FEHR PEERS

Memorandum

Date: August 26, 2022

To: Chris Dickinson, Homes by Towne
David Mohlenbrok, City of Rocklin

From: Rob Hananouchi & John Gard, Fehr & Peers

Subject: Estia at Rocklin – Transportation Impact Study Addendum

RS21-4090.01

This memorandum presents the addendum to the Final Transportation Impact Study (TIS) for the Estia at Rocklin project. Specifically, this addendum evaluates a few potential changes to the commercial site plan. This includes:

- Changes to the proposed land uses for the commercial site.
- An alternative that consolidates access on Sunset Boulevard to a single driveway.
- An alternative that eliminates access on Sunset Boulevard entirely.

This memorandum presents a trip generation estimate of the proposed land use changes for the commercial site, including a comparison to the trip generation analyzed in the final TIS. This addendum also presents a trip generation estimate if the entire 30-acre project site developed as a commercial retail center, as assumed in the Northwest Rocklin Area General Development Plan and the City of Rocklin travel forecasting model.

This addendum also considers PM peak hour traffic demand for the following scenarios:

- With a single driveway on Sunset Boulevard, as shown in the updated commercial site plan.
- With no access on Sunset Boulevard, per direction from City of Rocklin staff and the project applicant.
- Level of service (LOS) analysis of the University Avenue corridor north of Sunset Boulevard with a roundabout and signal added at William Jessup University access points to address the sight distance limitations identified in the final TIS.

Executive Summary

Trip Generation Evaluation

The updated commercial land uses/site plan results in approximately eight percent fewer net external vehicle trips during the AM and PM peak hours than the commercial land uses analyzed in the Final TIS for the Estia at Rocklin project. At the University Avenue/Atherton Road / Sunset Boulevard intersection, the changes to the commercial driveways may cause some shifts in where vehicles access the project site, causing some turn movements to be higher and others to be lower than analyzed in the Final TIS. However, the decrease in net external trips would result in fewer trips traveling through the Sunset Boulevard / West Stanford Ranch Road/Lonetree Boulevard study intersection. Therefore, this addendum does not re-analyze peak hour traffic operations at this intersection, as the traffic analysis in the Final TIS adequately addresses the potential traffic impacts of the changes to the commercial site plan.

The addendum also compares the proposed Estia at Rocklin project trip generation to the assumed land development for the project site in the City's travel forecasting model, which is consistent with the General Plan land use designation and the Northwest Rocklin Area General Development Plan. This evaluation shows the Estia at Rocklin project generates about half as many daily trips compared to if the 30-acre site developed as a 328,000 square foot commercial center, as assumed in the City's travel forecasting model. It also generates slightly fewer AM peak hour trips and about 44 percent fewer PM peak hour trips.

Since the Estia at Rocklin project is forecasted to generate 44 percent fewer PM peak hour trips than the current General Plan land use designation, the Sunset Boulevard / University Avenue/Atherton Road intersection would experience less delay during the PM peak hour with the proposed Estia at Rocklin than if the project site developed according to the site's current land use designation.

The Final TIS for the Estia at Rocklin project forecasted that this intersection would operate at LOS D during the PM peak hour under cumulative plus project conditions with the Estia at Rocklin project. Therefore, it would almost certainly operate at LOS D (or worse) if the site develops according to its current land use designation, as assumed in the City's travel forecasting model.

University Avenue Corridor Analysis

To address the sight distance limitations identified in the Final TIS, the City of Rocklin, William Jessup University, and the project applicant requested an analysis of the following access control changes:

- Construct a multi-lane roundabout at the southern William Jessup University driveway
- Install a traffic signal at the center William Jessup University driveway

Additionally, the City and project applicant indicated the right-in/right-out commercial driveway on Sunset Boulevard may not be allowed and requested an analysis of conditions both with and without this driveway. The initial analysis (presented in **Table 11** of this memorandum) showed that the corridor would

experience heavy delay with LOS D or worse operations. Therefore, this study also evaluates traffic operations for the corridor with the following improvement options:

Option A

- Convert the planned southbound through lane to a shared left/through lane, resulting in three lanes for southbound left turns (two dedicated left-turn pockets and the shared left/through lane).
- Add a right-turn overlap phase for westbound right-turns.
- Add a right-turn overlap phase for southbound right-turns for the "No Driveway on Sunset Boulevard" condition only (overlap is not advisable for the "With Driveway on Sunset Boulevard" condition due to conflicting eastbound U-turn demand).

Option B

- Convert the planned southbound through lane to a shared left/through lane (same as Option A).
- Add a right-turn overlap phase for westbound right-turns (same as Option A).
- Modify the southbound approach to provide a channelized southbound free right turn. Provide a corresponding westbound receiving/acceleration lane on Sunset Boulevard.

Table 1 presents the results of the LOS analysis for the University Avenue corridor with the Sunset Boulevard driveway. **Table 2** presents the LOS analysis results without the Sunset Boulevard driveway.

Table 1: Intersection Operations – Cumulative Plus Project PM Peak Hour with Improvements – With Project Driveway on Sunset Boulevard

Intersection	Traffic Control	Cumulative + Project Base Condition		Cumulative + Project Option A Improvements		Cumulative + Project Option B Improvements	
		Delay	LOS	Delay	LOS	Delay	LOS
1. Project Driveway 2/William Jessup Center Driveway / University Ave.	Signal	**121**	**F**	20	B	19	B
2. Project Driveway 3/William Jessup South Driveway / University Ave.	Roundabout	**71**	**F**	21	C	16	C
3. Sunset Blvd. / University Ave./Atherton Rd.	Signal	**48**	**D**	**46**	**D**	**38**	**D**

Notes:

Results for locations 1 and 2 represent the average outputs of ten Vissim microsimulation model runs. Results for location 3 based on outputs from the Synchro 11 software, which calculates delay and LOS based on the HCM 6th Edition methodology.

BOLD indicates LOS D or worse operations (i.e., unacceptable LOS).

Source: Fehr & Peers, 2022.

Table 2: Intersection Operations – Cumulative Plus Project PM Peak Hour with Improvements – Without Project Driveway on Sunset Boulevard

Intersection	Traffic Control	Cumulative + Project Base Condition		Cumulative + Project Option A Improvements		Cumulative + Project Option B Improvements	
		Delay	LOS	Delay	LOS	Delay	LOS
1. Project Driveway 2/William Jessup Center Driveway / University Ave.	Signal	**122**	**F**	**52**	**D**	24	C
2. Project Driveway 3/William Jessup South Driveway / University Ave.	Roundabout	**70**	**F**	**48**	**E**	24	C
3. Sunset Blvd. / University Ave./Atherton Rd.	Signal	**59**	**E**	**46**	**D**	**38**	**D**

Notes:

Results for locations 1 and 2 represent the average outputs of ten Vissim microsimulation model runs. Results for location 3 based on outputs from the Synchro 11 software, which calculates delay and LOS based on the HCM 6th Edition methodology.

