Final

Transportation Impact Study for Starbucks Store & Panda Express Restaurant on Auburn Boulevard

Prepared for:

CITRUS HEIGHTS CALIFORNIA

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RS22-4192

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INTRODUCTION/BACKGROUND

This study analyzes the potential transportation impacts associated with a proposed Starbucks Store and Panda Express Restaurant that would be situated on the east side of Auburn Boulevard directly south of Whyte Avenue. The project site straddles the City of Citrus Heights/City of Roseville and Sacramento County/Placer County border.

This report is prepared to serve as the supporting transportation impact study for the environmental review being processed by the City of Citrus Heights. While this study provides valuable analysis and information to the City of Roseville, future development of Panda Express (or another project) on the north parcel will require further entitlement analysis and review through the City of Roseville.

PROJECT OVERVIEW

According to the project site plan (*Starbucks + Retail Proposed Site Plan*, McCandless & Associates Architects, September 23, 2022), the proposed project would include the following land use components:

- Demolition of an existing 106 square-foot (s.f.) Java Detour coffee kiosk
- Demolition of an existing 1,447 s.f. liquor store
- Construction of a 2,170 s.f. Starbucks Coffee store with drive-through window
- Construction of a 2,600 s.f. restaurant (identified as a Panda Express) with drive-through window

The segment of Auburn Boulevard along the project frontage will be modified within the next several years as part of the City of Citrus Heights' *Auburn Boulevard – Phase 2 Complete Streets Plan*. The project site plan reflects the planned changes in access, which include the following:

- Close the most southerly driveway (near "Tea It").
- Close the most northerly driveway on Auburn Boulevard (near Java Detour).
- Provide full access (via a traffic signal) at the central driveway with a west leg serving the Citrus Grove Shopping Center.

If the Panda Express Restaurant was constructed, the inbound driveway from Whyte Avenue would be closed and the outbound driveway would be modified to permit both inbound and outbound travel. Additionally, the off-street parking supply for Hoss Lee Academy would also be reduced by 28 spaces.

EXISTING CONDITIONS

Fehr & Peers conducted field observations and reviewed video data collected by National Data Services with respect to turning movements at the Auburn Boulevard/Whyte Avenue intersection. The presence of a DO NOT BLOCK INTERSECTION sign (along with KEEP CLEAR pavement markings) and recurring congestion on northbound Auburn Boulevard cause a variety of atypical and often undesirable travel behaviors, which are described in detail in Chapter 2.

All study intersections operate at LOS D or better except for the following, which operate at LOS F during the PM peak hour:

- Auburn Boulevard/Whyte Avenue (eastbound left-turn/through movement)
- Auburn Boulevard/Jack in the Box Driveway/Java Detour Driveway (eastbound approach)

Traffic levels on Whyte Avenue east of Auburn Boulevard are influenced by operations at the Hoss Lee Academy. This Cosmetology and Esthetician Training School has operating hours from 8:30 AM to 4:00 PM on weekdays for classes. Traffic data collection and field observations show a pronounced spike in travel to the school in the 30 minutes prior to school starting. About 38 vehicles complete the southbound Auburn Boulevard to eastbound Whyte Avenue movement during the AM peak hour. Despite the relatively low turning volume, a maximum queue of 125 feet (i.e., about 5 vehicles) was observed between 8:15 and 8:30 AM, with all 5 vehicles arriving within a 30-second span. This queue is a result of the surge in southbound left-turning traffic accessing the Hoss Lee Academy. As further evidence, a supplemental site visit observed a maximum queue of 6 southbound left turn vehicles shortly after 8:15 AM.

Based on the multiple days of data collection and observations of video by Fehr & Peers staff, the following general conclusion is drawn regarding travel behavior in the southbound left-turn lane at the Auburn Boulevard/Whyte Avenue intersection:

- Southbound left-turns typically arrive in a random fashion, with the notable exception of between 8:15-8:30 AM (i.e., prior to start of Hoss Lee Academy). Depending on when they arrive, southbound left-turns can experience almost no delay or upwards of 1 minute of delay. Longer delays do not occur because the intersection is blocked, but because there is a continuous flow of northbound traffic on Auburn Boulevard. Strong compliance with the DO NOT BLOCK INTERSECTION sign and KEEP CLEAR pavement marking was observed.

Maximum northbound Auburn Boulevard queues often spill back from the I-80 EB ramps intersection to the second driveway (i.e., Citrus Grove Driveway/Central Driveway) during both peak hours. The data and field observations suggest that the queue can extend beyond the Tea It Driveway. Queues are not continuously

present, however. They quickly build (as traffic is released from the upstream signalized intersections) and then typically dissipate (though not always) as the light at the I-80 EB ramps intersection turns green.

PROJECT TRAVEL CHARACTERISTICS

The proposed Starbucks store would generate approximately 219 AM peak hour and 85 PM peak hour gross trips, while the Panda Express restaurant would generate about 3 AM peak hour and 195 PM peak hour gross trips. Pass-by trip percentages of 80% and 55% (PM peak hour only) were applied for the Starbucks store and Panda Express restaurant, respectively. Pass-by trips are trips already on the adjacent roadway system that make an intermediate stop at the project site on their way to a primary destination. They do not add traffic to the adjacent roadway system but are added into and out of the project driveways. Site trips were also subtracted for uses demolished by the proposed project.

In total, the project would generate about 174 net pass-by trips and 45 net new external vehicle trips in the AM peak hour. During the PM peak hour, the project would generate 175 net pass-by trips and 95 net new external vehicle trips. A large majority of project trips would travel northbound or southbound on Auburn Boulevard.

EXISTING PLUS PROJECT CONDITIONS

Potential transportation impacts on the surrounding transportation system were analyzed under existing conditions assuming implementation of Phase 2 of the *Auburn Boulevard Complete Streets Plan*.

Phase 2 of the *Auburn Boulevard Complete Streets Plan* would result in the following changes to the roadway network and its operation within the study area, as outlined in the "Study of Planned Improvements on Auburn Boulevard in Citrus Heights, CA" final technical memorandum (April 11, 2022).

<u>Auburn Boulevard/Whyte Avenue</u>

- Installation of a triangular raised median on the westbound approach to prohibit outbound through or left turns.
- Installation of a narrow raised median in the northbound and southbound left-turn lanes, though northbound and southbound left-turns would continue to be permitted.

<u>Auburn Boulevard/Jack in the Box Driveway/Java Detour Driveway</u>

- Closure of the Java Detour driveway.
- Installation of a raised median to prohibit inbound and outbound left turns at the Jack in the Box driveway.

Auburn Boulevard/Tea It Driveway

- Closure of Tea It driveway

Auburn Boulevard/Citrus Grove Shopping Center Driveway/Central Driveway

- Conversion to a signalized intersection with crosswalks on all four approaches and an offset driveway configuration.
- Provision of a dedicated left-turn and a shared through/right lane on the eastbound and westbound approaches, which would be operated with protected left-turn phasing.
- Prohibition of northbound and southbound "right-turns on red" due to the driveway offset and stop bar setbacks.
- Addition of a narrow raised median on the northbound and southbound approaches.
- Signal coordination with the Auburn Boulevard/I-80 Eastbound Off-Ramp/Orlando Avenue intersection.

Project trips were added to existing conditions assuming implementation of Phase 2 of the *Auburn Boulevard Complete Streets Plan*. All study intersections would operate at LOS E or better under existing plus project conditions except for the Auburn Boulevard/Whyte Avenue intersection during the PM peak hour. This operation is not considered deficient since the City of Roseville's LOS policy only pertains to signalized intersections.

Maximum queues for movements at the Whyte Avenue and Auburn Boulevard driveway intersections were estimated. The maximum queue would exceed the available storage on the westbound approach to the signalized Auburn Boulevard/Citrus Grove Driveway/Central Driveway during both peak hours. During the AM and PM peak hours, the westbound left-turn lane would result in a maximum queue of 4 and 6 vehicles, respectively. A maximum queue of 4 vehicles is expected during the AM peak hour in the westbound through/right turn lane.

This analysis found that the project would not cause vehicle queues in the southbound left-turn lane at Auburn Boulevard/Whyte Avenue to exceed the available storage under typical conditions. However, there may be occasional instances where the queue temporarily exceeds the turn pocket length, but those conditions will typically dissipate quickly.

INTERIM SCENARIO

Project access was evaluated for an interim scenario in which both projects are constructed and the improvements from the *Auburn Boulevard Complete Streets Plan* are not yet constructed. A range of project access options was quantitatively analyzed under interim conditions, including various turn restrictions and

control types at the project driveway, Citrus Grove Shopping Center driveway, and Whyte Avenue. The following safety issues were considered:

- The left turn movement from westbound Whyte Avenue to southbound Auburn Boulevard is extremely challenging to perform and the frequency of vehicles attempting this movement would increase with the addition of Panda Express project vehicles.
- If westbound left-turns are prohibited at Whyte Avenue, motorists desiring to travel southbound on Auburn Boulevard would need to perform a U-turn, which is not permitted at the adjacent signalized intersection of Auburn Boulevard/Orlando Avenue/I-80 Eastbound Off-Ramp. This could result in about 70 PM peak hour project trips performing difficult or illegal U-turns, or using private property or other streets for turnarounds.

A concept of allowing direct outbound left-turns from the project driveway onto southbound Auburn Boulevard was also considered. However, by doing so, the driveway across the street would need to be modified to allow outbound left-turns, and direct outbound vehicles from the project site would need to find gaps in through traffic, which frequently spills back beyond this driveway during peak hours.

Considering the turning movement challenges at the project driveway and Whyte Avenue, as well as the above safety concerns, the following Conditions of Approval are recommended for the Starbucks Store to address the potential project timing issue:

- Prior to the opening of the Starbucks Store, a traffic signal shall be present and operational at the project driveway on Auburn Boulevard.
- In the event the Starbucks applicant chooses to advance the construction of the traffic signal at their own expense, they shall be required to submit to the City of Citrus Heights a recommended traffic signal coordination plan that would interconnect the new signal with the signal at the I-80 EB Ramps.

City of Roseville staff mentioned during a conference call (held on February 8, 2023) that they would require a more detailed site plan and additional analysis before they would consider any types of recommendations or Conditions of Approval for the Panda Express or any other use on the north parcel.

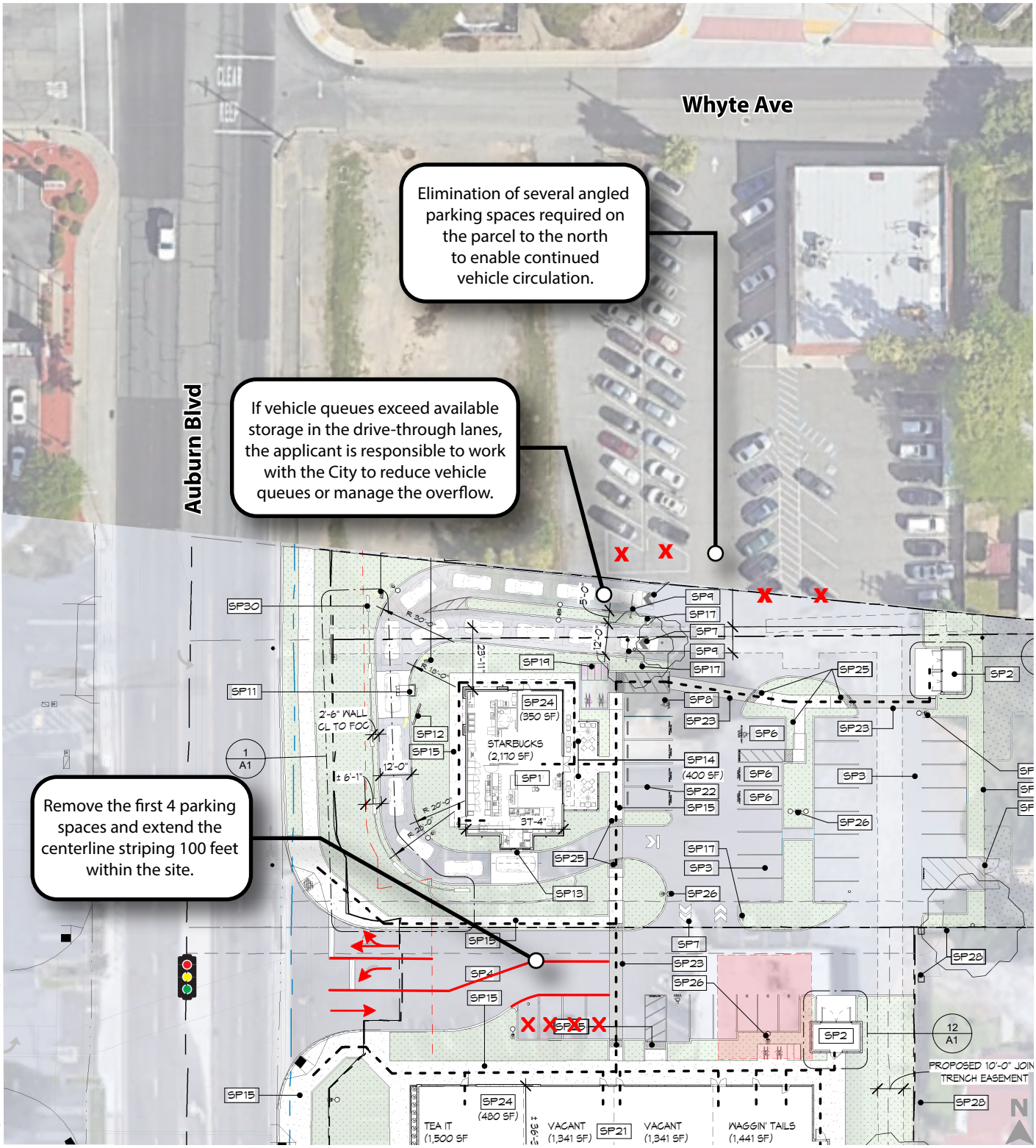
RECOMMENDATIONS FOR STARBUCKS STORE

On-site circulation and project access were evaluated for both the Starbucks store and Panda Express restaurant to the extent possible. Recommended improvements for the Starbucks store include the following (See Table 12 for additional details):

- Remove the first 4 parking spaces on the south side of the signalized project driveway on Auburn Boulevard and extend the centerline striping 100 feet within the site.

