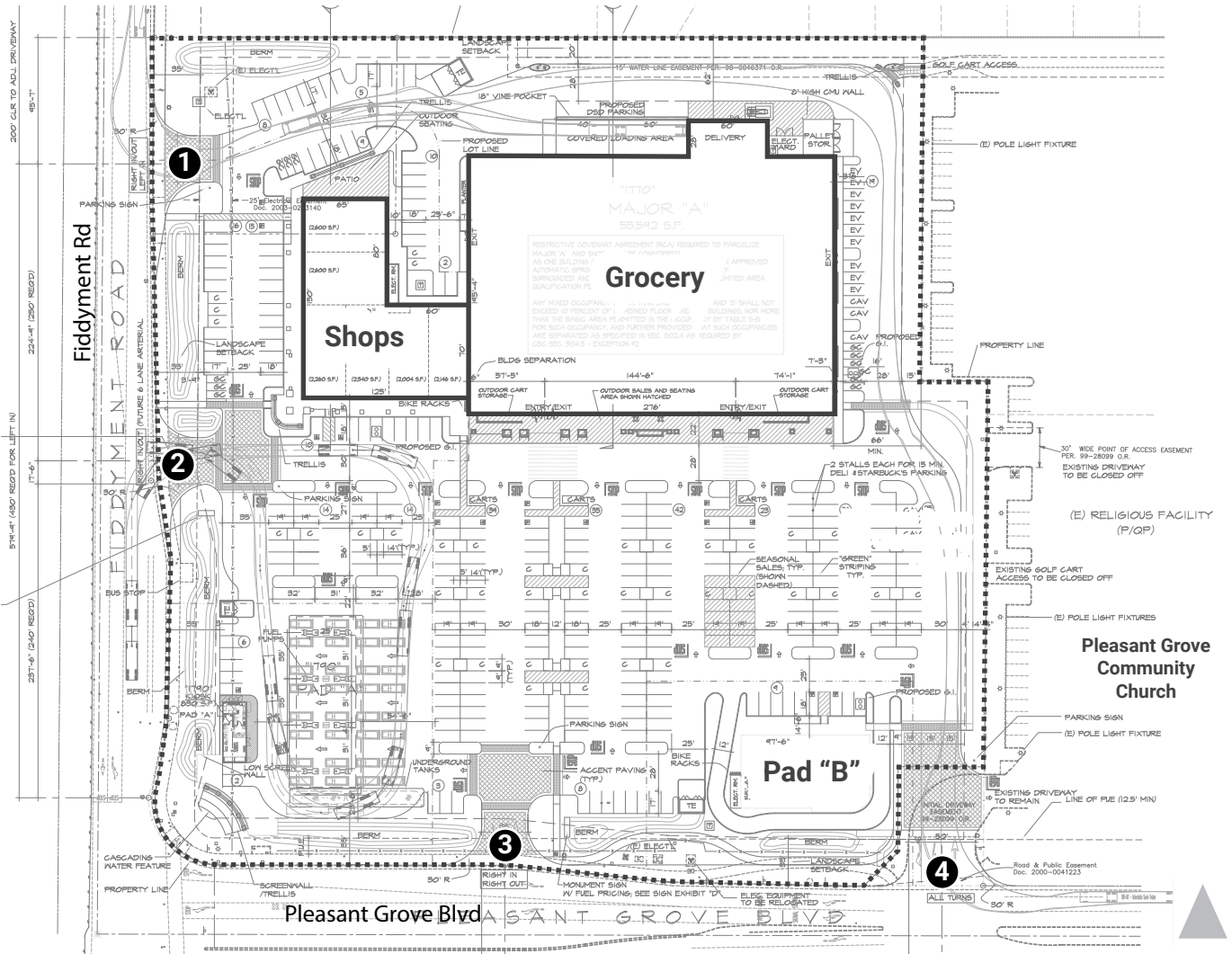
1. Project Dwy 1/Fiddlyment Rd	2. Project Dwy 2/Fiddlyment Rd	3. Project Dwy 3/Pleasant Grove Blvd	4. Project Dwy 4/Pleasant Grove Blvd
<p>Does Not Exist Under This Scenario</p>	<p>Does Not Exist Under This Scenario</p>	<p>Does Not Exist Under This Scenario</p>	<p> Pleasant Grove Blvd 16 (15) 2 (3) 1,010 (958) 4 (5) </p> <p> Project Dwy 4 0 (0) 631 (1,217) 28 (36) 10 (6) </p> <p> 4 (10) 0 (0) 3 (13) </p>

- 1** Project Driveway
- Turn Lane
- AM (PM) Sunday AM Peak Hour (Weekday PM Peak Hour) Traffic Volume
- Stop Sign



Note: Volumes at Driveway 4 represent conditions assuming the currently permitted full-access on the southbound approach (versus the recent prohibition of southbound left-turns via signed posted by a private party).

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



1. Project Dwy 1/Fiddlyment Rd	2. Project Dwy 2/Fiddlyment Rd	3. Project Dwy 3/Pleasant Grove Blvd	4. Project Dwy 4/Pleasant Grove Blvd
<p>800 (844) 87 (85)</p> <p>Fiddlyment Rd</p> <p>24 (27)</p> <p>Project Dwy 1</p> <p>801 (971) 46 (40)</p>	<p>800 (844)</p> <p>Fiddlyment Rd</p> <p>50 (57)</p> <p>Project Dwy 2</p> <p>809 (954) 159 (134)</p>	<p>203 (188)</p> <p>Project Dwy 3</p> <p>74 (78) 720 (1,269)</p> <p>Pleasant Grove Blvd</p> <p>1,079 (1,010)</p>	<p>74 (88) 0 (0) 96 (97)</p> <p>Pleasant Grove Blvd</p> <p>34 (33) 54 (52) 987 (920) 4 (5)</p> <p>Project Dwy 4</p> <p>56 (56) 682 (1,216) 28 (36) 21 (6)</p> <p>4 (10) 0 (0) 3 (15)</p>