BOLD indicates LOS D or worse operations (i.e., unacceptable LOS).

Source: Fehr & Peers, 2022.

These results show that the proposed signal and roundabout at the project driveways would operate better with the improvements identified in Option A and Option B. With a project driveway on Sunset Boulevard, the signal and roundabout would operate at LOS C or better with either Option A or Option B improvements, as shown in **Table 1**. Without a project driveway on Sunset Boulevard, the signal and roundabout would operate at LOS D/E with the Option A improvements, and LOS C with the Option B improvements.

Most notably, the vehicle queues on University Avenue would be substantially reduced with the Option A or Option B improvements, with maximum queues only periodically extending between the roundabout and signal at Sunset Boulevard on University Avenue, and generally dissipating quickly without greatly impacting traffic flow, as demonstrated by the LOS C operations presented in **Table 1** and **Table 2**.

I. Updated Commercial Site Plan

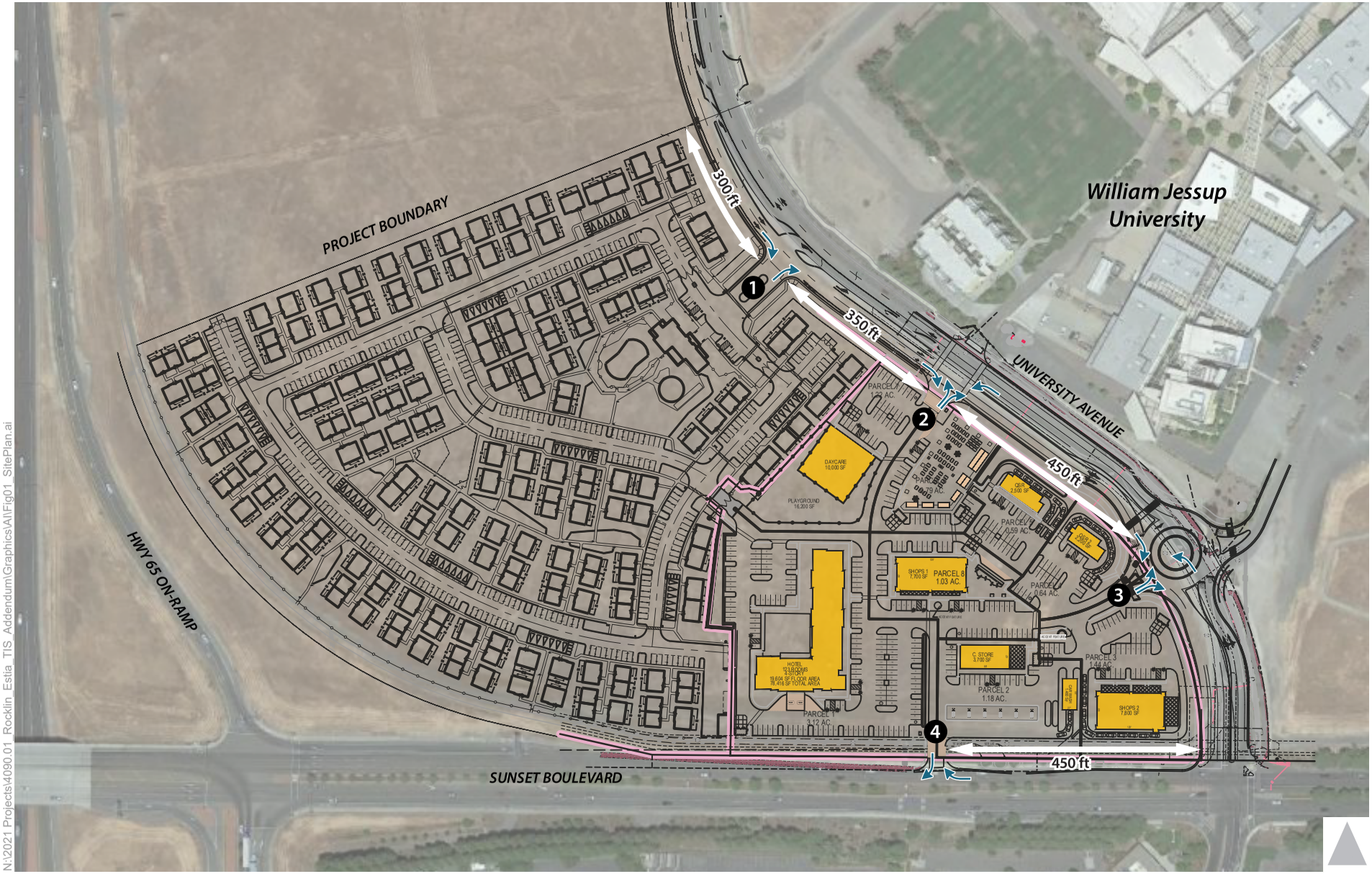
The project applicant shared an updated site plan showing several changes to the commercial land uses and site plan that were analyzed in the Final TIS. The multifamily residential component of the project is unchanged in the updated site plan, with access points remaining at the same locations. **Figure 1** presents the updated site plan.

Below is a summary of the proposed commercial land uses in this updated site plan, per the project applicant for the commercial development:

- 78,416 square-foot hotel with 4 levels and 123 rooms
- 10,000 square-foot daycare facility
- 7,700 square-foot general commercial retail building
- 7,800 square-foot general commercial retail building with a drive-through window
    - 1,300 square-feet of 7,800 square-feet assumed to be a coffee-shop with drive-through window, per information provided by commercial project applicant
- 2,500 square-foot fast food restaurant with drive-through window
- 2,200 square-foot fast food restaurant with drive-through window
- A gas station with 12 fueling positions, a 3,700 square-foot convenience store, and 1,460 square-foot attached automated car wash
- An outdoor biergarten/food court area that would consist of the following:
    - 700 square-foot container for beer/beverage sales
    - 350 square-foot container with refrigeration unit for food sales
    - Two 176 square-foot containers for food vendors (e.g., coffee, ice cream, salad, etc.)
    - Two 176 square-foot containers for on-site restroom facilities
    - Approximately 10,000 square-foot patio with tables and picnic benches with a seating capacity of approximately 350 people
    - Hours of operation anticipated to be 11:00 AM to 9:00 PM.