- Eliminate several angled parking spaces on the very south portion of the north parcel to enable continued vehicle circulation within the drive aisles.
- If the City Engineer observes that vehicle queues exceed available storage in the Starbucks drive-through lanes and extend into the adjacent parking lot, the applicant is responsible to work with the City to reduce vehicle queues or manage the overflow.

Figure ES-1 illustrates the study recommendations at the project site.



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— Striping (not raised)

Figure ES-1

Project Recommendations for Starbucks Store

Chapter 1. **Introduction**

This study analyzes the potential transportation impacts associated with a proposed Starbucks Store and Panda Express Restaurant that would be situated on the east side of Auburn Boulevard directly south of Whyte Avenue. The project site straddles the City of Citrus Heights/City of Roseville and Sacramento County/Placer County border. This report includes an in-depth intersection operations analysis, a detailed site access review, and a comprehensive evaluation of on-site circulation.

BACKGROUND

In May 2022, the City of Citrus Heights retained Fehr & Peers to perform a transportation impact study for the proposed Starbucks Store. During that study, it became apparent that development of the vacant parcel directly to the north (within the City of Roseville) could affect the conclusions of the Starbucks study. Because the property to the north was owned/controlled by the same applicant and development activity for that parcel was being considered, it was decided that a joint study that would consider development of both parcels would be appropriate. Staff from Citrus Heights, Roseville, and Fehr & Peers met in September 2022 to discuss the scope of the joint study. It was agreed that this report would be prepared to serve as the supporting transportation impact study for the environmental review being processed by the City of Citrus Heights. While this study also provides valuable analysis and information to the City of Roseville, future development of a Panda Express Restaurant (or another project) on the north parcel will require further entitlement analysis and review through the City of Roseville (e.g., on-site/off-site parking, drive through queueing, internal circulation, off-site traffic impacts, etc.).

PROJECT OVERVIEW

Figure 1 displays the project site plan (*Starbucks + Retail Proposed Site Plan*, McCandless & Associates Architects, September 23, 2022). According to the project site plan, the proposed project would include the following land use components:

- Demolition of an existing 106 square-foot (s.f.) Java Detour coffee kiosk
- Demolition of an existing 1,447 s.f. liquor store
- Construction of a 2,170 s.f. Starbucks Coffee store with drive-through window
- Construction of a 2,600 s.f. restaurant (identified as a Panda Express[1]) with drive-through window

[1] Although the project site plan describes this pad as a "Quick Serve Retail (QSR) Pad", it was revealed during the conference call on September 7, 2022, with Fehr & Peers, City of Roseville, and City of Citrus Heights staff that a Panda Express restaurant is being considered.

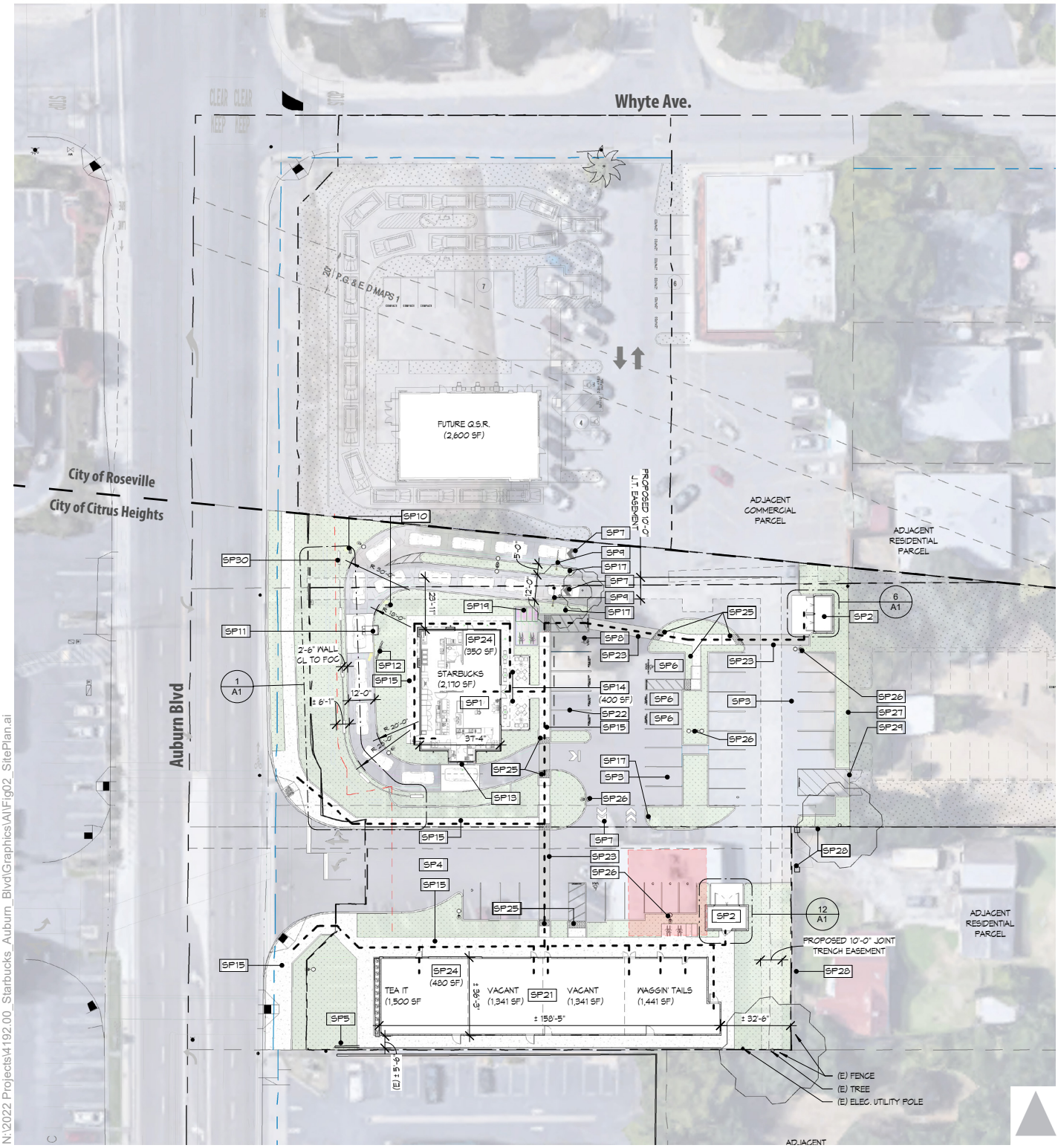

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Figure 1

Site Plan

The project site currently has three driveways onto Auburn Boulevard. One driveway is situated adjacent to an on-site retail building. For reference, "Tea It" is the tenant within that building visible from Auburn Boulevard.

A second driveway is situated 80 feet to the north of the "Tea It" driveway. A third driveway is situated 80 feet north of the second driveway. The two southerly driveways are restricted to right-turns only by a raised median on Auburn Boulevard. The third driveway allows full access via a two-way left-turn lane. Additionally, the project site has one inbound-only driveway and one outbound-only driveway on Whyte Avenue.

Because the two projects would share project driveway access and be internally connected, they were analyzed together. However, recognizing that each project is subject to a separate environmental review and approval processes, applicable policies and standards of each agency are applied specifically for the project under each agency's control. Additionally, separate sets of recommendations are made for each project in recognition that it is plausible for one project to be approved/constructed, while the other is not.

The segment of Auburn Boulevard along the project frontage will be modified within the next several years as part of the City of Citrus Heights' *Auburn Boulevard – Phase 2 Complete Streets Plan*. The project site plan reflects the planned changes in access, which include the following:

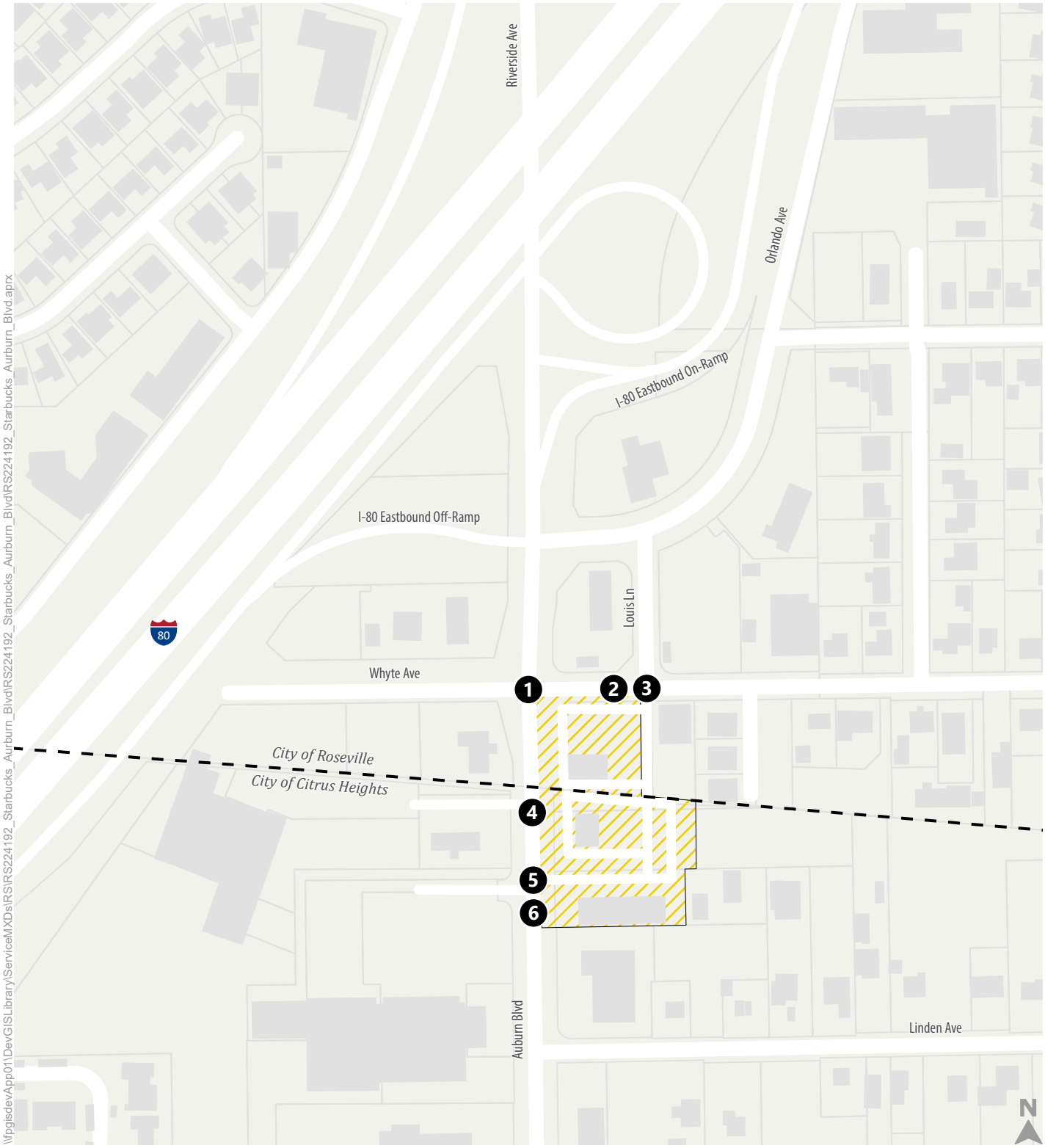
- Close the most southerly driveway (near "Tea It").
- Close the most northerly driveway on Auburn Boulevard (near Java Detour).
- Provide full access (via a traffic signal) at the central driveway with a west leg serving the Citrus Grove Shopping Center.

The westerly portion of the parcel to be occupied by Panda Express Restaurant is vacant, while the easterly portion is a paved parking lot used by the Hoss Lee Academy which operates within the building immediately east of the parcel. If the Panda Express Restaurant was constructed, the inbound driveway from Whyte Avenue would be closed and the outbound driveway would be modified to permit both inbound and outbound travel. The off-street parking supply for Hoss Lee Academy would also be reduced by 28 spaces.

STUDY AREA AND TIME PERIODS

Figure 2 shows the project location including its proximity to Interstate 80, as well as study intersections and driveways. Project effects are studied at the Auburn Boulevard/Whyte Avenue intersection and the 5 driveways (3 on Auburn Boulevard and 2 on Whyte Avenue) described above and shown in Figure 2.

Traffic operations are analyzed during the typical weekday AM and PM peak hours. However, as discussed in Chapter 2, the traffic data collection effort to document vehicle queuing on Auburn Boulevard at Whyte Avenue covered an extended time period to ensure that any mid-day surges in queues were recorded.



1 Study Intersection

Project Site

Figure 2

Note: Refer to Figure 6 for specific driveway names and adjacent land uses.

Study Area

ANALYSIS SCENARIOS

The following scenarios are analyzed in this study:

- Existing Conditions – represents October 2022 conditions.
- Existing Plus Project Conditions – represents existing conditions with the addition of both projects and assuming implementation of Phase 2 of the *Auburn Boulevard Complete Streets Plan*.
- Existing Plus Project Under Interim Conditions – represents existing conditions with the addition of both projects prior to the completion of Phase 2 of the *Auburn Boulevard Complete Streets Plan*. The term "Interim" is used because such a condition may only exist for a short period of time (i.e., a year or less) but will have its own set of access requirements.