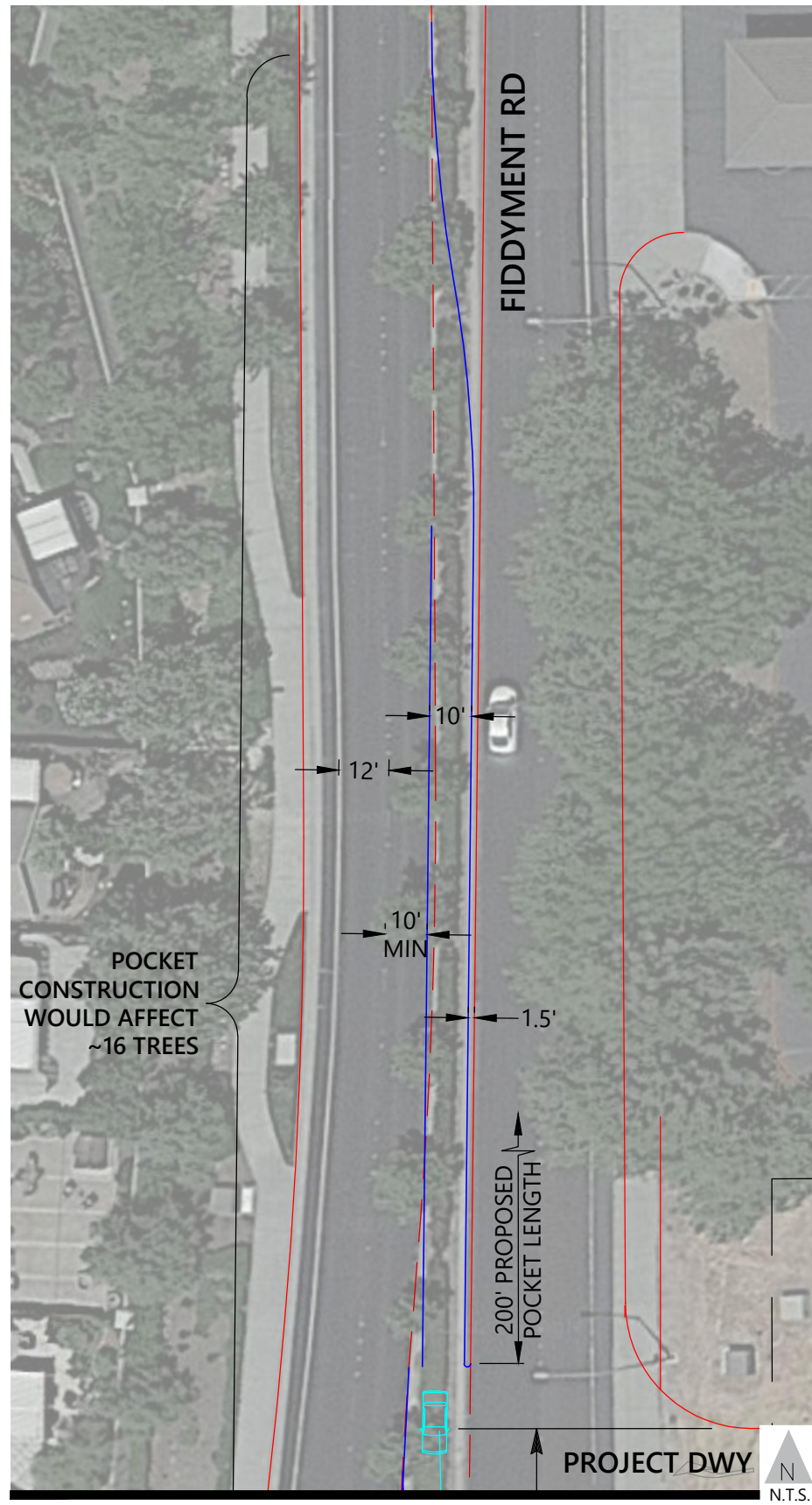
- Project Driveway
- Turn Lane
- AM (PM) Sunday AM Peak Hour (Weekday PM Peak Hour) Traffic Volume
- Stop Sign