The updated site plan shows a single access on Sunset Boulevard near the proposed gas station. The project applicant indicated that if access on Sunset Boulevard is eliminated, the proposed gas station (Parcel 2) and the proposed Shops 2 building (Parcel 3) would be swapped such that the gas station would be located at the northwest corner of the University Avenue / Sunset Boulevard intersection with access via the driveway on the west leg of the proposed roundabout.

The project applicant also indicated a willingness to eliminate the northbound left-turn into the multifamily residential driveway. Although the underlying site plan in **Figure 1** shows a northbound left-turn pocket at this driveway, the permitted turn movements shown in **Figure 1** reflect no left-in access.



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1 Project Driveway

Permitted Turning Movement Into/Out of Project Driveways

Figure 1

Project Site Plan

II. Trip Generation Evaluation

Table 3 presents the estimated daily, AM peak hour, and PM peak hour vehicle trip generation for the project with the proposed commercial land uses identified above. **Table 3** shows the gross vehicle trip generation (i.e., the total number of trips that would travel to/from the project site), the amount of "pass-by" trips to the site, internal trip capture, and the net new external vehicle trips generated by the project.

Trip Generation Methodology

This analysis generally applies trip generation rates contained in the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers (ITE), 2021) to estimate the project's vehicle trip generation. This method presumes that the project's commercial tenants, particularly for the two proposed fast-food pads, would generate vehicle trips consistent with typical uses (i.e., not unique, ultra-popular brands such as In-N-Out Burger, Chick-Fil-A, or Raising Canes that generate trips at higher rates).

This analysis also presumes that 1,300 square feet of the proposed 15,500 square feet of commercial retail space is occupied by a coffee-shop with drive-through window, per information provided by commercial project applicant. The remaining 14,200 square feet of commercial space is assumed to be occupied by tenants typically found in a neighborhood commercial center, and therefore applies the trip generation rates for Strip Retail Plaza (ITE land use code 822) from the *Trip Generation Manual*.

Table 3: Estia at Rocklin Vehicle Trip Generation Estimate

ITE Land Use (Code)	Units	Vehicle Trip Generation Estimate						
		Daily	AM Peak Hour			PM Peak Hour		
		Total	Total	In	Out	Total	In	Out
Multifamily Housing (Low-Rise) (220)[1]	181 DUs	1,236	79	19	60	98	62	36
Hotel (310)[1]	123 Rooms	983	57	32	25	73	37	36
Daycare (565)[1]	10.0 KSF	476	110	58	52	111	52	59
Retail (822)[1]	14.2 KSF	829	36	22	14	100	50	50
Fast Food with Drive-Through (934)[1]	4.7 KSF	2,197	210	107	103	155	81	74
Coffee Shop with Drive-Through (937)[1]	1.3 KSF	694	112	57	55	50	25	25
Outdoor Biergarten/Food Court[2]	350 seats	1,037	7	4	3	100	62	38
Gas Station with Convenience Market (945)[1]	12 Fueling Positions	3,181	194	97	97	222	111	111
Total Gross Trip Generation[3]		10,633	805	396	409	909	480	429
Pass-by Trips[4]		4,454	314	157	157	364	182	182
Internal Trip Capture[5]		336	58	29	29	102	51	51
Net New External Project Trips[6]		**5,843**	**433**	**210**	**223**	**443**	**247**	**196**

Notes:

DUs = dwelling units

KSF = thousand square feet

1. Vehicle trip generation estimate calculated using trip generation fitted curve equations or average rates obtained from *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021).
2. Vehicle trip generation estimate for the outdoor biergarten/food court uses a customized trip generation rate based on data for Fine Dining Restaurant (931) and High-Turnover Sit-Down Restaurant (932) obtained from *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021). See Table 4 for calculation.
3. Gross trip generation = total trips to/from the project site.
4. Pass-by trips = existing trips on adjacent roadways that would access the project en route to their primary destination. Estimated using the average pass-by percentages contained in the ITE *Trip Generation Manual, 11th Edition* (see Table 6):
   Retail (820): 20% Daily and AM peak hour, 40% PM peak hour
   Fast-food with drive-through (934): 50% Daily & AM peak hour, 55% PM peak hour (also used for coffee shop with drive-through – see discussion below for explanation).
   Gas station with convenience market (945): 75% Daily & PM peak hour, 76% AM peak hour
5. Internal trip capture = trips that remain internal to the project site. Estimated using the MXD+ mixed-use development trip generation model. Daily: 3.2%; AM Peak Hour: 7.2%, PM Peak Hour: 11.2%
6. Net new trips = Gross trip generation – pass-by trips – internal trip capture. Reflects the number of new trips added to the transportation network by the proposed project.

Source: Fehr & Peers, 2022.

Outdoor Biergarten/Food Court

The *Trip Generation Manual* does not contain trip generation data for an outdoor biergarten/food court. Since this use would function similarly to a restaurant where patrons come to dine and socialize, this study uses a customized trip generation rate based on data for Fine Dining Restaurant (ITE land use code 931) and High-Turnover Sit-Down Restaurant (ITE land use code 932) obtained from *Trip Generation Manual, 11th Edition*. The *Trip Generation Manual* identifies the following characteristics to describe these two restaurant land uses:

- Fine Dining Restaurant (931):
  - Customers typically stay at least 1 hour
  - Generally does not serve breakfast; some may not serve lunch; all serve dinner.
- High-Turnover Sit-Down Restaurant (932):
  - Customers typically stay 60 minutes or less
  - Generally serves lunch and dinner; may also be open for breakfast; sometimes open 24 hours a day

Table 4 presents the trip generation rates for Fine Dining Restaurant and High-Turnover Sit-Down Restaurant (on a per seat basis), and the customized trip generation rate used for the proposed biergarten/food court.