ANALYSIS METHODOLOGY

This study follows applicable procedures described in the *City of Citrus Heights Transportation Impact Study (TIS) Guidelines* (March 2021) and Section 4 of the *City of Roseville Design Standards* (January 2020). These documents provide guidance on a variety of study parameters ranging from analysis scenarios, study locations, and specific analysis methods.

Level of service is a qualitative measure of traffic operating conditions whereby a letter grade, from A (the least congested) to F (the most congested), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving. LOS A represents free-flow conditions with no congestion, and LOS F represents severe congestion and delay under stop-and-go conditions.

Table 1 displays the average delay ranges associated with each LOS category. For signalized intersections, LOS is based on the average delay experienced by all vehicles passing through the intersection. For unsignalized intersections, LOS is evaluated separately for each individual movement with delay reported for the critical (i.e., worst case) turning movement.

Traffic operations at the study intersections were analyzed using procedures contained in the *Highway Capacity Manual, 7th Edition* (Transportation Research Board, 2022). These methodologies were applied using Cubic-Trafficware's Synchro 11 software program, which considers vehicle volumes, lane configurations, pedestrian volumes, heavy vehicle percentages, and other pertinent parameters of intersection operations. Consistent with both City of Citrus Heights and Roseville study guidelines, this study applies a 1.0 peak hour factor (PHF) to report average conditions over the entire peak hour.

Table 1: Intersection Level of Service Definitions

Level of Service	Average Control Delay (seconds/vehicle) [1]	
	Signalized	Unsignalized
A	0 – 10.0	0 – 10.0
B	10.1 – 20.0	10.1 – 15.0
C	20.1 – 35.0	15.1 – 25.0
D	35.1 – 55.0	25.1 – 35.0
E	55.1 – 80.0	35.1 – 50.0
F	> 80.0	> 50.0

Notes:
[1] Control delay includes initial deceleration delay, queue move-up time, stopped delay, and acceleration delay based on Highway Capacity Manual (Transportation Research Board, 2016).
Source: Fehr & Peers, 2022.

LEVEL OF SERVICE STANDARDS

The *City of Citrus Heights General Plan* (amended 2019) contains various transportation-related goals and policies. Those relevant to this study are listed below.

> *Policy 29.2: Measure customer satisfaction related to vehicle travel using level of service (LOS) according to procedures in the latest version of the Highway Capacity Manual published by the Transportation Research Board. The City will strive to achieve LOS E or better conditions for City roadways and intersections during peak hours (these may include weekday, AM, Mid-Day, and PM hours as well as Saturday Mid-Day or PM peak hours). The intent of this policy is to effectively utilize the roadway network capacity while balancing the desire to minimize potential adverse effects of vehicle travel on the environment and other modes.*
>
> *Exceptions to LOS E are allowed for both roadway segments and intersections along the following streets:*
>
> - *Sunrise Boulevard – south City limits to north City limits*
> - *Greenback Lane – west City limits to east City limits*
> - *Old Auburn Road – Sylvan Road to Fair Oaks Boulevard*
> - *Antelope Road – I-80 to Auburn Boulevard*
> - *Auburn Boulevard – Old Auburn Road to northern City limits*

According to this policy, an exception to LOS E is allowed at the project site driveways along Auburn Boulevard. Policy 29.2 specifies that turn pocket lengthening and signal timing modifications (in lieu of widening of exempt roadways) may be considered for development projects that adversely affect vehicle travel and other modes.

The City of Roseville's *General Plan 2035* (2020) also contains transportation-related goals related to intersection LOS. *Policy CIRC2.1* states as follows:

> *Maintain a LOS "C" standard at a minimum of 70 percent of all signalized intersections and roadway segments in the City during the a.m. and p.m. peak hours. Exceptions to the LOS "C" standard may be considered where improvements required to achieve the standard would adversely affect pedestrian, bicycle, or transit access, and where feasible LOS improvements and travel demand-reducing strategies have been exhausted.*

As stated above, this policy pertains only to signalized intersections. Given that the study intersections within the City of Roseville (i.e., at Whyte Avenue/Auburn Boulevard and driveways along Whyte Avenue) are unsignalized, those study intersections are not subject to any specific City of Roseville LOS thresholds. However, LOS at those locations is nonetheless reported for informational purposes.

Chapter 2. **Existing Conditions**

This chapter describes the existing roadway, bicycle, pedestrian, and transit network within the study area.

EXISTING ROADWAY NETWORK

Figure 3 displays the existing roadway network in the study area. The following are descriptions of the primary roadways in the vicinity of the project:

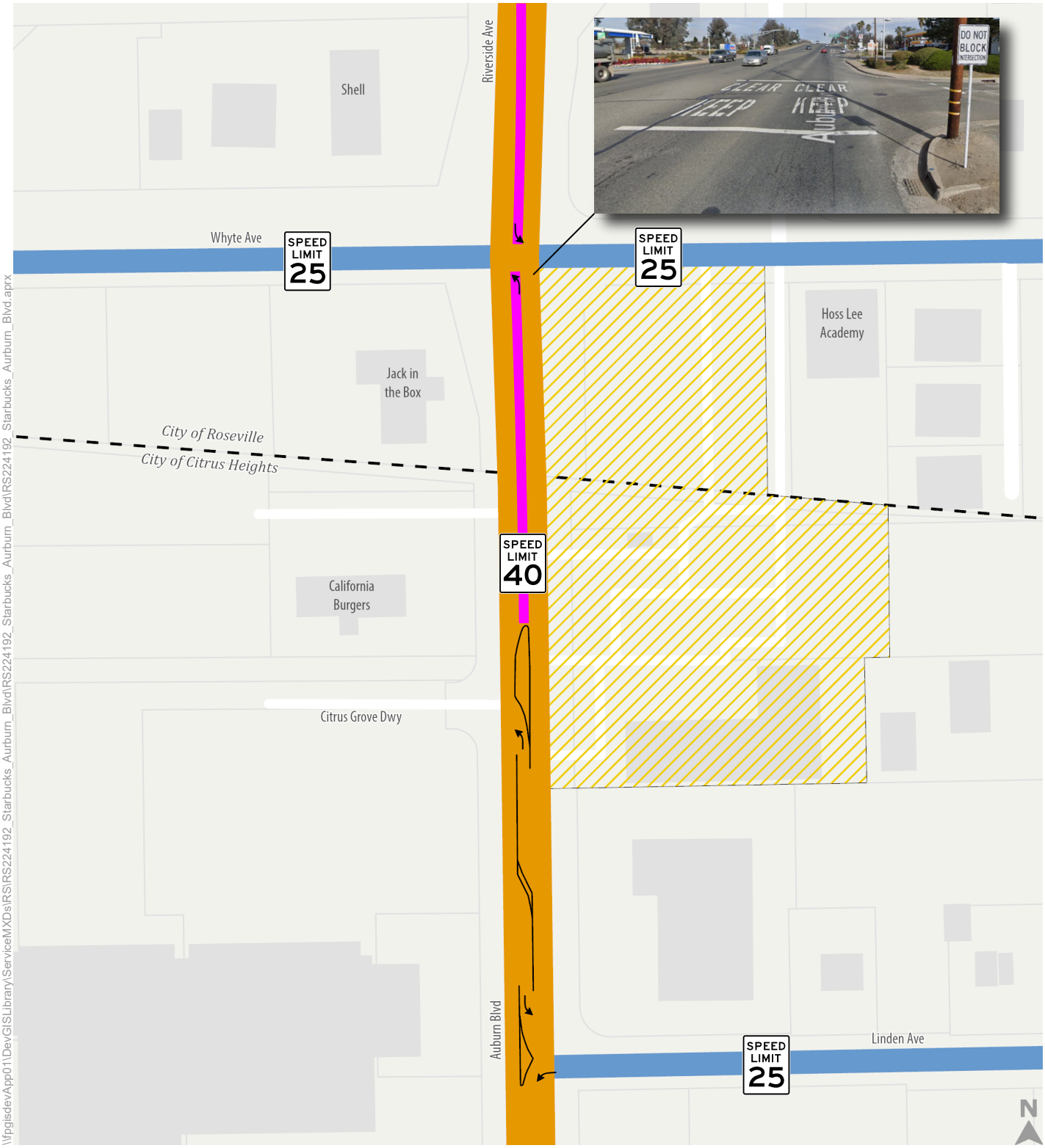
- **Auburn Boulevard** is a four-lane north/south, median-divided arterial that provides access to a variety of land uses and major east/west arterials, connecting to Interstate 80 (I-80) and then becoming Riverside Avenue. Within the project vicinity, it has a posted speed limit of 40 miles per hour (mph) northbound, 35 mph southbound north of the Tea It driveway and 40 mph southbound south of the Tea It driveway.
- **Whyte Avenue** is an east/west collector street within the City of Roseville's jurisdiction. Within the study area, it begins 475 feet west of Auburn Boulevard and extends easterly to Mariposa Avenue. Whyte Avenue provides access to the Louis/Orlando Transit Center and Cirby Park & Ride situated between Whyte Avenue and Orlando Avenue. Whyte Avenue has a posted speed limit of 25 mph.

The City of Citrus Heights' truck route map identifies Auburn Boulevard from the north City limits to Stock Ranch Commercial Center (on Auburn Boulevard west of Sylvan Road) as a local truck route[2], while the City of Roseville's truck route map labels Auburn Boulevard from the south City limits to Cirby Way as an STAA truck route that exceeds the California length limit[3].

Travel Behaviors at Auburn Boulevard/Whyte Avenue Intersection

The side-street, stop-controlled Auburn Boulevard/Whyte Avenue intersection is located approximately 250 feet south of the signalized Auburn Boulevard/I-80 Eastbound Ramps/Orlando Avenue intersection. This short distance causes northbound traffic stopped at the I-80 Eastbound Ramps intersection to frequently spill back through Whyte Avenue and beyond. The extent of queuing is described in more detail later in this chapter. To accommodate turning movements at the intersection, "KEEP CLEAR" pavement markings and a "DO NOT BLOCK INTERSECTION" sign is present for northbound motorists within the Auburn Boulevard/Whyte Avenue intersection (see **Image 1**). Compliance with these regulatory messages is discussed later in this chapter.

[2] See link to "Truck Route Map (PDF)" at the following website: https://www.citrusheights.net/819/Truck-Routes
[3] See link to "Truck Route Map" at the following website:
https://www.roseville.ca.us/government/departments/public_works/roadways_traffic/transportation_permits___truck_routes



Project Site
Raised Median
Number of Lanes
Four Lanes
Two Lanes
Two-Way Left-Turn Lane

*Posted Speed Limit on southbound Auburn Blvd changes from 35 MPH to 40 MPH just south of the Citrus Grove Driveway.

Figure 3

Lanes, Posted Speed Limits, & Median Treatments - Existing Conditions

Image 1: View of KEEP CLEAR pavement markings and DO NOT BLOCK INTERSECTION sign facing northbound traffic on Auburn Boulevard at Whyte Avenue.

Fehr & Peers conducted field observations and reviewed the video data collected by National Data Services (NDS) with respect to turning movements at the intersection. The presence of the DO NOT BLOCK INTERSECTION sign and recurring congestion on northbound Auburn Boulevard cause a variety of atypical and often undesirable travel behaviors, which are described below:

- In general, northbound through traffic complied with the DO NOT BLOCK INTERSECTION signage. There were relatively few instances in which a southbound left-turning vehicle was blocked by northbound traffic sitting within the intersection. **Image 2** illustrates a typical condition in which northbound motorists provided ample space for southbound left-turns to be made.
- During peak periods, left turns from westbound Whyte Avenue are challenging due to northbound queued traffic. **Image 3** shows a white SUV performing this movement during the PM peak hour. These movements often require the motorist to enter the intersection to cross northbound traffic and then wait for a gap in southbound Auburn Boulevard traffic to merge.
- Left-turns from eastbound Whyte Avenue are also difficult to perform due to northbound queued traffic and southbound left-turning vehicles. **Image 4** shows an eastbound left-turn motorist utilizing the two-way left-turn lane (TWLTL) north of Whyte Avenue to bypass a southbound vehicle waiting to turn left to Whyte Avenue.

Image 2: Example of PM peak hour traffic complying with the DO NOT BLOCK INTERSECTION sign.

Image 3: White SUV turning left from westbound Whyte Avenue onto southbound Auburn Boulevard.

- Motorists turning right from westbound Whyte Avenue were often able to use the KEEP CLEAR zone within the intersection to merge onto northbound Auburn Boulevard, thereby reducing their delays and queues (see **Image 2** for example).
- The southeast corner of the Auburn Boulevard/Whyte Avenue intersection has an approximate 10-foot curb return radius. As shown in **Image 5**, this causes northbound right-turning buses to encroach a considerable amount into the westbound lane.

Image 4: View of eastbound Whyte Avenue left-turning vehicle bypassing southbound left-turn vehicles to travel northbound on Auburn Boulevard.

Appendix A to this report contains screenshots taken from the video data collection. These screenshots illustrate a variety of other awkward vehicle turning movements, conflicts between vehicles, and other conditions. Examples include the following:

- Narrow width of Whyte Avenue east of Auburn Boulevard causes conflicts between eastbound and westbound vehicles.
- Conflicts occur in the southbound left-turn lane involving southbound and eastbound left-turns.
- Some northbound motorists unexpectedly stop at the DO NOT BLOCK INTERSECTION sign despite free-flowing conditions ahead.
- Conflicts occur in the center median south of Whyte Avenue.