Figure 4

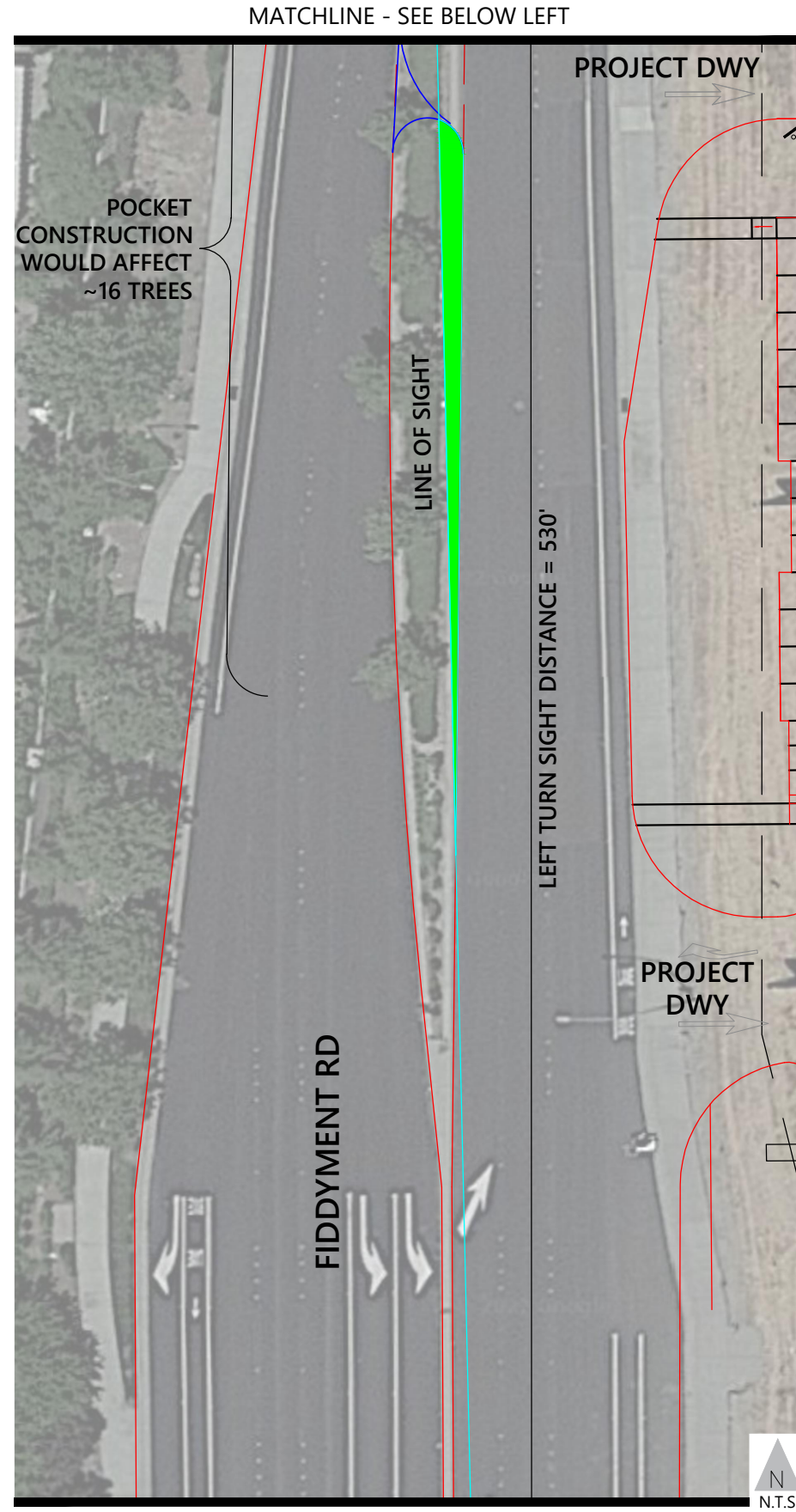
Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Project Conditions



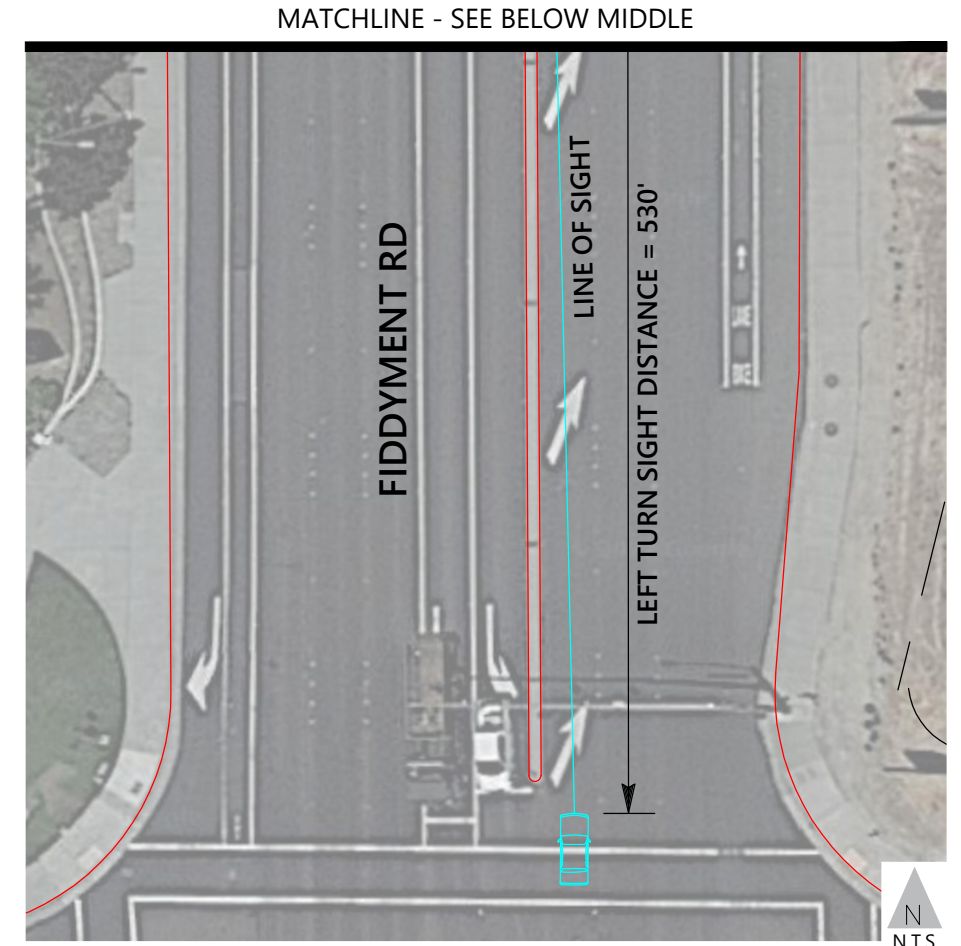
Note: Volumes at Driveway 4 represent conditions assuming the currently permitted full-access on the southbound approach (versus the recent prohibition of southbound left-turns via signed posted by a private party).




MATCHLINE - SEE ABOVE MIDDLE



MATCHLINE - SEE ABOVE RIGHT



LEGEND

 LEFT TURN SIGHT DISTANCE TRIANGLE - DESIGN OF VERTICAL ELEMENTS IN THIS AREA TO BE CONSISTENT WITH 2018 AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS CHAPTER 9.5.3.6 CASE F AND CITY OF ROSEVILLE DESIGN STANDARDS SECTION 7-12 (B)¹.