Table 4: Outdoor Biergarten/Food Court Customized Trip Generation Rate

Land Use (ITE Land Use Code)	Vehicle Trip Generation Rate[1]						
	Daily	AM Peak Hour			PM Peak Hour		
	Total	Total	In	Out	Total	In	Out
Fine Dining Restaurant (931)[1]	2.60	0.02	Not available		0.28	67%	33%
High-Turnover (Sit-Down) Restaurant (932)[1]	4.37	0.45	52%	48%	0.39	57%	43%
Average[2]	3.49	0.24	52%	48%	0.34	62%	38%
Outdoor Biergarten/Food Court[3]	**2.96**	**0.02**	**52%**	**48%**	**0.29**	**62%**	**38%**

Notes:

1. Vehicle trip generation rates reflect weighted average trip rates (vehicle trips per seat) obtained from *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021) for Fine Dining Restaurant and High-Turnover Sit-Down Restaurant.
2. Represents the average of the Fine Dining Restaurant and High-Turnover Sit-Down Restaurant trip generation rates.
3. The customized trip generation rate used for the proposed outdoor biergarten/food court. This customized trip rate uses the Fine Dining Restaurant trip rate for the AM peak hour and 85% of the average of the Fine Dining Restaurant and High-Turnover Sit-Down Restaurant trip generation rates for daily and the PM peak hour (see discussion below for justification).

Source: Fehr & Peers, 2022.

The outdoor biergarten/food court would blend quick-service food delivery with amenities that encourage longer stays and socialization. Since customers may have a wide range in stay durations, this analysis blends the trip generation rates of the two land uses to develop a customized trip generation rate for the PM peak hour and daily trip rates, as shown in **Table 4**.

Since the biergarten/food court hours of operation would be 11:00 AM to 9:00 PM, it would likely not generate many trips during the AM peak hour. Therefore, for the AM peak hour, the analysis assumes the biergarten/food court would generate trips at a similar rate to Fine Dining Restaurant, which are similarly not open for breakfast per the *Trip Generation Manual* description.

Compared to a typical restaurant, the biergarten/food court would likely have a lower seat occupancy. The proposed outdoor seating capacity serves more of a support role, whereas maximizing table occupancy is of more vital importance at conventional sit-down restaurants. Therefore, the customized daily and PM peak hour trip generation rates presented in **Table 4** applies an 85 percent factor to the average trip generation rate assuming table occupancy would be lower for the outdoor biergarten/food court than a typical restaurant.

Pass-By Trips

Pass-by trips are existing trips on the adjacent roadway network that would access the project en route to their primary destination. This study estimates pass-by trips using the average pass-by percentages contained in the *Trip Generation Manual, 11th Edition*. **Table 5** presents the pass-by data from the *Trip Generation Manual* used in this study.

Table 5: *Trip Generation Manual* Pass-By Data

Land Use (ITE Land Use Code)	Daily	AM Peak Period	PM Peak Period
Shopping Plaza (821)	No Data	No Data	40%
Fine Dining Restaurant (931)	No Data	No Data	44%
Fast-Food Restaurant with Drive Through (934)	No Data	50%	55%
Convenience Store/Gas Station (945)	No Data	76%	75%

Source: *Trip Generation Manual, 11th Edition*, Institute of Transportation Engineers, 2021.

The *Trip Generation Manual* has no pass-by data for Strip Retail Plaza (822). This study uses pass-by data for Shopping Plaza (821) for the commercial shop space given the similar characteristics to the project's proposed commercial space.

The *Trip Generation Manual* also has no pass-by data for the AM peak period for several uses, and no pass-by data for daily. Therefore, this study assumes a certain level of pass-by activity that does not exceed the data for the available time periods. For example, the study assumes that the pass-by for strip

retail plaza would be half the PM peak period value (i.e., 20 percent) during the weekday AM peak period and daily.

Table 6 presents the pass-by percentages applied in this study.

Table 6: Project Pass-By Trip Inputs

Land Use	Pass-By Trip Percentage			Comments
	Daily	AM Peak Period	PM Peak Period	
Commercial Retail	20%	20%	40%	Applies pass-by data for Shopping Plaza (ITE 821). Daily and AM peak period pass-by percentage assumed to be half PM peak period pass-by percentage.
Fast-Food with Drive-Through	50%	50%	55%	Applies pass-by data for ITE 934. Daily assumed to be 50% (equal to AM peak period).
Coffee Shop with Drive-Through	50%	50%	55%	
Outdoor Biergarten/Food Court	44%	0	44%	Applies pass-by data for ITE 931. Daily assumed to be equal to PM peak period. No pass-by during AM peak period since it falls outside the hours of operation for outdoor biergarten/food court.
Convenience Store/Gas Station	75%	76%	75%	Applies pass-by data for ITE 945. Daily assumed to be equal to PM peak period (slightly lower than AM peak period).

Source: Fehr & Peers, 2022.

Internal Trips

Table 3 shows that the vehicle trip generation estimate also accounts for internal trips between complementary land uses within the project (e.g., a trip between the day care and coffee shop; or a trip between the residential and gas station). The internal trip capture is estimated using the MXD+ trip generation model, whose outputs are provided in **Appendix A**. The MXD+ trip generation model forecasts the following amount of project trips would remain internal to the project site: 3.2 percent of daily trips, 7.2 percent of AM peak hour trips, and 11.2 percent of PM peak hour trips.

Trip Generation Comparison

Table 7 presents the vehicle trip generation estimate for the proposed commercial uses (from **Table 3**) and compares it to the vehicle trip generation estimate calculated in the final TIS.

Table 7: Trip Generation Comparison – Final TIS vs. Updated Commercial Site Plan

Time Period	Direction	Total Gross Trip Generation[1]			Net New External Project Trips[2]		
		Final TIS	TIS Addendum	Difference[3]	Final TIS	TIS Addendum	Difference[3]
Daily	Total	9,639	10,633	994	5,630	5,843	213
AM Peak Hour	Total	930	805	-125	468	433	-35
	In	452	396	-56	221	210	-11
	Out	478	409	-69	247	223	-24
PM Peak Hour	Total	880	909	29	482	443	-39
	In	451	480	29	252	247	-5
	Out	429	429	0	230	196	-34

Notes:

1. Gross trip generation = total trips to/from the project site.
2. Net new external trips = Gross trip generation – pass-by trips – internal trip capture. Reflects the number of new trips added to the transportation network by the proposed project.
3. Difference between the trip generation analyzed in the Final TIS and the updated trip generation estimate for the TIS Addendum (see Table 3). A positive value indicates the updated commercial land uses/site plan generate more trips than analyzed in the Final TIS, while a negative value indicates the updated commercial land uses/site plan generate fewer trips.

Source: Fehr & Peers, 2022.

As shown in **Table 7**, the proposed change to commercial land uses results in approximately 13 percent fewer gross vehicle trips during the AM peak hour and approximately three percent more gross vehicle trips during the PM peak hour. However, the net new external trips would be approximately eight percent less with the proposed change to commercial uses during both the AM and PM peak hours.