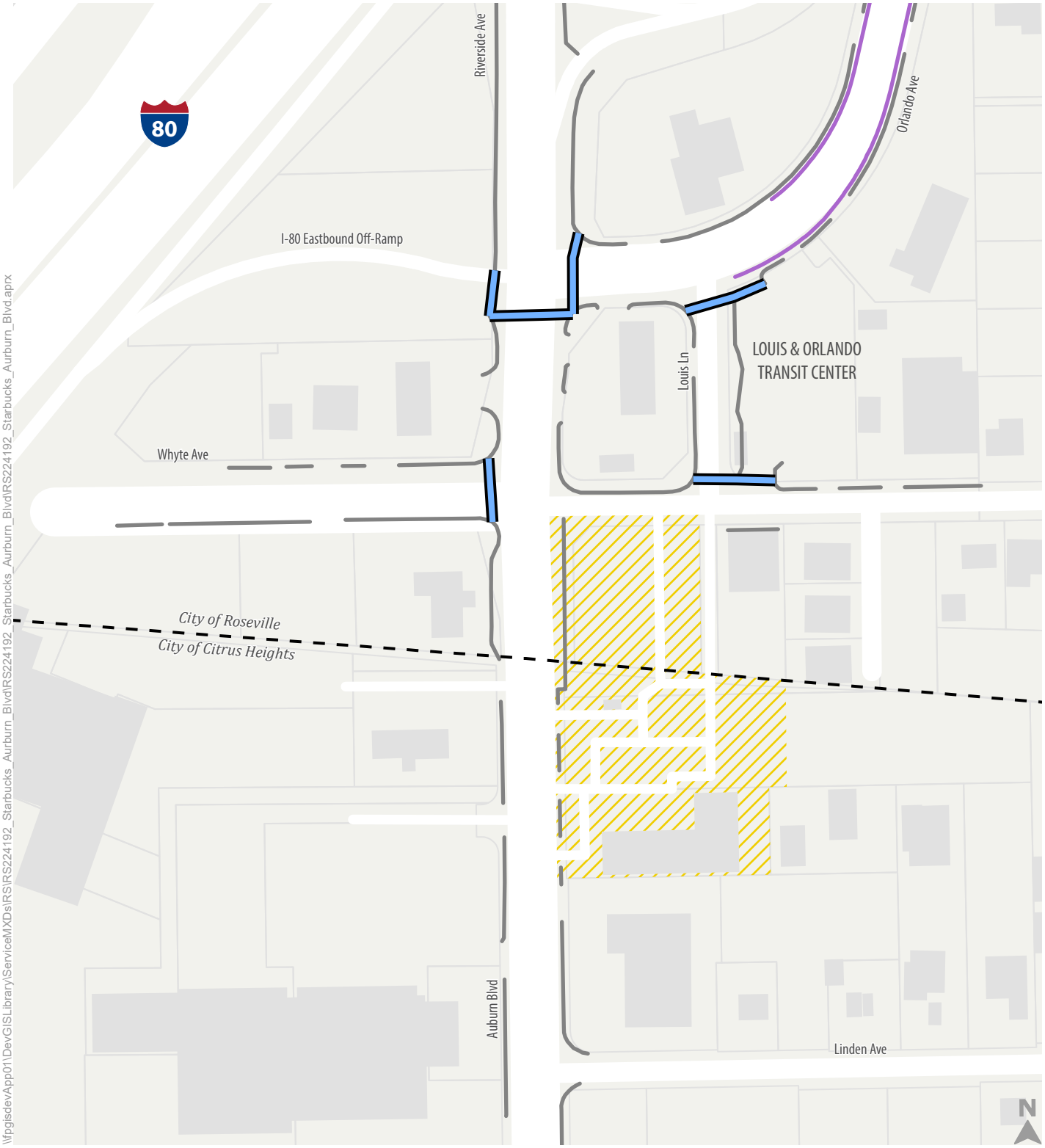
Image 5: Bus using westbound Whyte Avenue travel lane to turn right from northbound Auburn Boulevard.

EXISTING BICYCLE AND PEDESTRIAN NETWORK

Figure 4 shows existing bicycle and pedestrian facilities in the study area. As shown, there are no bicycle lanes in the immediate project vicinity. The nearest bicycle lanes are Class II bike lanes (on-street with appropriate pavement markings and signage) on Orlando Avenue to the north and on Twin Oaks Avenue to the south.

Within the study area, sidewalks are continuous on Auburn Boulevard, including along the project frontage. However, sidewalks are not provided along the south side of Whyte Avenue along the project frontage, except along the front of Hoss Lee Academy. Additionally, a marked crosswalk is provided on the west leg of the Whyte Avenue/Auburn Boulevard intersection, but not on the east leg. The nearest marked crosswalk across Auburn Boulevard is on the south leg of the Orlando Avenue/I-80 Off-Ramp/Auburn Boulevard intersection.

During the AM and PM peak hours, pedestrian and bicycle activity was low at all study intersections (i.e., 8 or less pedestrian crossings per hour and 8 or less bicycles per hour). Field observations revealed some pedestrians walking across Auburn Boulevard at unmarked locations between Whyte Avenue and Linden Avenue. Some of these movements were likely associated with usage of the Louis/Orlando Bus Transfer Station located east of Auburn Boulevard between Whyte Avenue and Orlando Avenue. As discussed in Chapter 3, Phase 2 of the *Auburn Boulevard Complete Streets Plan* will substantially improve the bicycling and walking environment along this segment of Auburn Boulevard.



Note: Bicycle and Pedestrian facilities only shown on Auburn Blvd, Whyte Ave, Louis Lane, and Orlando Ave.

Figure 4

Bicycle & Pedestrian Facilities - Existing Conditions

EXISTING TRANSIT FACILITIES AND SERVICES

Figure 5 displays transit facilities and services in the study area. As shown, the Louis/Orlando Transit Center is located across Whyte Avenue from the north project frontage. This center serves as a connection hub and bus stop for 9 routes across 3 agencies, including Sacramento Regional Transit (SacRT), Roseville Transit, and Placer County Transit.

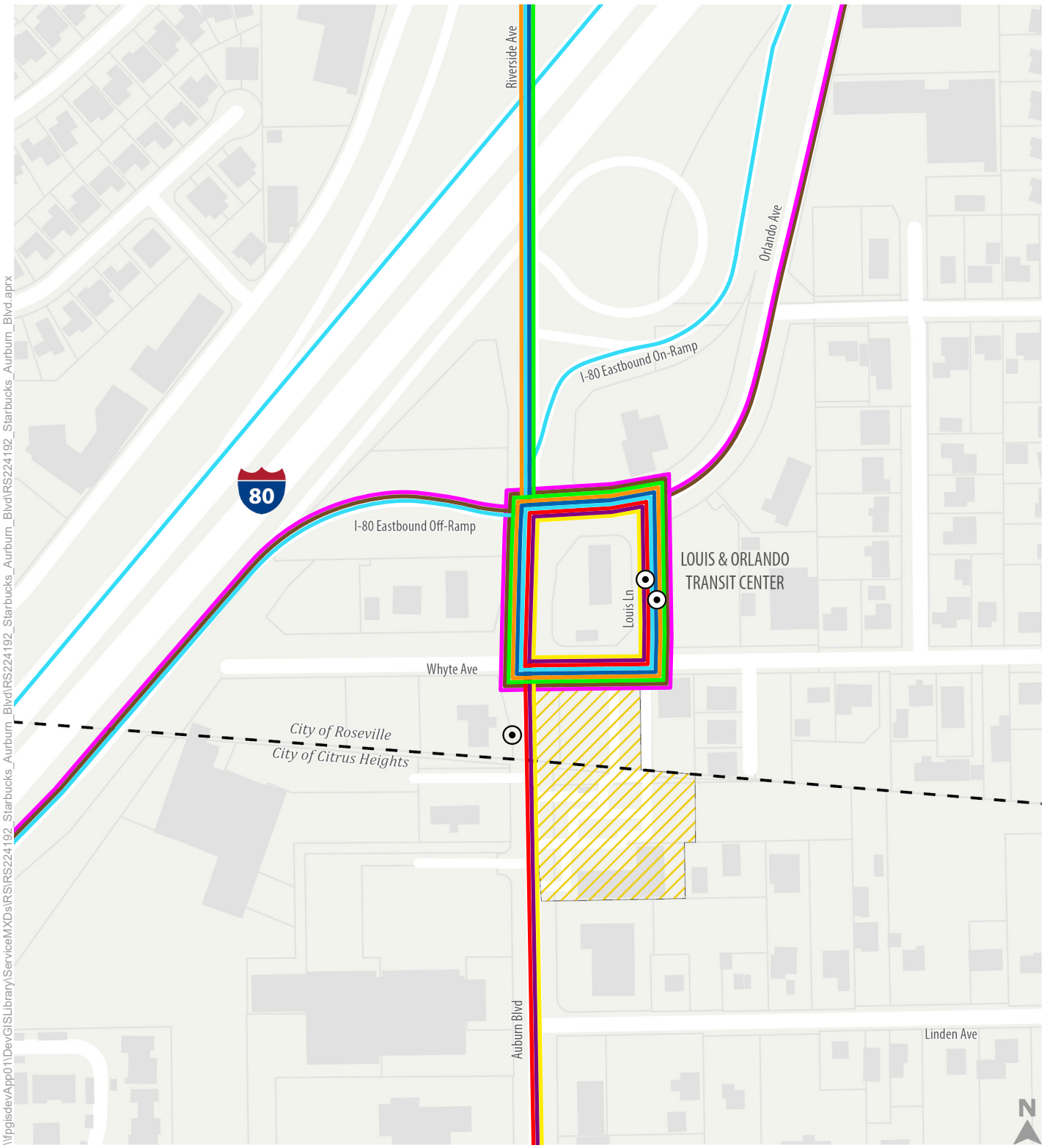
SacRT operates Routes 21, 25, and 93 along the project's frontage on Auburn Boulevard. Each route is described briefly below.

- **Route 21** connects riders from Louis/Orlando Transit Center to the Mather Field/Mills Light Rail Station in Rancho Cordova, and it includes a stop at the Sunrise Mall Transit Center. The route runs Monday through Friday between 5:52 AM and 10:45 PM at approximately 30-minute headways both northbound and southbound. Reduced services and headways are also provided on Saturday and Sunday.
- **Route 25** provides service between the Louis/Orlando Transit Center and the Marconi/Arcade Light Rail Station in Sacramento. The route operates daily, with reduced service and headways on Saturday and Sunday. On weekdays, the route generally has 30-minute headways northbound and southbound, and it runs between 5:40 AM and 10:56 PM.
- **Route 93** provides service between the Louis/Orlando Transit Center and the Watt/I-80 Light Rail Station. This route runs daily, with reduced service and headways on weekends. On weekdays, Route 93 generally has 30-minute headways in both directions and runs between 5:43 AM and 9:49 PM.

SacRT also offers SmaRT Ride, which is a door-to-door transit service provided in select geographic areas (such as Citrus Heights). Riders can request a ride by making a request on a mobile app, and specifying the pick-up and destination address, both of which must be within the service zone, which includes the Cities of Antelope, Citrus Heights, Fair Oaks, and Orangevale, as well as the Historic Folsom Light Rail Station. The mobile app will provide passengers with an estimated pick-up time and drop-off window, which is a function of overall demand.

Roseville Transit operates 3 local routes (Routes A, B, and R) and 2 commuter routes (Routes AM4 and PM1) along the project's frontage on Whyte Avenue. Each route is described briefly below.

- **Route A** is a local clockwise loop that connects riders from Louis/Orlando Transit Center to locations near I-80, including the Galleria Transfer Point, the Civic Center Transfer Point, the Sutter Roseville Medical Center, and the Sierra Gardens Transfer Point. The route runs on weekdays between 6:00 AM and 6:00 PM at 30-minute headways and between 6:00 PM and 9:53 PM at hourly headways. Reduced services and headways are also provided on Saturday.



Project Site

Bus Stop

Roseville Transit

- Route A
- Route B
- Route R (Weekday Peak)
- Route AM4
- Route PM1

Sacramento Regional Transit

- Route 93
- Route 25
- Route 21

Placer County Transit

- Auburn to Light Rail (Watt/I-80)

Figure 5

Transit Facilities - Existing Conditions

- **Route B** is a counterclockwise loop of Route A. The route operates daily, with reduced service and headways on Saturday. On weekdays, the route has 30-minute headways between 6:10 AM and 6:40 PM and hourly headways between 6:40 PM and 9:43 PM.
- **Route R** provides local service between Louis/Orlando Transit Center and various stops along Riverside Avenue, Cirby Way, and Foothills Boulevard, terminating near the northern terminus of Foothills Boulevard. Route R runs only on weekdays during AM (7:30 to 8:57) and PM (3:53 to 5:20) peak periods.
- **Route AM4** provides morning commuter service between the Louis/Orlando Transit Center and downtown Sacramento. This route leaves the Louis/Orlando Transit Center at 6:00 AM on weekdays, makes stops at the Maidu and Taylor/I-80 park-and-rides, and arrives at 9th/I Street in Sacramento at 6:46 AM. A reverse commute is available that picks passengers up in downtown and arrives at the Louis/Orlando Transit Center at 7:24 AM.
- **Route PM1** provides evening commuter service between downtown Sacramento and the Louis/Orlando Transit Center. This route leaves 15th/N Street at 3:25 PM and arrives at the Louis/Orlando Transit Center at 4:05 PM, before continuing to the Maidu and Saugstad park-and-rides, among other destinations. No reverse commute option is available for this route.

In addition to fixed route service, Roseville Transit also offers curb-to-curb shared transit service and complimentary ADA paratransit service within City limits. Riders can reserve a ride by calling at least one day in advance and receiving a 30-minute pick-up window at the requested pick-up location. Same-day trips are provided at a premium fare when space is available.

TRAFFIC DATA COLLECTION

Traffic counts were conducted at the 6 study intersections/driveways in the morning (7 to 9 AM), mid-day (11 AM to 1 PM), and evening (3 to 6 PM) peak periods on Wednesday, October 26, 2022, except for the driveway intersections on Whyte Avenue, which were only counted during the evening peak period. At those study driveways, morning peak period count data was used from counts conducted on Wednesday, June 1, 2022. All counts included vehicle turning movements, heavy vehicles, bicyclists, and pedestrians. At the time of the counts, weather conditions were dry and nearby schools were in session. Based on a review of video footage, the Java Detour kiosk was not open during the morning, mid-day, or evening peak hours on October 26, 2022.