DESIGN SPEED

FIDDYMENT ROAD - 55 MPH
(BASED ON CITY OF ROSEVILLE DESIGN STANDARDS SECTION 7-12 (A))

LEFT TURN SIGHT DISTANCE

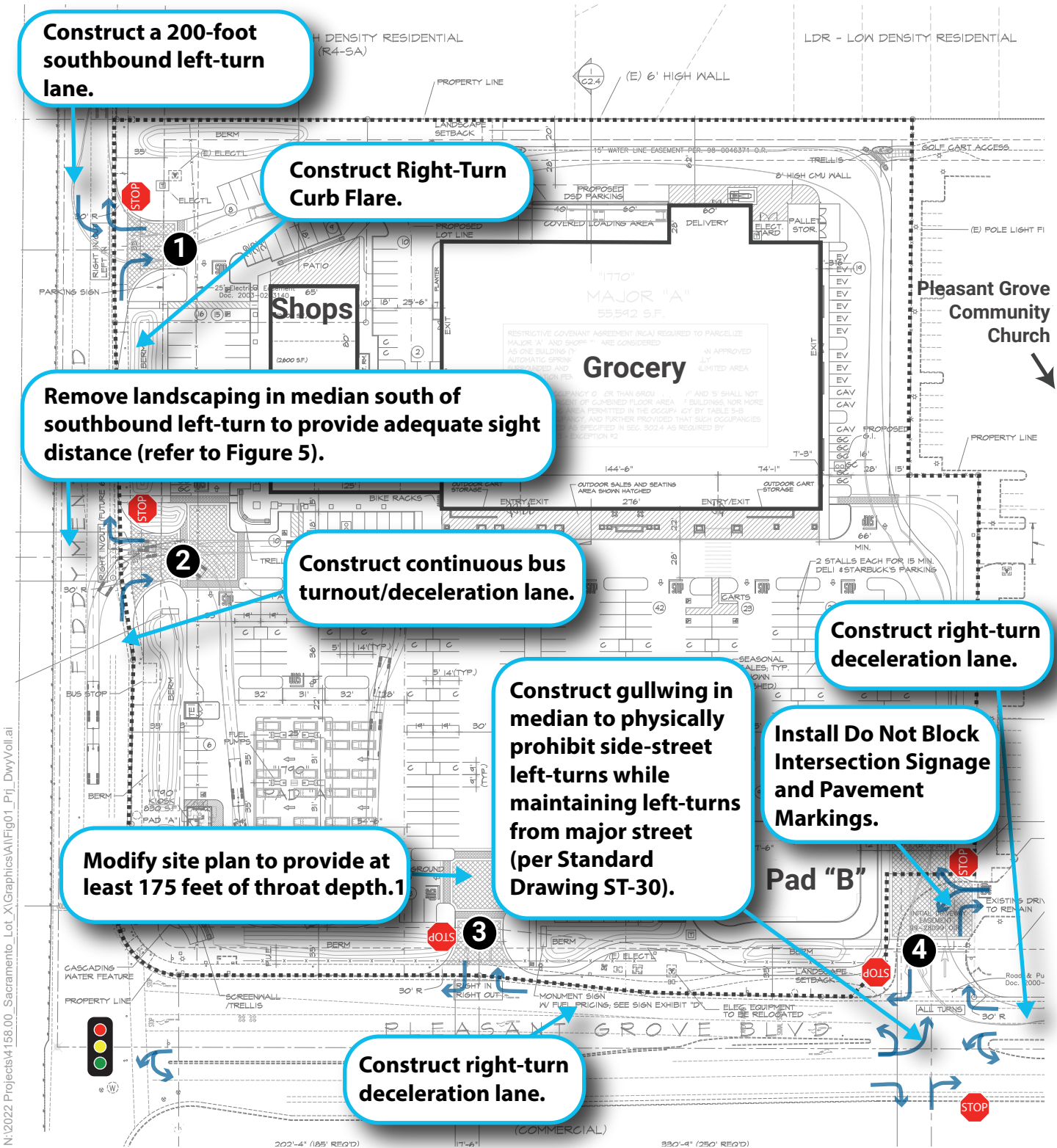
LEFT TURN SIGHT DISTANCE = 530' CALCULATED PER 2018 AASHTO GEOMETRIC DESIGN OF HIGHWAYS AND STREETS CHAPTER 9.5.3.6 CASE F.







1: SHADED GREEN AREA REPRESENTS PORTION OF MEDIAN SITUATED BETWEEN THE FACE OF CURB AND THE REQUIRED LINE OF SIGHT.

Figure 5
Left Turn Sight Distance Analysis
Project Driveway at Fiddymment Road North of Pleasant Grove Boulevard

CADD FILE: W:\Roseville - N Drive\2022 - Projects\4156.00 - West_Roseville_Marketplace\CADD\4156-SB Left-Turn.dwg
Mar. 03, 2022



N:\2022 Projects\4158.00 Sacramento_Lot_X\Graphics\AI\Fig01_Prt_Dwv\Vol1.ai

-  Stop Sign
-  Permitted Turning Movement
-  Traffic Signal
-  Driveway Number

Note: Additional studies/discussion are required to determine whether eastbound left-turn ingress at Driveway 4 can be maintained in the long-term given expected increases in through traffic on Pleasant Grove Blvd and corresponding increases in queuing.

1: Alternatively, a design similar to what exists at the Safeway Shopping Center driveway on Woodcreek Oaks Boulevard (i.e., raised median in driveway with about 125 feet of throat depth along with a right in/out opening to the gas station) would be acceptable.