The decrease in net external trips indicates that the updated commercial land uses/site plan would generally be less impactful to traffic operations than the land uses/site plan analyzed in the Final TIS. Specifically, the updated commercial land uses would result in fewer project trips added to the roadway network. At the University Avenue/Atherton Road / Sunset Boulevard intersection, the changes to the commercial driveways may cause some shifts in where vehicles access the project site, causing some turn movements to be higher and others to be lower than analyzed in the Final TIS. Therefore, this addendum analyzes the PM peak hour traffic operations (i.e., LOS) at this intersection. However, the decrease in net external trips would result in fewer trips traveling through the Sunset Boulevard / West Stanford Ranch Road/Lonetree Boulevard study intersection. Therefore, this addendum does not conduct additional LOS analysis at the Sunset Boulevard/ West Stanford Ranch Road/Lonetree Boulevard intersection.

Current General Plan Land Use Trip Generation

The City of Rocklin and project applicant also requested a trip generation comparison of the proposed project to the current General Plan land use designation. Therefore, this addendum evaluates the

estimated trip generation if the entire 30-acre project site develops as a commercial retail center, as assumed in the Northwest Rocklin Area General Development Plan and the City of Rocklin travel forecasting model.

The Northwest Rocklin Area General Development Plan and the City of Rocklin travel forecasting model assume the 30-acre parcel would develop with 328,000 square feet of commercial retail. This evaluation uses the City of Rocklin travel forecasting model trip generation outputs to represent this amount of development. **Table 8** presents the City's travel forecasting model trip generation for the General Plan land use designation.

Table 8: Current General Plan Land Use Designation – City Travel Model Vehicle Trip Generation

Land Use	Units	City Travel Model Vehicle Trip Generation[1]						
		Daily	AM Peak Hour			PM Peak Hour		
		Total	Total	In	Out	Total	In	Out
Commercial Retail	328 KSF	11,480	440	312	128	790	308	482

Notes:
KSF = thousand square feet
1. Based on trip generation outputs from the City of Rocklin travel forecasting model.
Source: Fehr & Peers, 2022.

Table 9 compares the trip generation of the proposed Estia at Rocklin project, as presented in **Table 3**, to the City's travel forecasting model trip generation estimate for the General Plan land use designation.

Table 9: Vehicle Trip Generation Comparison – Estia at Rocklin vs. Current Land Use Designation

Scenario	Vehicle Trip Generation						
	Daily	AM Peak Hour			PM Peak Hour		
	Total	Total	In	Out	Total	In	Out
Proposed Estia at Rocklin Project[1]	5,843	433	210	223	443	247	196
Current Land Use Designation[2]	11,480	440	312	128	790	308	482
Difference[3]	-5,637	-7	-102	+95	-347	-61	-286

Notes:

KSF = thousand square feet

1. Net new external trip generation estimate for proposed Estia at Rocklin project, as presented in Table 3.
2. Vehicle generation estimate for current land use designation based on trip generation outputs from the City of Rocklin travel forecasting model, as presented in Table 8.
3. Difference between the proposed Estia at Rocklin project and the current General Plan land use designation. A negative value indicates the Estia at Rocklin project generates fewer trips than the General Plan land use designation.

Source: Fehr & Peers, 2022.

As shown in **Table 9**, the proposed Estia at Rocklin project generates about half as many daily trips compared to if the 30-acre site developed as a 328,000 square foot commercial center. The Estia at Rocklin project also generates slightly fewer AM peak hour trips and about 44 percent fewer PM peak hour trips.

Since the Estia at Rocklin project is forecasted to generate 44 percent fewer PM peak hour trips than the current General Plan land use designation, the Sunset Boulevard / University Avenue/Atherton Road intersection would experience less delay with the proposed Estia at Rocklin project when compared to the current General Plan land use designation during the PM peak hour.

The Final TIS for the Estia at Rocklin project forecasted that this intersection would operate at LOS D during the PM peak hour under cumulative plus project conditions with the Estia at Rocklin project. Therefore, it would also operate at LOS D (or worse) if the site develops according to its current land use designation, as assumed in the City's travel forecasting model. Since the City's travel forecasting model assumes almost double the number of trips generated by the site during the PM peak hour, the Sunset Boulevard / University Avenue/Atherton Road intersection would almost certainly operate at LOS D (or worse) during the PM peak hour under cumulative conditions if the site develops according to its current land use designation, as assumed in the City's travel forecasting model.

III. University Avenue Corridor Analysis

The Final TIS notes that University Avenue features both horizontal and vertical curvature along the project frontage. Based on sight distance exhibits prepared by the project applicant's civil engineer, King Engineering, the Final TIS noted a few potential sight line conflicts, particularly at the southern William Jessup University driveway and center William Jessup University driveway. To address these sight distance limitations, the City of Rocklin, William Jessup University, and the project applicant requested an analysis of the following access control changes:

- Construct a multi-lane roundabout at the southern William Jessup University driveway
- Install a traffic signal at the center William Jessup University driveway

With these changes to the University Avenue corridor, the project applicant adjusted the commercial site plan to align access with the proposed roundabout.

The City of Rocklin requested an analysis of these proposed improvements to confirm the roundabout and traffic signal would operate effectively (i.e., not result in vehicle queues that extend through the roundabout from Sunset Boulevard and along the William Jessup University frontage). Given the close spacing of these intersections and their proximity to the traffic signal at University Avenue / Sunset Boulevard, Fehr & Peers employed a Vissim microsimulation analysis model to evaluate queues and traffic flow on University Avenue north of Sunset Boulevard through these two intersections.

The lane configurations on University Avenue match those assumed in the Final TIS. This includes two northbound and two southbound lanes along the project frontage per the City's adopted Circulation Element, and planned widening at the University Avenue/Atherton Road / Sunset Boulevard intersection originally outlined in the *Final Transportation Impact Analysis for the Northwest Rocklin Area General Development Plan* (Fehr & Peers, 2016).

Concurrent with this analysis, the City of Rocklin and project applicant indicated the right-in/right-out driveway on Sunset Boulevard may not be allowed, and requested an analysis of conditions both with and without the driveway on Sunset Boulevard. The project applicant indicated that removing the driveway on Sunset Boulevard would not change the proposed commercial uses. However, the proposed gas station would swap locations with the proposed Shops 2 building, as noted in the introduction. The following analysis considers scenarios with and without the driveway on Sunset Boulevard accordingly.