Maximum vehicle queue data was collected (in 15-minute increments) on Wednesday, October 26, 2022, for the following movements and time periods.

- Southbound left-turn from Auburn Boulevard to Whyte Avenue – 24 hours
- Northbound through movement on Auburn Boulevard at Whyte Avenue – morning, mid-day, and evening (only 4 to 6 PM) peak periods
- Northbound left-turn from Auburn Boulevard to the Citrus Grove Shopping Center driveway – morning, mid-day, and evening peak periods

- Northbound left-turn from Auburn Boulevard to the Jack in the Box driveway – morning, mid-day, and evening peak periods

The mid-day peak period was counted to determine if it has certain peaks in travel or queuing that would require it to be studied. Based on the data collected, total intersection volumes at the Auburn Boulevard study intersections/driveways during the mid-day peak hour were between 11% and 14% less than total intersection volumes during the morning peak hour and between 24% and 26% less than those of the evening peak hour. In the aggregate, Auburn Boulevard side-street approach volumes between Whyte Avenue and the Tea It driveway were similar between mid-day and evening peak hours. Additionally, the queue data showed that maximum vehicle queues during the mid-day peak hour were equal to or less than maximum queues during the evening peak hour. Based on this evaluation of volume and queue data, the mid-day peak hour was removed from further analysis.

INTERSECTION OPERATIONS

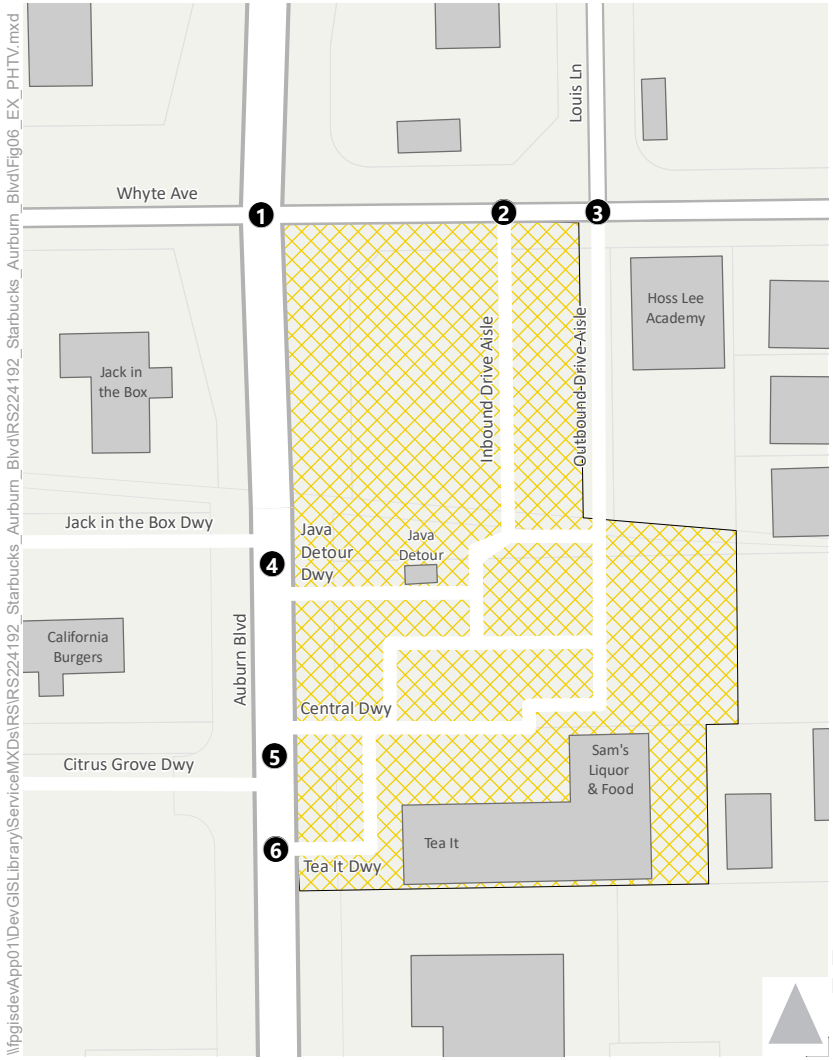
The system peak hours of the study intersections/driveways on Auburn Boulevard occurred from 7:30 to 8:30 AM and 4:15 to 5:15 PM. Trucks represented about 2% of traffic on Auburn Boulevard during the morning and evening peak hours. **Figure 6** displays peak hour turning movement volumes, traffic controls, and lane configurations at study intersections and driveways.

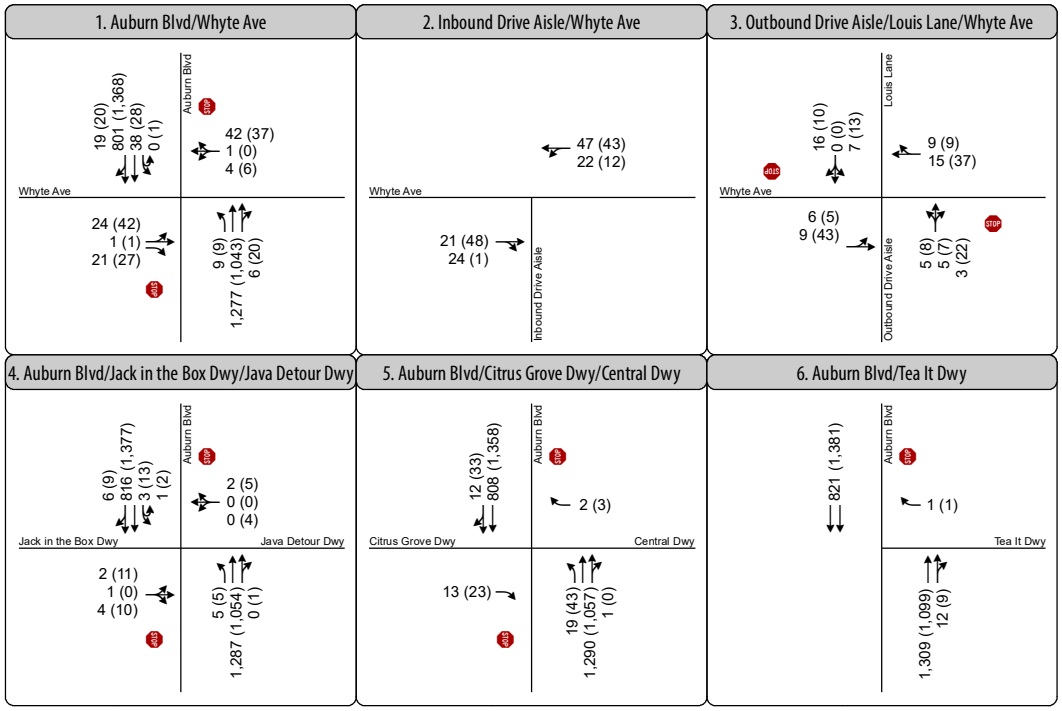
Traffic levels on Whyte Avenue east of Auburn Boulevard are influenced by operations at the Hoss Lee Academy, which is situated immediately east of the project site. This Cosmetology and Esthetician Training School has operating hours from 8:30 AM to 4:00 PM on weekdays for classes. Traffic data collection and field observations show a pronounced spike in travel to the school in the 30 minutes prior to school starting.

Table 2 displays peak hour intersection operations under existing conditions. See **Appendix B** for technical calculations. All study intersections operate at LOS D or better except for the following, which operate at LOS F during the PM peak hour:

- Auburn Boulevard/Whyte Avenue (eastbound left-turn/through movement)
- Auburn Boulevard/Jack in the Box Driveway/Java Detour Driveway (eastbound approach)

Image 6 shows a typical queue of 3 vehicles on eastbound Whyte Avenue during the PM peak hour.





Note: All Traffic counts were collected on Wednesday, October 26, 2022 except for the AM peak hour at Intersections 2 and 3, which was collected on Wednesday, June 1, 2022.

Figure 6

Peak Hour Traffic Volumes and Lane Configurations - Existing Conditions

Table 2: Peak Hour Level of Service – Existing Conditions

Intersection	Jurisdiction	Control	LOS/Delay (Worst Movement)[1]	
			AM Peak Hour	PM Peak Hour
1. Auburn Boulevard / Whyte Avenue	City of Roseville	SSSC	D / 30 (EBLT)	F / 62 (EBLT)
2. Whyte Avenue / Inbound Drive Aisle	City of Roseville	Uncontrolled	A / 7 (WBLT)	A / 7 (WBLT)
3. Whyte Avenue / Outbound Drive Aisle	City of Roseville	SSSC	A / 9 (NBLTR)	A / 9 (SBL)
4. Auburn Boulevard / Jack in the Box Driveway / Java Detour Driveway	City of Citrus Heights	SSSC	D / 33 (EBLTR)	F / 88 (EBLTR)
5. Auburn Boulevard / Citrus Grove Driveway / Central Driveway	City of Citrus Heights	SSSC	B / 14 (WBR)	C / 15 (EBR)
6. Auburn Boulevard / Tea It Driveway	City of Citrus Heights	SSSC	B / 14 (WBR)	B / 13 (WBR)

Notes: SSSC = Side-Street Stop Controlled.
[1] For side-street stop controlled and uncontrolled intersections, level of service and delay for the worst movement are reported with the movement listed in parentheses. Delay is reported in seconds per vehicle.
Source: Fehr & Peers, 2022.

Image 6: Queue of 3 vehicles waiting to turn left from eastbound Whyte Avenue onto northbound Auburn Boulevard during the PM peak hour.

VEHICLE QUEUING

Northbound Auburn Boulevard

Table 3 summarizes the observed (on October 26, 2022) peak hour maximum vehicle queues in 15-minute increments on northbound Auburn Boulevard. This table indicates that maximum northbound queues often spill back from the I-80 EB ramps intersection to the second driveway (i.e., Citrus Grove Driveway/Central Driveway) during both peak hours. The data and field observations suggest that the queue can extend beyond the Tea It Driveway. Queues are not continuously present, however. They quickly build (as traffic is released from the upstream signalized intersections) and then typically dissipate (though not always) as the light at the I-80 EB ramps intersection turns green.

Table 3: Peak Hour Observed Vehicle Queues – Existing Conditions

Time Period	Maximum Vehicle Queue	
	Northbound Through at Auburn Blvd./ I-80 Eastbound Off-Ramp/Orlando Ave.	Southbound Left-Turn at Auburn Blvd./Whyte Ave.
7:30 to 7:45 AM	500 ft	25 ft
7:45 to 8:00 AM	>500 ft[1]	75 ft
8:00 to 8:15 AM	475 ft	50 ft
8:15 to 8:30 AM	>500 ft[1]	125 ft
4:15 to 4:30 PM	>500 ft[1]	25 ft
4:30 to 4:45 PM	450 ft	50 ft
4:45 to 5:00 PM	400 ft	25 ft
5:00 to 5:15 PM	>500 ft[1]	25 ft

Notes:
[1] Vehicle queues beyond 500 feet could not be observed from field camera's vantage point.
Source: Fehr & Peers, 2022, based on observed conditions on Wednesday, October 26, 2022.

Southbound Left Turn at Auburn Boulevard/Whyte Avenue

Figure 6 shows that 38 vehicles complete the southbound Auburn Boulevard to eastbound Whyte Avenue movement during the AM peak hour. Despite the relatively low turning volume, a maximum queue of 125 feet (i.e., about 5 vehicles) was observed between 8:15 and 8:30 AM. This queue is a result of the aforementioned surge in southbound left-turning traffic accessing the Hoss Lee Academy.

Table 4 shows the timing and duration of southbound left-turn queues of at least 2 vehicles during the busiest 30-minute increments of the AM and PM peak hours. The table indicates that the maximum queue of 5 vehicles occurred at 8:28 AM, with all 5 vehicles arriving within a 30-second span.

Table 4: Characteristics of AM & PM Peak Conditions with Southbound Left-Turn Queues of Two or More Vehicles – Existing Conditions

Time Period	Southbound Left-Turn Volume	Arrival Time of 1st Vehicle in Queue[1]	Delay Experienced by 1st Vehicle	Maximum Queue (Vehicles)	Queue Affected by Blockage of KEEP CLEAR area?
8:00-8:15 AM	9	8:02 AM	26 seconds	2	No
		8:03 AM	57 seconds	2	No
		8:04 AM	33 seconds	2	No
8:15-8:30 AM	21	8:20 AM	69 seconds	4	No
		8:24 AM	58 seconds	4	No
		8:28 AM	38 seconds	5	No
4:00-4:15 PM	10	4:02 PM	76 seconds	2	No
		4:04 PM	23 seconds	2	No
4:15-4:30 PM	9	4:15 PM	10 seconds	2	No

Notes:
[1] Rounded to the nearest full minute.
Source: Fehr & Peers, 2022, based on review of field cameras from October 26, 2022, data collection.

The chart below shows the maximum queue in 15-minute increments across the entire count day. It clearly shows a spike in queuing from 8:15 to 8:30 AM.

As further evidence of the surge in vehicle queuing that occurs in the southbound left-turn lane, a supplemental set of field observations were performed on Thursday, December 1, 2022. As shown in **Image 7** below, a maximum queue of 6 southbound left turn vehicles was observed shortly after 8:15 AM.