Figure 6
Recommendations

Appendix A – Trip Generation Manual Outputs

Query Filter

DATA SOURCE:
 Trip Generation Manual, 11th Ed

SEARCH BY LAND USE CODE:
 821

LAND USE GROUP:
 (800-899) Retail

LAND USE :
 821 - Shopping Plaza (40-150k)

LAND USE SUBCATEGORY:
 Supermarket - Yes

SETTING/LOCATION:
 General Urban/Suburban

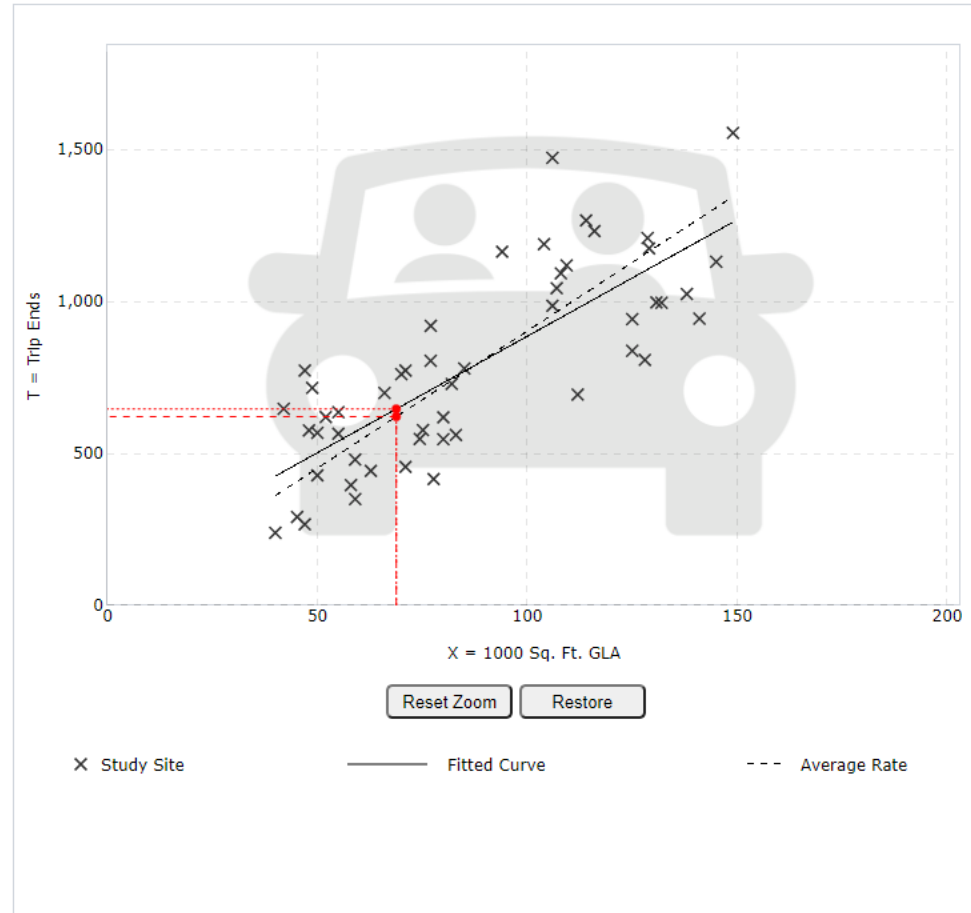
INDEPENDENT VARIABLE (IV):
 1000 Sq. Ft. GLA

TIME PERIOD:
 Weekday, Peak Hour of Adjacent Street Traffic

TRIP TYPE:
 Vehicle

ENTER IV VALUE TO CALCULATE TRIPS:
 68.8 Calculate

Data Plot and Equation



Use the mouse wheel to Zoom Out or Zoom In.
 Hover the mouse pointer on data points to view X and T values.

DATA STATISTICS

Land Use:
 Shopping Plaza (40-150k) - Supermarket - Yes (821)
[Click for Description and Data Plots](#)

Independent Variable:
 1000 Sq. Ft. GLA

Time Period:
 Weekday
 Peak Hour of Adjacent Street Traffic
 One Hour Between 4 and 6 p.m.

Setting/Location:
 General Urban/Suburban

Trip Type:
 Vehicle

Number of Studies:
 51

Avg. 1000 Sq. Ft. GLA:
 87

Average Rate:
 9.03

Range of Rates:
 5.35 - 16.45

Standard Deviation:
 2.37

Fitted Curve Equation:
 $T = 7.67(X) + 118.86$

R²:
 0.62

Directional Distribution:
 48% entering, 52% exiting

Calculated Trip Ends:
 Average Rate: 621 (Total), 298 (Entry), 323 (Exit)
 Fitted Curve: 647 (Total), 310 (Entry), 337 (Exit)

Appendix B – Technical Calculations

1: Project Driveway 4 & Pleasant Grove Blvd Performance by movement

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	NBL	NBR	SBL	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.3	0.2	0.3	0.1	0.1	4.0	0.2	0.1
Total Delay (hr)	0.0	0.0	0.6	0.0	0.0	0.1	0.5	0.0	0.0	0.1	0.1	1.6
Total Del/Veh (s)	6.9	7.7	2.0	1.8	15.2	12.2	3.0	30.6	8.6	19.0	8.2	3.1
Stop Delay (hr)	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.4
Stop Del/Veh (s)	2.5	3.0	0.2	0.3	8.5	7.6	0.0	29.3	8.6	15.5	4.8	0.7
Total Stops	7	1	1	0	6	18	0	4	4	20	60	121
Stop/Veh	0.41	0.50	0.00	0.00	0.67	0.64	0.00	1.00	1.00	1.00	1.00	0.07
Travel Dist (mi)	2.0	0.3	123.4	0.5	4.9	15.1	362.5	0.1	0.1	1.5	4.3	514.7
Travel Time (hr)	0.1	0.0	5.2	0.0	0.2	0.6	12.8	0.0	0.0	0.2	0.3	19.4
Avg Speed (mph)	18	19	24	21	24	25	28	3	7	9	15	27
Fuel Used (gal)	0.1	0.0	5.2	0.0	0.1	0.4	9.0	0.0	0.0	0.1	0.1	14.9
Fuel Eff. (mpg)	24.7	26.5	23.9	26.4	39.9	39.6	40.4	11.5	27.6	26.2	41.2	34.5
HC Emissions (g)	1	0	86	0	1	5	120	0	0	0	1	214
CO Emissions (g)	34	4	2667	8	17	89	2107	1	0	10	36	4972
NOx Emissions (g)	3	0	301	1	2	14	326	0	0	1	4	651
Vehicles Entered	16	2	1019	4	9	27	645	4	4	20	60	1810
Vehicles Exited	16	2	1020	4	9	27	647	4	4	20	60	1813
Hourly Exit Rate	16	2	1020	4	9	27	647	4	4	20	60	1813
Input Volume	16	2	1010	4	10	28	631	4	3	21	58	1789
% of Volume	102	89	101	94	90	96	103	94	123	94	103	101
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												598
Occupancy (veh)	0	0	5	0	0	1	13	0	0	0	0	19