This analysis focuses on the following three locations along the University Avenue corridor:

1. William Jessup Center Driveway/Project Driveway 2 / University Avenue (proposed traffic signal)
2. William Jessup South Driveway/Project Driveway 3 / University Avenue (proposed roundabout)
3. Sunset Boulevard / University Avenue/Atherton Road

The traffic analysis results in the Final TIS indicate that the study intersections would operate acceptably (i.e., LOS C or better) under existing, existing plus project, and existing plus approved projects conditions.

Under cumulative conditions, traffic operations are forecasted to degrade to LOS D or worse during the PM peak hour. Therefore, to model buildout conditions in the area, this study analyzes cumulative plus project traffic conditions during the weekday PM peak hour, which is the most impacted time period.

Cumulative Plus Project PM Peak Hour Traffic Forecasts

The project's net new external PM peak hour trips are assigned to the project driveways and adjacent roadway network according to the updated trip generation estimate presented in **Table 3** and PM peak hour project trip distribution shown in **Figure 2**. This trip distribution is consistent with the cumulative project trip distribution used in the Final TIS.

The project trips are added to the cumulative no project forecasts from the Final TIS to develop cumulative plus project PM peak hour turning movement forecasts. **Figure 3** shows the cumulative plus project PM peak hour turning movement forecasts assuming a single driveway on Sunset Boulevard. **Figure 4** shows the cumulative plus project PM peak hour turning movement forecasts with no driveway on Sunset Boulevard.

Pass-by trips are assigned to project driveways based on the cumulative no project traffic forecasts from the Final TIS and travel routes on Sunset Boulevard and University Avenue. The forecasts in **Figure 3** and **Figure 4** consider the presence (or absence) of the driveway on Sunset Boulevard accordingly.

Methodology

This study analyzes traffic operations (i.e., LOS) according to the *Highway Capacity Manual*, 6th Edition (HCM). The HCM methodology determines LOS by the average control delay per vehicle experienced by all motorists travelling through the intersection. **Table 10** presents the average control delay thresholds for each LOS grade for unsignalized (i.e., stop-controlled or roundabout) and signalized intersections.

Table 10: Level of Service Thresholds – Signalized & Unsignalized Intersections

Level of Service	Average Control Delay[1]	
	Unsignalized Intersections[2]	Signalized Intersections
A	≤ 10	≤ 10
B	>10 to 15	>10 to 20
C	>15 to 25	>20 to 35
D	>25 to 35	>35 to 55
E	>35 to 50	>55 to 80
F	>50	>80

Notes:

1. Average control delay presented in seconds per vehicle.
2. Unsignalized intersections include roundabouts and intersections with all-way or side-street stop control.

Source: *Highway Capacity Manual, 6th Edition*, Transportation Research Board, 2016.