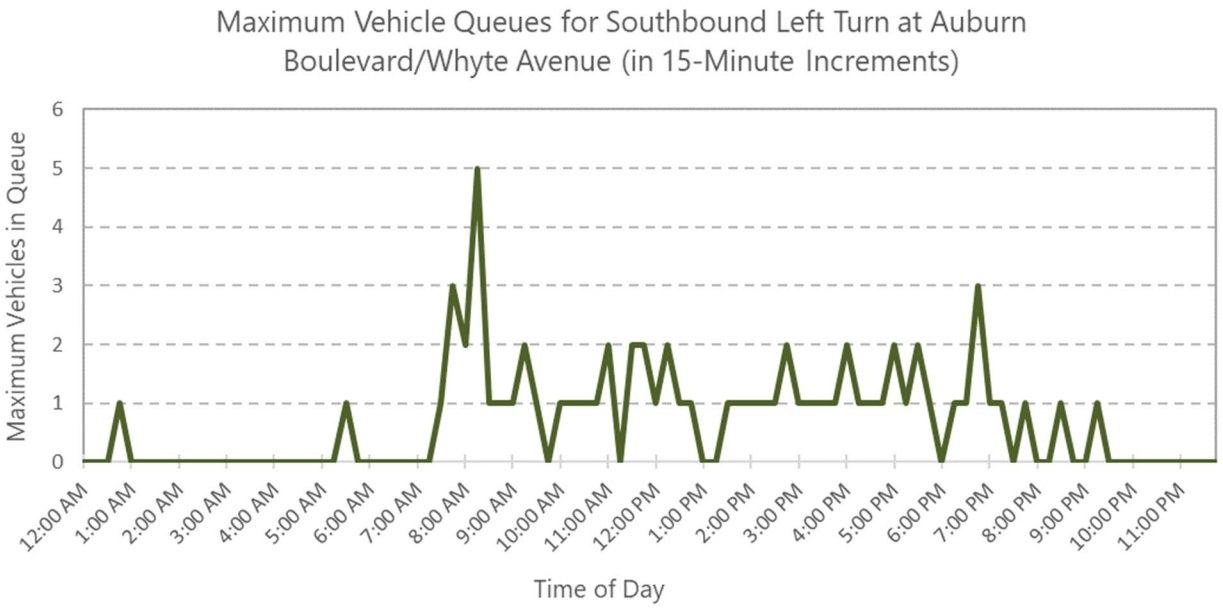


Image 7: Queue of 6 vehicles waiting to turn left from southbound Auburn Boulevard onto eastbound Whyte Avenue at 8:15 AM on Thursday, December 1, 2022.

Based on the multiple days of data collection and observations of video by Fehr & Peers staff, the following general conclusion is drawn regarding travel behavior in the southbound left-turn lane at the Auburn Boulevard/Whyte Avenue intersection:

- Southbound left-turns typically arrive in a random fashion, with the notable exception of between 8:15-8:30 AM (i.e., prior to start of Hoss Lee Academy). Depending on when they arrive, southbound left-turns can experience almost no delay or upwards of 1 minute of delay. Longer delays do not occur because the intersection is blocked, but because there is a continuous flow of northbound traffic on Auburn Boulevard. Strong compliance with the DO NOT BLOCK INTERSECTION sign and KEEP CLEAR pavement marking was observed.

Chapter 3. **Existing Plus Project Conditions**

This chapter analyzes the potential transportation impacts of the proposed project on the surrounding transportation system under existing conditions assuming implementation of Phase 2 of the *Auburn Boulevard Complete Streets Plan*.[4]

ROADWAY NETWORK AND OPERATION CHANGES

Phase 2 of the *Auburn Boulevard Complete Streets Plan* would result in the following changes to the roadway network and its operation within the study area, as outlined in the "Study of Planned Improvements on Auburn Boulevard in Citrus Heights, CA" final technical memorandum (April 11, 2022).

Auburn Boulevard/Whyte Avenue

- Installation of a triangular raised median on the westbound approach to prohibit outbound through or left turns.
- Installation of a narrow raised median in the northbound and southbound left-turn lanes, though northbound and southbound left-turns would continue to be permitted.[5]

Auburn Boulevard/Jack in the Box Driveway/Java Detour Driveway

- Closure of the Java Detour driveway.
- Installation of a raised median to prohibit inbound and outbound left turns at the Jack in the Box driveway.

Auburn Boulevard/Tea It Driveway

- Closure of Tea It driveway

[4] The precise timing of project construction and completion of Phase 2 Auburn Boulevard Complete Streets is not known at this time. Since site planning and access provisions for the proposed project incorporate the Complete Streets improvements, they are assumed in place together.

[5] City of Citrus Heights staff indicated that final design drawings for the Phase 2 Auburn Boulevard Complete Streets project will include lengthening this turn lane to its maximum feasible length of 140 feet. Note that the raised median north of Whyte Avenue will restrict driveway movements at the Chevron and Shell gas stations to right-turns only. It will also preclude the ability of left-turns on eastbound Whyte Avenue to utilize the southbound left-turn as a TWLTL to perform a two-stage crossing.

Auburn Boulevard/Citrus Grove Shopping Center Driveway/Central Driveway

- Conversion to a signalized intersection with crosswalks on all four approaches and an offset driveway configuration.
- Provision of a dedicated left-turn and a shared through/right lane on the eastbound and westbound approaches, which would be operated with protected left-turn phasing[6].
- Prohibition of northbound and southbound "right-turns on red" due to the driveway offset and stop bar setbacks.
- Addition of a narrow raised median on the northbound and southbound approaches.
- Signal coordination with the Auburn Boulevard/I-80 Eastbound Off-Ramp/Orlando Avenue intersection.

PROJECT SITE PLAN: LAND USE AND VEHICULAR ACCESS

The proposed project would include the following land use components:

- Demolition of an existing 106 s.f. Java Detour coffee kiosk
- Demolition of an existing 1,447 s.f. liquor store
- Construction of a 2,170 s.f. Starbucks Coffee store with drive-through window
- Construction of a 2,600 s.f. Panda Express restaurant with drive-through window

Along Whyte Avenue, the project would eliminate the inbound-only driveway and reconfigure the parking lot to allow inbound and outbound movements to occur from the current outbound-only driveway.

PROJECT TRAVEL CHARACTERISTICS

Trip Generation

Although the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021) contains coffee shop and fast-food restaurant trip generation rates, it is unknown whether this data, pulled from stores and restaurants across the US from the 1990's through 2020, would be representative of trips generated by a Starbucks store and Panda Express Restaurant. Therefore, it was determined that a traffic data collection effort should be undertaken at comparable facilities in the region.

[6] A swept path analysis of a pair of WB-50 trucks performed in the final technical memorandum demonstrated that both the eastbound and westbound left turns can occur simultaneously.

In June 2022, weekday traffic data was collected during the AM peak hour at two existing Starbucks drive-through locations. Counts were limited to the AM peak hour because Starbucks stores are known to be busier during the AM versus the PM peak hour. This data was used to estimate the AM peak hour trip generation for the proposed Starbucks store. **Table 5** displays the number of trips observed at each Starbucks store that was counted. These two stores were specifically identified for data collection because they are situated in the general project site vicinity, have similar store sizes with drive-through ordering windows, and are physically located a short distance (i.e., less than one-half mile) from Interstate 80. As shown in Table 5, they generated an average of 219 AM peak hour trips, with the difference in trips between the two stores being less than 2%. About two-thirds of vehicle trips were associated with drive-through orders.

Table 5: AM Peak Hour Trip Generation – Starbucks Coffee With Drive-Through

Location	Peak Hour	Trip Generation[1]		
		In	Out	Total
5411 Diablo Drive (Sacramento County)	7:30 to 8:30 AM	110	107	217
709 Cirby Way (City of Roseville)	7:15 to 8:15 AM	114	106	220
	Average	112	107	219

Notes:
[1] Based on AM peak period (6:30 to 9:30 AM) data collected on Wednesday, June 1, 2022.
Source: Fehr & Peers, 2022

Based on direction from City of Citrus Heights and City of Roseville staff, data was also collected at an existing Panda Express restaurant (with drive-through) to estimate the peak hour trip generation of the proposed restaurant. **Table 6** shows the number of trips observed at the counted Panda Express restaurant in the Natomas area of the City of Sacramento. Counts were collected on various dates in November 2022, as indicated by the footnotes in the table. The chosen Panda Express restaurant is less than one mile from Interstate 5, has a similar size to the proposed restaurant, and has a drive-through ordering window.

As shown, based on the average of two different count days, the Panda Express restaurant generated an average of 3 AM peak hour trips. Since the restaurant does not open to customers until 10 AM, these trips were made by employees, deliveries, etc.

Table 6: Peak Hour Trip Generation – Panda Express Restaurant With Drive-Through

Location	Peak Hour	Trip Generation		
		In	Out	Total
2940 Del Paso Boulevard (City of Sacramento)	7:45 to 8:45 AM[1]	2	1	3
	5:00 to 6:00 PM[2]	105	90	195

Notes:
[1] Based on AM (7:45 to 8:45 AM) data collected on Monday, November 21, and Tuesday, November 22, 2022.
[2] Based on PM peak hour (4:00 to 6:00 PM) data collected on Thursday, November 17, 2022.
Source: Fehr & Peers, 2022

During the PM peak hour, a substantial volume of trips (195) was observed at the Natomas Panda Express restaurant. This result was somewhat surprising as the same store was counted by Fehr & Peers in 2012 and generated 108 PM peak hour trips. The Trip Generation Manual indicates a 2,600 square-foot fast-food restaurant with drive-through window would generate 86 PM peak hour trips, though restaurants of that size generated between 40 to 200 PM peak hour trips, indicating quite a bit of variability. As an additional data point to consider, Fehr & Peers conducted a trip generation count at the Panda Express restaurant located on Blue Oaks Boulevard in Roseville on Thursday, December 1, 2022. That count yielded 140 PM peak hour trips. Thus, to ensure a conservative analysis, the Panda Express restaurant was analyzed based on the trip generation totals shown in Table 6.

Table 7 summarizes peak hour vehicle trip generation estimates for each project component. These estimates show both trips added and trips subtracted (i.e., associated with a demolished use). Table 7 also includes an estimate of pass-by trips for the Starbucks store and Panda Express restaurant. Pass-by trips are trips already on the adjacent roadway system that make an intermediate stop at the project site on their way to a primary destination. They do not add traffic to the adjacent roadway system but are added into and out of the project driveways.

As shown in Table 7, the project would result in 174 net pass-by trips and 45 net new trips during the AM peak hour. During the PM peak hour, the project would result in 175 net pass-by trips and 95 net new trips.

Table 7: Project Vehicle Trip Generation

Land Use	Size[1]	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Java Detour Coffee Kiosk[2]	0.106 KSF	0	0	0	0	0	0
Liquor Store[3]	1.447 KSF	-2	-1	-3	-5	-5	-10
Starbucks Store[4]	2.170 KSF	+112	+107	+219	+42	+43	+85
Panda Express Restaurant[5]	2,600 KSF	+2	+1	+3	+105	+90	+195
Gross Project Trips		**112**	**107**	**219**	**142**	**128**	**270**
Pass-By Trips (Starbucks Store)[6]		89	85	174	34	34	68
Pass-By Trips (Panda Express Restaurant) [7]		0	0	0	58	49	107
Net Pass-By Trips		**89**	**85**	**174**	**92**	**83**	**175**
Net New External Project Trips		**23**	**22**	**45**	**50**	**45**	**95**

Notes:
[1] KSF = thousand square feet.
[2] On the day of counts (October 26, 2022), Java Detour was "temporarily closed". Therefore, intersection/driveway counts and project trip generation reflect site conditions with Java Detour closed.
[3] Trip generation derived from weighted average trip rate (AM peak hour) and the fitted curve equation (PM peak hour) of the "Strip Retail Plaza (<40k)" land use category (ITE Code 822).
[4] AM peak hour trip generation based on data collected at two similar Starbucks drive-through stores located in the City of Roseville and Sacramento County (see Table 5). PM peak hour trip generation is derived from the weighted average trip rate of the "Coffee/Donut Shop with Drive-Through Window" land use category (ITE Code 937).
[5] Trip generation based on data collected at a similar Panda Express restaurant with drive-through ordering window located in the City of Sacramento (See Table 6).
[6] The *Trip Generation Manual, 11th Edition* (ITE, 2021) provides a limited data sample whose average pass-by percentage was 90% in the AM peak hour and 98% in the PM peak hour. To be conservative, 80% of trips were assumed as pass-by trips, similar to other coffee store studies prepared by Fehr & Peers in the City of Citrus Heights.
[7] Pass-by trip percentage of 55% during the PM peak hour is derived from data in the *Trip Generation Manual, 11th Edition* appendices.
Source: *Trip Generation Manual, 11th Edition* (ITE, 2021); Fehr & Peers, 2022

Trip Distribution

Per standard practice, separate trip distribution percentages were prepared for new trips versus pass-by trips. The distribution of pass-by trips is primarily a function of the amount of traffic in each direction of Auburn Boulevard during each peak hour and the ease of performing pass-by movements from either direction. In contrast, the distribution of new trips considers the likely trip origin (for inbound trips to the project) and destination (for outbound trips from the project). The expected percentages are presented below.

New Trips

As shown in **Table 8**, 60% of new project trips are expected to be distributed to/from the north, with 36% to/from the south, and 4% to/from the east on Whyte Avenue. The slightly greater percentage to the north takes into consideration the site's proximity to Interstate 80 and the likelihood that both uses attract "diverted link trips" off Interstate 80. Additionally, review of the earlier June 1, 2022, traffic counts (which included Java Detour in operation) showed greater overall levels of vehicles turning to the north.

Pass-by Trips

During the AM peak hour, 75% of pass-by trips are expected to come from northbound motorists on Auburn Boulevard for the following reasons:

- There is considerably more traffic heading northbound than southbound.
- Nearly all trips generated by the project site during the AM peak hour are made by the Starbucks Store. And of those that are pass-by, some will likely have work destinations that require travel on I-80.

The resulting pass-by percentages shown in **Table 9** take the differing directional traffic composition into consideration. The percentages also consider that performing a pair of right-turns (i.e., from northbound Auburn Boulevard) is typically easier than performing a pair of left-turns (i.e., from southbound Auburn Boulevard).