Intersection: 1: Project Driveway 4 & Pleasant Grove Blvd

Movement	EB	EB	WB	NB	SB	SB
Directions Served	UL	TR	UL	LTR	L	R
Maximum Queue (ft)	37	11	60	33	53	77
Average Queue (ft)	7	0	17	9	17	33
95th Queue (ft)	28	4	48	31	45	62
Link Distance (ft)		536		124		383
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	140		195		50	
Storage Blk Time (%)					0	1
Queuing Penalty (veh)					0	0

Movement

Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 76

HCM 6th TWSC
1: Project Driveway 4 & Pleasant Grove Blvd

Existing Conditions
PM Peak Hour

Intersection														
Int Delay, s/veh	1													
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↕			↕	↕			↕		↕		↕
Traffic Vol, veh/h	15	3	958	5	6	36	1217	0	10	0	13	2	0	4
Future Vol, veh/h	15	3	958	5	6	36	1217	0	10	0	13	2	0	4
Conflicting Peds, #/hr	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	-	140	-	-	-	195	-	-	-	-	-	50	-	0
Veh in Median Storage, #	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	15	3	958	5	6	36	1217	0	10	0	13	2	0	4

Major/Minor	Major1		Major2		Minor1		Minor2							
Conflicting Flow All	1217	1217	0	0	963	964	0	0	1691	2299	484	1817	-	609
Stage 1	-	-	-	-	-	-	-	-	998	998	-	1301	-	-
Stage 2	-	-	-	-	-	-	-	-	693	1301	-	516	-	-
Critical Hdwy	6.44	4.14	-	-	6.44	4.14	-	-	7.54	6.54	6.94	7.54	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	6.54	5.54	-	6.54	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	6.54	5.54	-	6.54	-	-
Follow-up Hdwy	2.52	2.22	-	-	2.52	2.22	-	-	3.52	4.02	3.32	3.52	-	3.32
Pot Cap-1 Maneuver	241	569	-	-	351	710	-	-	61	38	529	49	0	438
Stage 1	-	-	-	-	-	-	-	-	261	320	-	170	0	-
Stage 2	-	-	-	-	-	-	-	-	400	229	-	510	0	-
Platoon blocked, %			-	-			-	-						
Mov Cap-1 Maneuver	265	265	-	-	615	615	-	-	54	33	528	43	-	438
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	54	33	-	43	-	-
Stage 1	-	-	-	-	-	-	-	-	243	298	-	158	-	-
Stage 2	-	-	-	-	-	-	-	-	369	213	-	463	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.4	0.4	46.2	39.8
HCM LOS			E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	110	265	-	-	615	-	-	43	438
HCM Lane V/C Ratio	0.209	0.068	-	-	0.068	-	-	0.047	0.009
HCM Control Delay (s)	46.2	19.6	-	-	11.3	-	-	92.8	13.3
HCM Lane LOS	E	C	-	-	B	-	-	F	B
HCM 95th %tile Q(veh)	0.7	0.2	-	-	0.2	-	-	0.1	0

Intersection: 1: Project Driveway 4 & Pleasant Grove Blvd

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	UL	T	TR	UL	T	TR	LTR	R
Maximum Queue (ft)	43	14	25	61	17	15	65	32
Average Queue (ft)	13	1	1	19	1	1	18	5
95th Queue (ft)	38	9	15	49	9	8	49	23
Link Distance (ft)		536	536		2960	2960	124	382
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	140			195				
Storage Blk Time (%)								
Queuing Penalty (veh)								

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

--

1: Project Driveway 4 & Pleasant Grove Blvd Performance by movement

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBR	SBL	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	3.9	0.4
Total Delay (hr)	0.1	0.1	0.4	0.0	0.1	0.1	0.8	0.1	0.1	0.0	1.0	0.2
Total Del/Veh (s)	8.3	8.4	1.5	0.1	20.6	14.0	3.9	3.6	51.4	9.9	38.9	10.6
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.9	0.1
Stop Del/Veh (s)	2.8	3.0	0.0	0.0	11.0	9.6	0.1	0.1	50.3	10.0	35.7	6.8
Total Stops	17	28	0	0	14	20	4	0	5	4	90	74
Stop/Veh	0.49	0.48	0.00	0.00	0.70	0.69	0.01	0.00	1.00	1.00	0.99	0.99
Travel Dist (mi)	1.7	2.9	50.4	0.2	11.2	16.0	387.5	31.6	0.1	0.1	17.5	14.5
Travel Time (hr)	0.1	0.2	1.5	0.0	0.4	0.5	9.0	0.7	0.1	0.0	1.7	0.7
Avg Speed (mph)	15	15	34	21	32	33	43	43	1	5	11	20
Fuel Used (gal)	0.0	0.1	1.2	0.0	0.3	0.5	11.9	0.9	0.0	0.0	0.7	0.4
Fuel Eff. (mpg)	40.4	39.9	42.8	79.0	33.3	32.8	32.6	33.9	6.2	20.6	26.1	39.1
HC Emissions (g)	0	1	26	0	3	6	222	20	0	0	6	5
CO Emissions (g)	15	27	956	0	192	289	9111	762	1	0	167	106
NOx Emissions (g)	2	3	76	0	16	25	834	71	0	0	17	13
Vehicles Entered	35	58	996	4	20	28	687	56	5	4	89	74
Vehicles Exited	35	57	996	5	20	28	687	56	5	4	89	74
Hourly Exit Rate	35	57	996	5	20	28	687	56	5	4	89	74
Input Volume	34	54	988	4	21	28	682	56	4	3	96	74
% of Volume	103	105	101	118	94	101	101	100	118	123	93	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	0	0	2	0	0	0	9	1	0	0	2	1