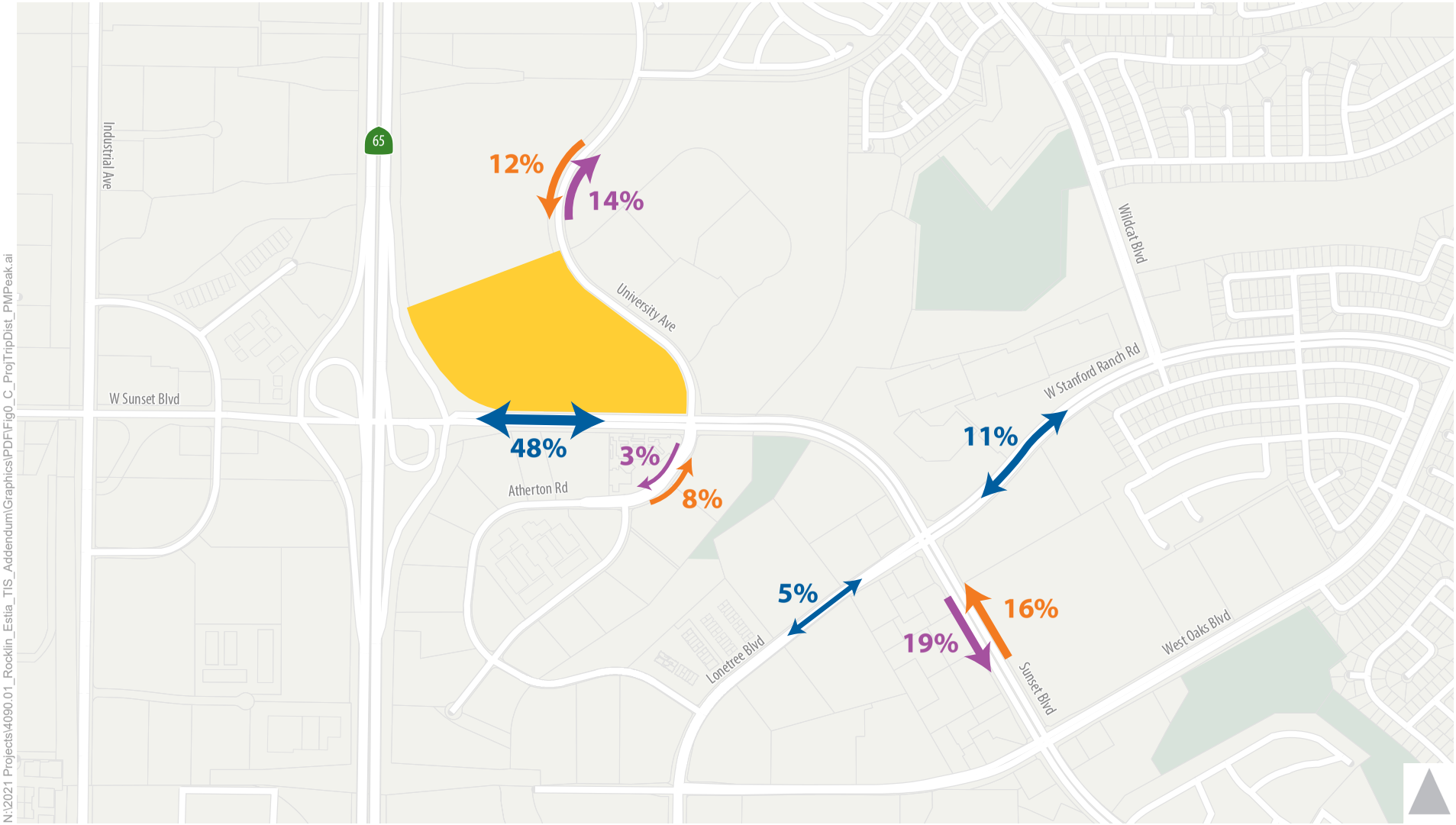
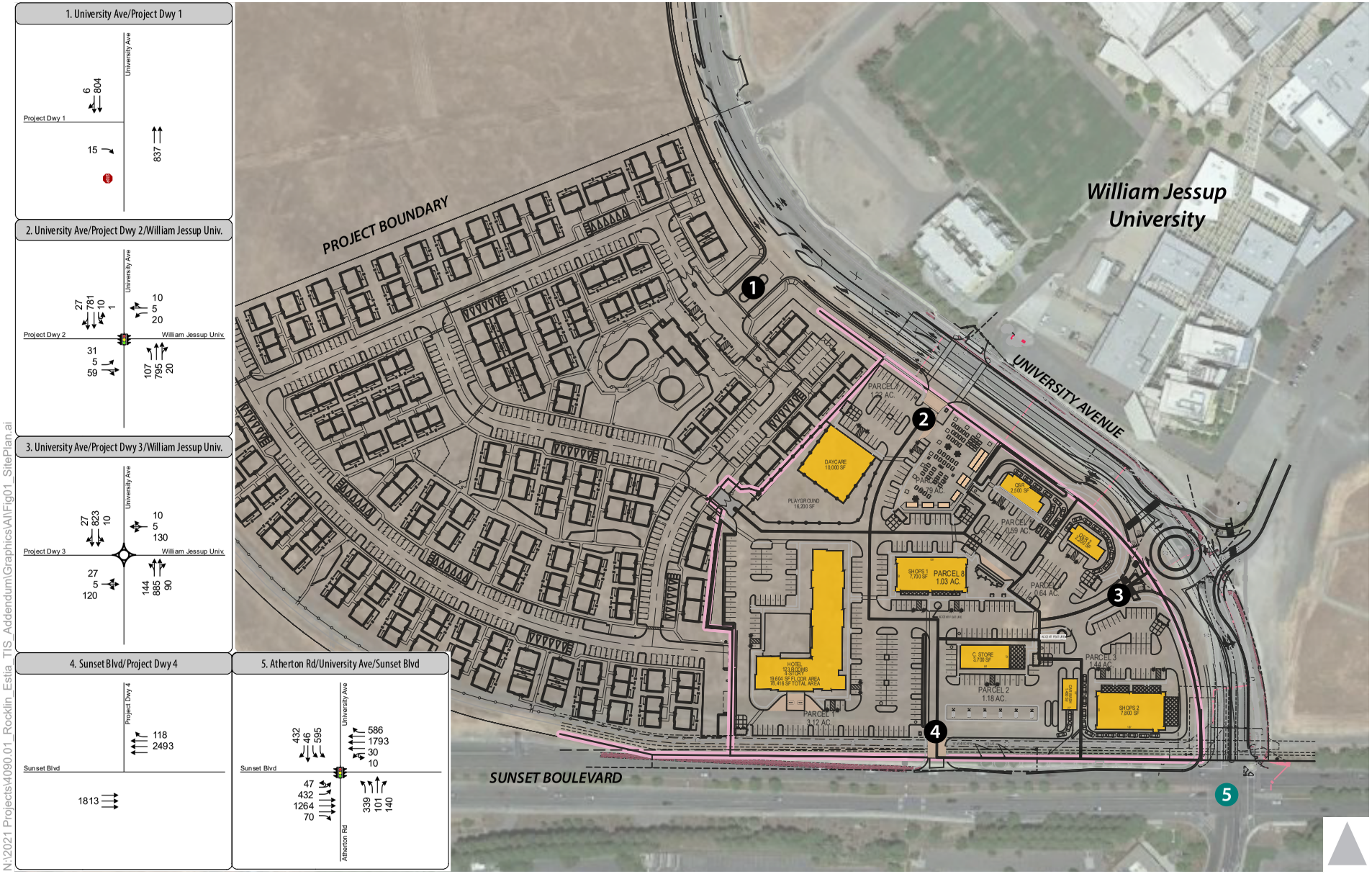


Figure 2

Cumulative Project Trip Distribution - PM Peak Hour



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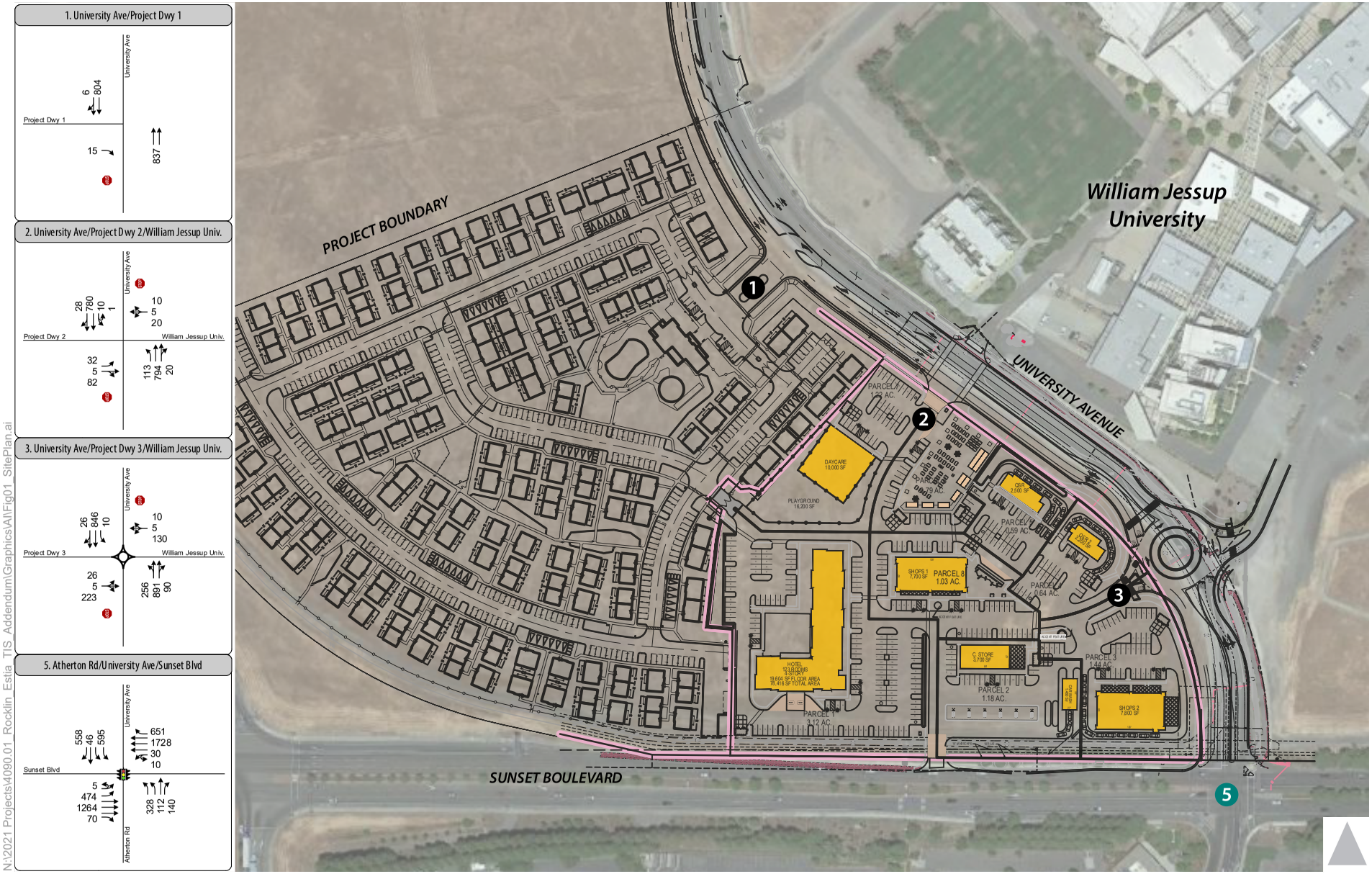
1 Project Driveway
5 Study Intersection
Traffic Signal
STOP Stop Sign
Turn Lane
PM Peak Hour Traffic Volume
U-Turn
Roundabout