During the PM peak hour, 60% of pass-by trips are expected to come from the heavier southbound direction of travel. This percentage considers the presence of many residential areas south of the project site and the likelihood of performing a pass-by trip to the Panda Express restaurant for dinner (especially in the popular drive-through lane).

Table 8: Project Trip Distribution (Net New External)

Origin/Destination	Percentage of Project Trips (Net New External)
Auburn Boulevard north of Whyte Avenue	60%
Auburn Boulevard south of Project Driveway	36%
Whyte Avenue east of Louis Lane	4%

Source: Fehr & Peers, 2022

Table 9: Project Trip Distribution (Pass-By)

Direction of Travel Prior to Accessing Site	Percentage of Project Trips (Pass-By)	
	AM Peak Hour	PM Peak Hour
Southbound Auburn Boulevard	25%	60%
Northbound Auburn Boulevard	75%	40%

Source: Fehr & Peers, 2022

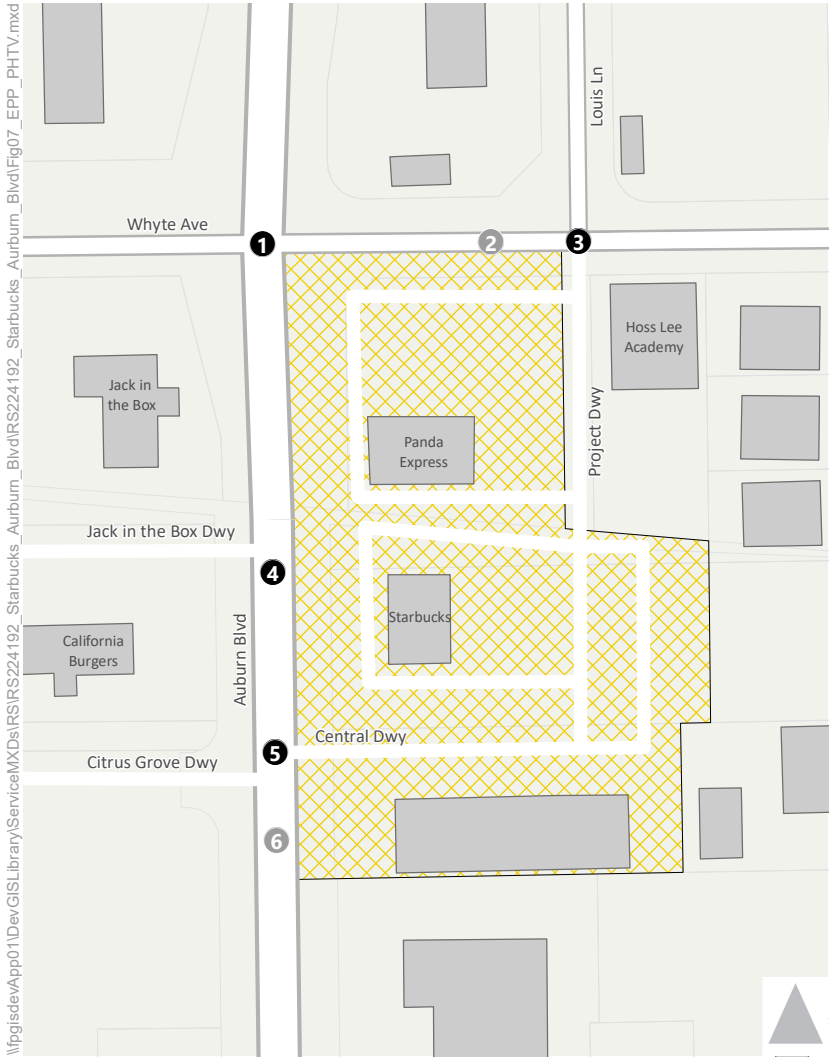
INTERSECTION OPERATIONS

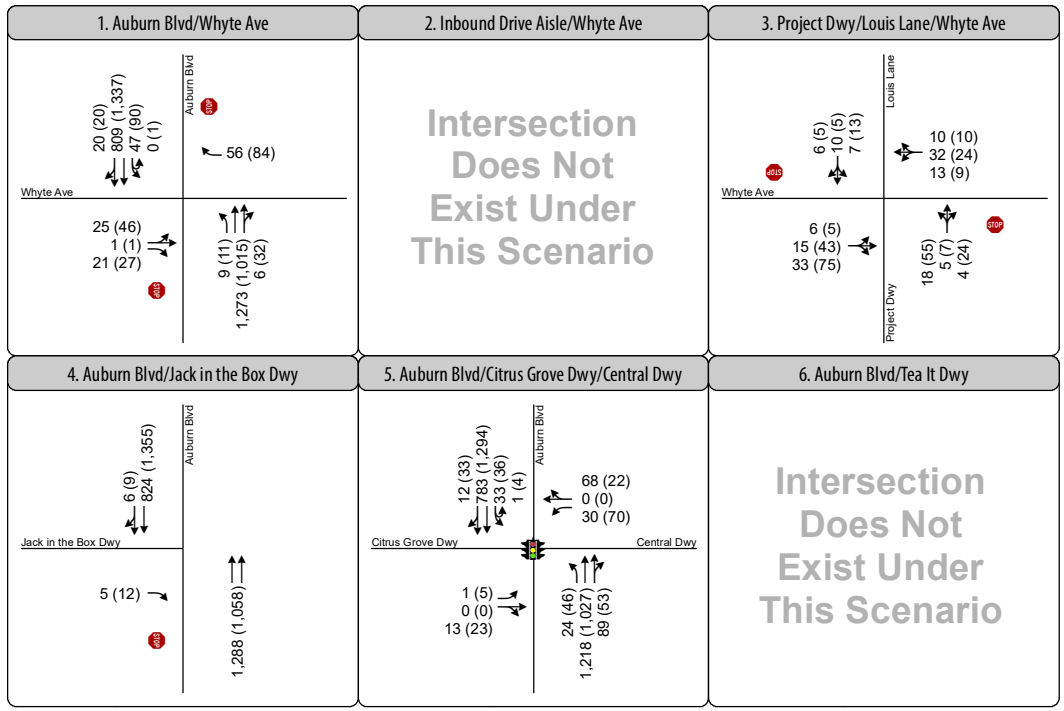
Project trips were added to existing conditions assuming implementation of Phase 2 of the *Auburn Boulevard Complete Streets Plan*. Only trips from the to-be-demolished liquor store are subtracted, since the Java Detour coffee kiosk was closed on the day traffic counts were conducted (i.e., trips associated with Java Detour are not part of the existing conditions traffic volumes). **Figure 7** displays the resulting AM and PM peak hour turning movement volumes, traffic controls, and lane configurations at study intersections and driveways under existing plus project conditions.

Table 10 displays the operational results at the study intersections under existing plus project conditions (refer to **Appendix C** for technical calculations). Operations would improve at the Auburn Boulevard/Jack in the Box Driveway/Java Detour Driveway intersection because of the closure of the Java Detour driveway and prohibition of all left turns at the Jack in the Box driveway. At the Auburn Boulevard/Whyte Avenue intersection, traffic operations are largely affected by the following two factors under existing plus project conditions:

- Installation of a narrow raised median on the north leg – this prevents eastbound left turn vehicles from completing a two-stage crossing (using the two-way left turn lane as vehicles do under existing conditions), thus increasing delay to the eastbound left-turn/through lane group.

- Signal coordination between the Auburn Boulevard/Citrus Grove Driveway/Central Driveway intersection and the Auburn Boulevard/I-80 Eastbound Off-Ramp/Orlando Avenue intersection – this results in greater platooning of vehicles along Auburn Boulevard, which provides additional opportunities for Whyte Avenue side street vehicles to complete their movements (thereby offsetting some of the additional delays associated with elimination of the two-stage crossing).





1 Study Intersection

Project Site

Traffic Signal

Turn Lane

AM (PM) Peak Hour Traffic Volume

Stop Sign

Note: Assumes implementation of the Auburn Boulevard Complete Streets project.

Figure 7

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

All study intersections would operate at LOS E or better under existing plus project conditions except for the Auburn Boulevard/Whyte Avenue intersection during the PM peak hour. This operation is not considered deficient since the City of Roseville's LOS policy only pertains to signalized intersections.

Table 10: Peak Hour Level of Service – Existing Plus Project Conditions

Intersection	Jurisdiction	Control	LOS/Delay (Worst Movement)[1]			
			Existing Conditions		Existing Plus Project Conditions	
			AM	PM	AM	PM
1. Auburn Boulevard / Whyte Avenue	City of Roseville	SSSC	D / 30 (EBLT)	F / 62 (EBLT)	E / 40 (EBLT)	F / 73 (EBLT)
2. Whyte Avenue / Inbound Drive Aisle	City of Roseville	Uncontrolled	A / 7 (WBLT)	A / 7 (WBLT)	-	
3. Whyte Avenue / Outbound Drive Aisle	City of Roseville	SSSC	A / 9 (NBLTR)	A / 9 (SBLTR)	A / 10 (NBLTR)	A / 10 (NBLTR)
4. Auburn Boulevard / Jack in the Box Driveway / Java Detour Driveway	City of Citrus Heights	SSSC	D / 33 (EBLTR)	F / 88 (EBLTR)	A / 10 (EBR)	B / 12 (EBR)
5. Auburn Boulevard / Citrus Grove Driveway / Central Driveway	City of Citrus Heights	SSSC / Signal	B / 14 (WBR)	C / 15 (EBR)	A / 7	A / 8
6. Auburn Boulevard / Tea It Driveway	City of Citrus Heights	SSSC	B / 14 (WBR)	B / 13 (WBR)	-	

Notes: SSSC = Side-Street Stop Controlled.
[1] For signal control, average delay is the weighted average for all movements. For side-street stop controlled and uncontrolled intersections, level of service and delay for the worst movement is reported with the movement listed in parentheses. Delay is reported in seconds per vehicle.
Source: Fehr & Peers, 2022.

VEHICLE QUEUING

Maximum Queues at Project Driveways

Table 11 displays the maximum queues for critical turn movements at the project driveways along Auburn Boulevard and Whyte Avenue. The methodology described in *Estimation of Maximum Queue Lengths at Unsignalized Intersections* (ITE Journal, 2001) was used to estimate maximum queues for movements at the Whyte Avenue driveway intersection. The SimTraffic microsimulation model was used to estimate maximum queues at the Auburn Boulevard/Citrus Grove Shopping Center Driveway/Central Driveway intersection. Maximum queues are based on an average of ten simulation runs. As shown in Table 11, the maximum queue

would exceed the available storage on the westbound approach to the signalized Auburn Boulevard/Citrus Grove Driveway/Central Driveway during both peak hours. During the PM peak hour, the westbound left-turn lane would serve 70 vehicles, resulting in a maximum queue of 6 vehicles. A maximum queue of 4 vehicles is expected during the AM peak hour for both the westbound left turn and through/right turn movements. Recommendations to address these queues are discussed in Chapter 5.

Table 11: Maximum Queues at Project Accesses – Existing Plus Project Conditions

Project Access Intersection	Movement	Storage Length	Maximum Queues	
			AM Peak Hour	PM Peak Hour
3. Whyte Avenue / Project Driveway (Unsignalized)	Westbound Left/Through	-	25 ft	25 ft
	Northbound Left/Through/Right	65[1] ft	25 ft	50 ft
5. Auburn Boulevard / Citrus Grove Driveway / Central Driveway	Southbound Left	110[2] ft	75 ft	100 ft
	Westbound Left	60[1] ft	**100 ft**	**150 ft**
	Westbound Through/Right	70[1] ft	**100 ft**	50 ft

Notes: **Bold** indicates exceedance of available storage length.
[1] Storage distance measured to the first intersecting drive aisle or parking space.
[2] Per *Auburn Boulevard Complete Streets – Phase 2 Design*.
Source: Fehr & Peers, 2022.

Southbound Left Turn at Auburn Boulevard/Whyte Avenue

Between existing and existing plus project conditions, the southbound left turn movement volume would experience the following increases in travel demand:

- AM peak hour – from 38 to 47 vehicles. This increase is due to the location of the Starbucks drive-through entrance (situated on the north end of the Starbucks site), which would encourage a small number of inbound drivers to make a southbound left-turn at Auburn Boulevard/Whyte Avenue (versus continuing southerly to use the signalized entry). Additionally, the Panda Express is estimated to add 1 southbound left-turn at the Auburn Boulevard/Whyte Avenue intersection.
- PM peak hour – from 28 to 90 vehicles. This increase is mostly due to the location of the Panda Express restaurant, and particularly its proposed drive-through entrance on the north end of the project site, although the Starbucks store would also add some trips.

During the AM peak hour, the Starbucks could potentially increase the southbound left-turn queue by one vehicle. As was documented in Chapter 2, a maximum queue of 5 or 6 vehicles occurred between 8:15 and 8:30 AM, but soon dissipated. The potential exists for a vehicle queue to exceed the 140 feet of available storage for a very short duration (i.e., one minute or less). Queues are not expected to extend back to the I-80 Eastbound Ramps/Auburn Boulevard intersection on a recurring basis.

The project (Panda Express restaurant and Starbucks store combined) would add an average of one vehicle per minute to the southbound left-turn lane during the PM peak hour. Field observations at these stores/restaurants indicate that arriving traffic is dispersed throughout the hour and does not have pronounced peaks such as occurs at Hoss Lee Academy. Thus, even if two vehicles were to simultaneously arrive in the left-turn lane, resulting in a total of 4 queued vehicles, the available storage of 140 feet would be sufficient.

In conclusion, this analysis has found that the project would not cause vehicle queues in the southbound left-turn lane to exceed the available storage on a recurring basis. However, there may be occasional instances where the queue temporarily exceeds the turn pocket length, but those conditions will typically dissipate quickly.

Chapter 4. **Interim Scenario**

This chapter summarizes the evaluation Fehr & Peers conducted as part of the draft report to evaluate an interim scenario where both projects were developed before implementation of the *Auburn Boulevard Complete Streets* project.