Intersection: 1: Project Driveway 4 & Pleasant Grove Blvd

Movement	EB	EB	WB	WB	NB	SB	SB
Directions Served	UL	TR	UL	T	LTR	L	R
Maximum Queue (ft)	81	2	70	2	39	136	90
Average Queue (ft)	28	0	22	0	8	57	31
95th Queue (ft)	62	2	54	0	30	114	66
Link Distance (ft)		208		2917	124		1028
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	150		195			150	
Storage Blk Time (%)						1	
Queuing Penalty (veh)						1	

Intersection: 2: Fiddymnt Rd & Project Driveway 1

Movement	WB	NB	NB	SB
Directions Served	R	T	TR	L
Maximum Queue (ft)	41	9	35	81
Average Queue (ft)	17	0	2	29
95th Queue (ft)	44	7	18	65
Link Distance (ft)	208	153	153	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				250
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Fiddymnt Rd & Project Driveway 2

Movement	WB	NB	NB	NB
Directions Served	R	T	T	T
Maximum Queue (ft)	57	20	65	68
Average Queue (ft)	15	1	10	9
95th Queue (ft)	35	13	40	42
Link Distance (ft)	185	286	286	286
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

1: Project Driveway 4 & Pleasant Grove Blvd Performance by movement

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBR	SBL	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	3.8	0.4
Total Delay (hr)	0.2	0.3	0.4	0.0	0.0	0.2	2.4	0.1	0.2	0.1	5.3	1.6
Total Del/Veh (s)	17.6	20.4	1.4	1.3	16.6	17.9	7.1	4.8	94.7	28.2	208.7	67.0
Stop Delay (hr)	0.2	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.1	5.3	1.6
Stop Del/Veh (s)	17.5	18.7	0.0	0.0	11.7	6.3	0.1	0.4	92.3	25.9	208.2	65.2
Total Stops	25	44	1	0	4	23	15	2	9	13	95	112
Stop/Veh	0.81	0.80	0.00	0.00	0.67	0.64	0.01	0.03	1.00	1.00	1.03	1.27
Travel Dist (mi)	1.5	2.7	46.7	0.3	3.3	19.8	680.3	34.4	0.2	0.3	17.3	17.0
Travel Time (hr)	0.2	0.4	1.4	0.0	0.1	0.6	16.9	0.9	0.2	0.1	6.0	2.3
Avg Speed (mph)	7	6	34	34	31	33	40	38	1	3	3	7
Fuel Used (gal)	0.1	0.1	1.1	0.0	0.1	0.6	20.2	1.0	0.1	0.0	1.7	0.8
Fuel Eff. (mpg)	22.6	23.6	43.2	36.1	32.0	34.0	33.7	34.3	3.6	10.8	10.1	21.1
HC Emissions (g)	1	1	24	0	1	10	370	15	0	0	8	9
CO Emissions (g)	24	21	900	7	50	397	14971	693	3	2	276	229
NOx Emissions (g)	1	2	69	0	4	38	1382	61	0	0	19	22
Vehicles Entered	31	54	921	6	6	35	1205	61	9	13	89	87
Vehicles Exited	31	54	921	6	6	35	1207	61	9	13	86	86
Hourly Exit Rate	31	54	921	6	6	35	1207	61	9	13	86	86
Input Volume	33	52	920	5	6	36	1216	56	10	13	97	88
% of Volume	94	104	100	120	100	97	99	109	90	100	89	98
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	0	0	1	0	0	1	17	1	0	0	6	2

Intersection: 1: Project Driveway 4 & Pleasant Grove Blvd

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	UL	T	TR	UL	T	T	R	LTR	L	R
Maximum Queue (ft)	105	13	8	60	50	33	24	76	169	448
Average Queue (ft)	47	0	0	20	3	2	1	24	126	164
95th Queue (ft)	90	6	3	48	28	23	8	61	211	459
Link Distance (ft)		208	208		2917	2917		124		1028
Upstream Blk Time (%)								0		
Queuing Penalty (veh)								0		
Storage Bay Dist (ft)	150			195			200		150	
Storage Blk Time (%)	0								37	1
Queuing Penalty (veh)	0								33	1

Intersection: 2: Fiddymt Rd & Project Driveway 1

Movement	WB	NB	SB
Directions Served	R	TR	L
Maximum Queue (ft)	67	12	98
Average Queue (ft)	23	1	37
95th Queue (ft)	54	7	81
Link Distance (ft)	208	153	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			250
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Fiddymt Rd & Project Driveway 2

Movement	WB	NB	NB	NB	SB
Directions Served	R	T	T	T	T
Maximum Queue (ft)	62	39	104	97	7
Average Queue (ft)	18	2	23	22	0
95th Queue (ft)	42	21	73	70	5
Link Distance (ft)	185	286	286	286	153
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

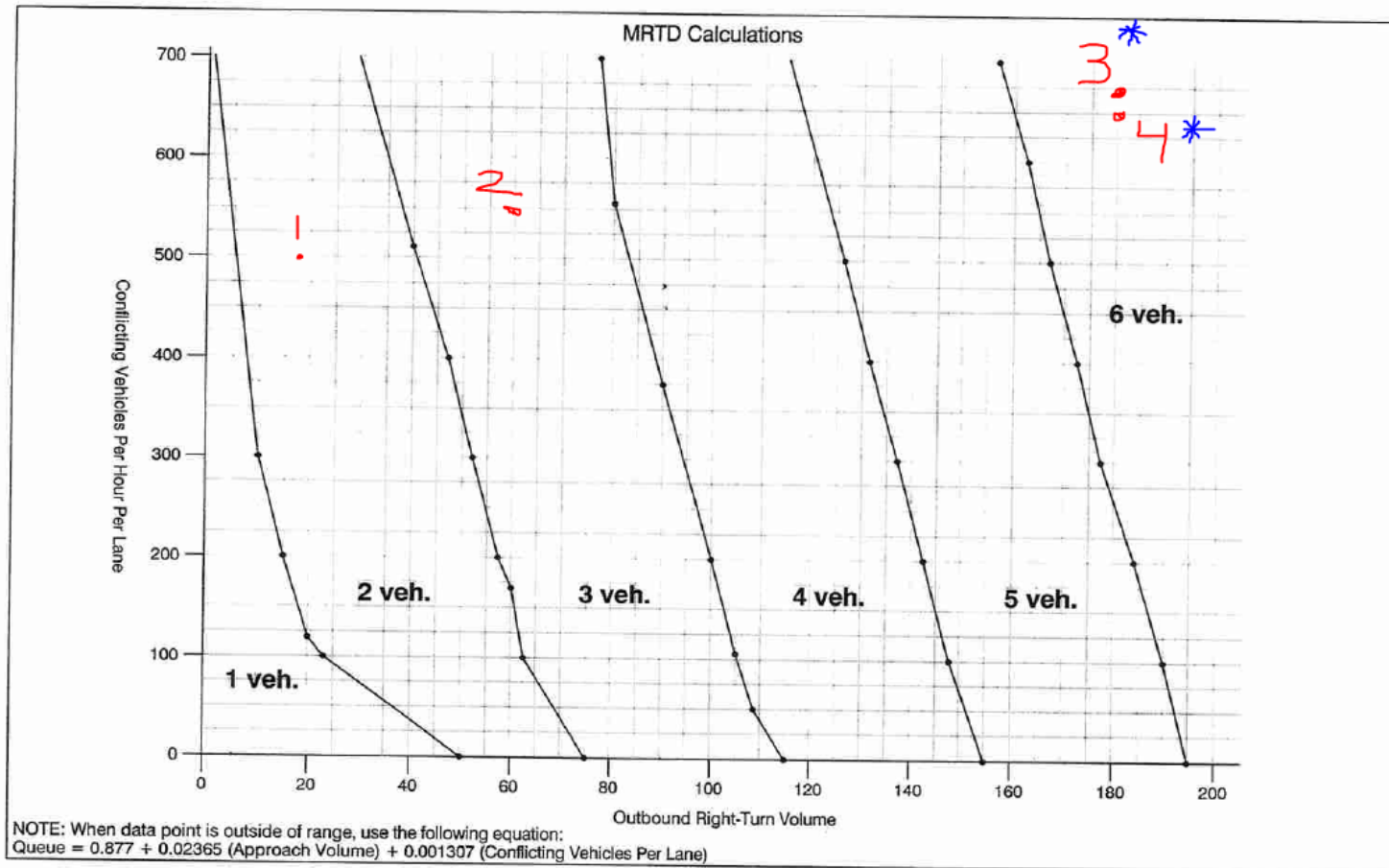
SimTraffic Performance Report Existing Plus Project Conditions
with Proj Dwy 4 Restricted to Right-Turns Only

03/08/2022

1: Project Driveway 4 & Pleasant Grove Blvd Performance by movement

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.0
Total Delay (hr)	0.2	0.2	0.3	0.0	0.0	0.2	2.4	0.1	0.2	0.1	2.3	5.9
Total Del/Veh (s)	20.1	17.5	1.4	1.2	15.2	18.1	7.1	4.0	62.3	20.5	44.5	8.7
Stop Delay (hr)	0.2	0.2	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	2.3	3.0
Stop Del/Veh (s)	19.9	15.6	0.0	0.0	8.6	6.1	0.2	0.2	59.8	18.1	44.5	4.4
Total Stops	22	36	2	0	4	21	16	1	9	14	183	308
Stop/Veh	0.79	0.78	0.00	0.00	0.67	0.62	0.01	0.02	1.00	1.00	0.99	0.12
Travel Dist (mi)	1.4	2.3	42.8	0.2	3.7	19.3	688.6	32.8	0.2	0.3	35.8	827.4
Travel Time (hr)	0.2	0.3	1.2	0.0	0.1	0.6	17.1	0.8	0.2	0.1	3.7	24.4
Avg Speed (mph)	6	7	34	35	33	33	40	39	1	4	10	34
Fuel Used (gal)	0.1	0.1	0.9	0.0	0.1	0.6	20.5	0.9	0.0	0.0	1.4	24.7
Fuel Eff. (mpg)	21.5	26.2	45.3	42.9	33.2	33.7	33.6	34.7	5.4	14.2	25.5	33.5
HC Emissions (g)	0	1	21	0	1	10	382	20	0	0	12	447
CO Emissions (g)	21	20	791	4	57	387	15193	755	2	2	366	17597
NOx Emissions (g)	1	2	57	0	5	38	1422	69	0	0	33	1628
Vehicles Entered	28	45	841	4	6	34	1218	58	9	14	182	2439
Vehicles Exited	28	46	841	4	6	34	1220	59	9	14	184	2445
Hourly Exit Rate	28	46	841	4	6	34	1220	59	9	14	184	2445
Input Volume	33	52	1001	5	6	36	1216	56	10	13	185	2613
% of Volume	85	88	84	80	100	94	100	105	90	108	99	94
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												563
Occupancy (veh)	0	0	1	0	0	1	17	1	0	0	4	24

Estimation of Maximum Queue Lengths at Project Driveways. Existing plus project Weekday PM peak hour conditions



= Queue expected to be slightly greater due to downstream congestion and increased waiting to access left-turn lanes

Source: *Estimation of Maximum Queue Lengths at Unsignalized Intersections* (ITE Journal, 2001).