A range of project access options was quantitatively analyzed under interim conditions, including various turn restrictions and control types at the project driveway, Citrus Grove Shopping Center driveway, and Whyte Avenue. The following safety issues were considered:

- As documented in Chapter 2, the left turn movement from westbound Whyte Avenue to southbound Auburn Boulevard is extremely challenging to perform and the frequency of vehicles attempting this movement would increase with the addition of Panda Express project vehicles.
- If westbound left-turns are prohibited at Whyte Avenue, then motorists desiring to travel southbound on Auburn Boulevard would need to perform a U-turn, which is not permitted at the adjacent signalized intersection of Auburn Boulevard/Orlando Avenue/I-80 Eastbound Off-Ramp. This could result in about 70 PM peak hour project trips performing difficult or illegal U-turns, or using private property or other streets for turnarounds.

A concept of allowing direct outbound left-turns from the project driveway onto southbound Auburn Boulevard was also considered. However, by doing so, the driveway across the street would need to be modified to allow outbound left-turns. Direct outbound vehicles from the project site would include both trips from the Starbucks, Panda Express, and Hoss Lee Academy. Those movements would need to find gaps in through traffic, which frequently spills back beyond this driveway during peak hours (i.e., not too dissimilar to the situation present at Whyte Avenue currently).

Considering the turning movement challenges at the project driveway and Whyte Avenue, as well as the above safety concerns, the following Conditions of Approval are recommended for the Starbucks Store to address the potential project timing issue:

- Prior to the opening of the Starbucks Store, a traffic signal shall be present and operational at the project driveway on Auburn Boulevard (situated in the correct ultimate location).
- In the event the Starbucks applicant chooses to advance the construction of the traffic signal at their own expense, they shall be required to submit to the City of Citrus Heights a recommended traffic signal coordination plan that would interconnect the new signal with the signal at the I-80 EB Ramps.

City of Roseville staff mentioned during a conference call (held on February 8, 2023) that they would require a more detailed site plan and additional analysis before they would consider any types of recommendations or Conditions of Approval for the Panda Express or any other use on the north parcel.

Chapter 5. **Project Access and On-Site Circulation Review**

This chapter evaluates project access, on-site circulation and expected vehicle queues at the Starbucks drive-through lane.

PROJECT ACCESS

Driveway Throat Depths

Chapter 3 demonstrated that the Panda Express Restaurant driveway on Whyte Avenue would have adequate on-site stacking for exiting traffic. This is important because lack of on-site storage could block the path of inbound traffic, causing vehicles to queue back onto the adjacent public street.

However, the Starbucks store driveway on Auburn Boulevard would not have adequate throat depth. To provide an adequate throat depth, Fehr & Peers recommends the following (under an assumed condition where the new traffic signal is constructed):

- Remove the first 4 parking spaces on the south side of the driveway and extend the centerline striping 100 feet within the site. This improvement is illustrated on **Figure 8.**

Vehicular Ingress from Whyte Avenue

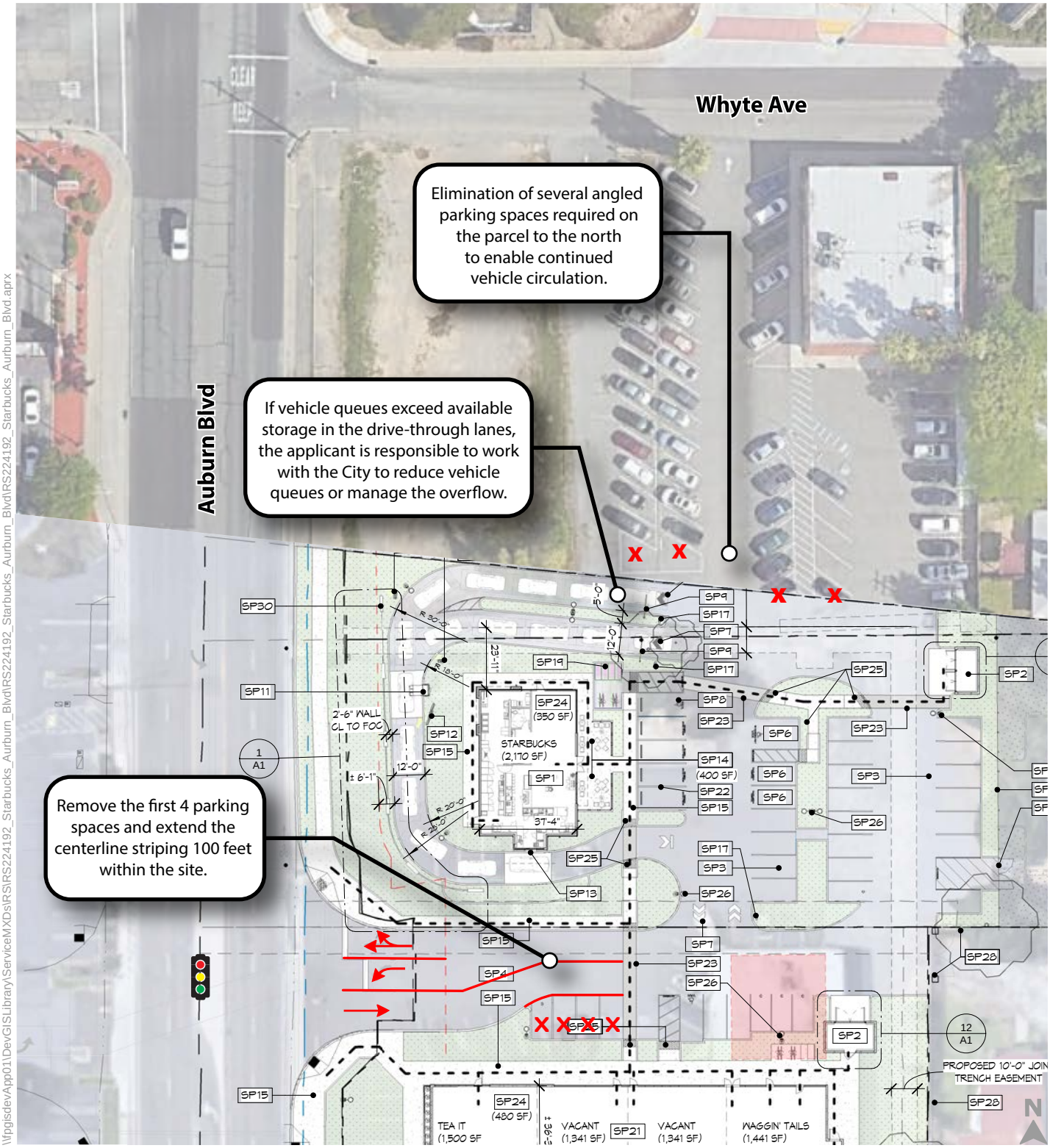
City of Roseville design standards do not require construction of left or right turn lanes into project driveways on collector streets, such as Whyte Avenue. Thus, no modifications to Whyte Avenue at this driveway are necessary.

Vehicular Ingress from Auburn Boulevard

Access to the Starbucks Store driveway was analyzed under Existing Plus Project (ultimate) conditions. As shown in Table 11, the storage length from the *Auburn Boulevard Complete Streets* project would be adequate to contain the southbound left turn AM/PM peak hour maximum vehicle queues.

Auburn Boulevard/Whyte Avenue Southeast Corner Modifications

The project site plan indicates that the southeast corner of this intersection would be reconstructed to have a 25 to 30 feet curb return radius. This design will better accommodate buses that turn right from northbound Auburn Boulevard versus the current approximately 10-foot curb return.



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— Striping (not raised)

Figure 8

Project Recommendations for Starbucks Store

Whyte Avenue Improvements

The site plan indicates that the existing edge of pavement on the south side of Whyte Avenue along the project frontage will be upgraded in its current location. The site plan does not show sufficient details to confirm whether curb, gutter, and sidewalk would be provided.

ON-SITE CIRCULATION

The Starbucks Coffee store includes a drive-through entrance situated at the north property boundary. If Starbucks is constructed and Panda Express is not, the current angled parking lot to the north would remain and become a circulation constraint. Specifically, vehicles traveling in the southbound direction (from Whyte Avenue) would be unable to turn left to access the northbound return parking aisle or access the Starbucks drive-through lane (due to insufficient driveway width). To address this issue, Fehr & Peers recommends the following:

- The project should ensure that circulation in the north parcel is maintained by eliminating several angled parking spaces on the north parcel as shown on Figure 8.

As described previously, the Panda Express restaurant would result in the loss of 28 off-street existing parking spaces on the north parcel that are currently utilized by the Hoss Lee Academy. In fact, during the December 1, 2022, field observations, parking demands from that center extended into vacant parking stalls on the south parcel. With both projects constructed, Hoss Lee Academy parking may occupy parking spaces adjacent to the Panda Express restaurant. This, in turn, could potentially lead to isolated parking shortfalls in some areas of the two projects. To the extent this occurs, there is potential for overflow parking demand to occur along Whyte Avenue. To address these conditions, the following are recommended:

- City of Roseville and Citrus Heights staff should evaluate the joint parking requirements and adequacy of parking supply for the two projects. Between 8:30 AM and 4:00 PM, the Hoss Lee Academy has a parking demand in the range of 50 to 60 spaces (as evidenced on December 1, 2022, and as shown in the Google Maps aerial taken on a weekday morning).

- The project architect for the Panda Express restaurant should evaluate the potential to reconfigure parking directly south of the Hoss Lee Academy building to increase the parking yield.

- City of Roseville staff should identify where on-street parking should be permitted versus prohibited along the project's frontage on Whyte Avenue. Conditions to consider include maintaining a clear sight distance triangle at the project driveway and the Louis/Orlando driveway on the north side of the street, the varying width of Whyte Avenue, and other factors.

The portion of the project site plan showing the Panda Express restaurant does not contain the necessary site plan element details to allow for a comprehensive on-site circulation review. Driveway widths are not shown, and it is not clear whether sidewalks or pedestrian linkages would be provided along the project's public street frontages. Additional review would be required to evaluate these, and other details.

STARBUCKS DRIVE-THROUGH QUEUING

The site plan shows approximately 345 feet of total available storage in the Starbucks drive-through lane, with the first 200 feet of storage split between two ordering lanes. Fehr & Peers conducted average length queuing distance measurements at two Starbucks drive-through locations in the Sacramento region in July 2022. The two stores exhibited an average distance occupied of about 23 feet per vehicle. If the proposed store has the same type of vehicle fleet and driver behaviors, the drive-through lane would have storage for about 15 vehicles. Note that the site plan shows 17 vehicles that could be stored within the drive-through lane.

As described in Chapter 3, weekday traffic data was collected at two existing Starbucks drive-through locations in June 2022. In addition to collecting trip generation data, the following additional data was collected between 6:30 AM and 9:30 AM:

- Maximum queues (in vehicles) in 15-minute increments
- Service rate (i.e., the rate at which the drive-through window processes vehicles)

The data showed that both Starbucks locations had comparable drive-through operations. Both locations had an AM peak hour maximum queue of 9 drive-through vehicles. One location served an average of 1.03 vehicles per minute, while the other served an average of 1.10 vehicles per minute, which represents a difference in terms of service rate of less than 7 percent. This data suggests that if the proposed Starbucks store operates at a service rate similar to that observed at the Starbucks data collection locations, then the available drive-through storage would be sufficient to contain the expected vehicle queue of 9 vehicles during the AM peak hour without queues extending into the adjacent parking lot. However, if the service rate at the proposed Starbucks is considerably lower than 1.03 vehicles per minute, maximum drive-through queues would extend beyond 9 vehicles.

PROJECT RECOMMENDATIONS

Table 12 summarizes project recommendations and provides additional background, reasoning, effectiveness, and/or other information. These recommendations pertain only to the Starbucks store. Based on the conference call held on February 8, 2023, the City of Roseville will require a more detailed site plan and additional analysis before they would consider any types of recommendations or Conditions of Approval for the Panda Express or any other use on the north parcel. Additional analysis would include evaluations of

parking overflow at Hoss Lee Academy, permitted versus prohibited on-street parking on Whyte Avenue, internal circulation, drive-through queuing, and other topics related to circulation and access.

Table 12: Recommendations for Starbucks Store

Recommendation	Notes
Interim Conditions (Prior to Implementation of *Auburn Boulevard Complete Streets* Project)	
Prior to the opening of the Starbucks Store, a traffic signal shall be present and operational at the project driveway on Auburn Boulevard (situated in the correct ultimate location).	The signalized intersection should be consistent with the lane configurations and signal timing/phasing parameters of the *Auburn Boulevard Complete Streets* plan.
In the event the Starbucks applicant chooses to advance the construction of the traffic signal at their own expense, they shall be required to submit to the City of Citrus Heights a recommended traffic signal coordination plan that would interconnect the new signal with the signal at the I-80 EB Ramps.	Signal coordination is consistent with the *Auburn Boulevard Complete Streets* project.
Ultimate Conditions (With Implementation of *Auburn Boulevard Complete Streets* Project)	
Remove the first 4 parking spaces on the south side of the signalized project driveway on Auburn Boulevard and extend the centerline striping 100 feet within the site.	This is necessary under the scenario where a traffic signal is installed due to inadequate throat depth. See Figure 8 for illustrative purposes.
Eliminate several angled parking spaces on the very south portion of the north parcel.	This is necessary to maintain continued vehicle circulation on the north parcel.
If the City Engineer observes that vehicle queues exceed available storage in the Starbucks drive-through lanes and extend into the adjacent parking lot, the applicant is responsible to work with the City to reduce vehicle queues or manage the overflow.	This study suggests that if the proposed Starbucks store operates at a service rate similar to that observed at the data collection locations, then the available drive-through storage would be sufficient to contain the expected vehicle queue of 9 vehicles during the AM peak hour.

Source: Fehr & Peers, 2023.