Figure 3

PM Peak Hour Traffic Volumes & Lane Configurations - Cumulative Plus Project Conditions - With Driveway on Sunset Blvd.



1 Project Driveway
5 Study Intersection
Traffic Signal
STOP Stop Sign
Turn Lane
PM Peak Hour Traffic Volume
U-Turn
Roundabout

Figure 4

PM Peak Hour Traffic Volumes & Lane Configurations - Cumulative Plus Project Conditions - No Driveway on Sunset Blvd.

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Traffic flow through the roundabout will be influenced by platooning created by the proposed new traffic signal at the William Jessup University center driveway and the existing signal at Sunset Boulevard. Since deterministic tools may not account for these platooning effects, this study uses an advanced traffic microsimulation software (Vissim) to model traffic flow through the roundabout and new proposed traffic signal. The Vissim microsimulation model accounts for interactions between intersections, vehicle platooning, queue spillback, and upstream/downstream bottlenecks, and provides more accurate estimates of vehicular queueing and delay when compared to deterministic methods. **Figure 5** below presents a screenshot of the Vissim microsimulation model.

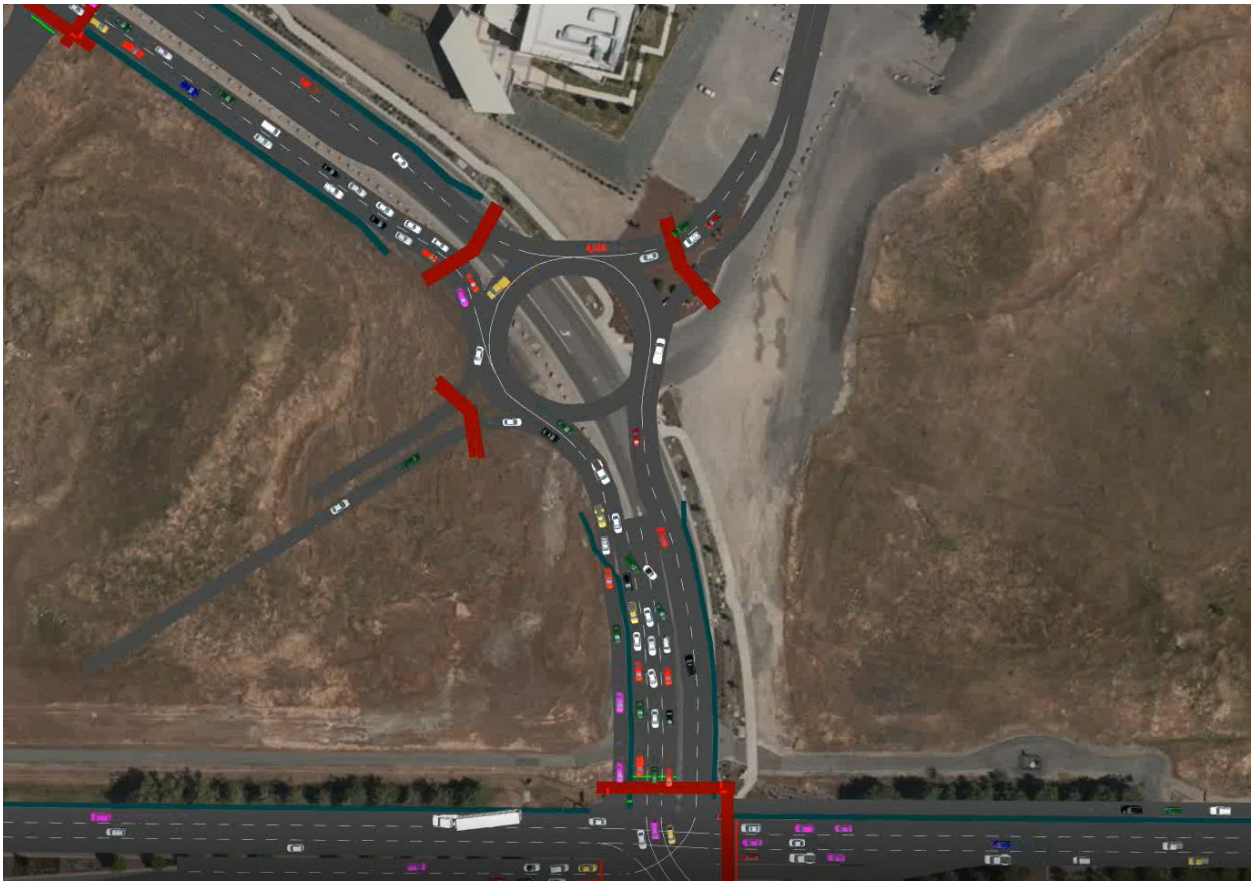

Figure 5: Vissim microsimulation model of the University Ave. corridor north of Sunset Blvd.

For consistency with the Final TIS, this study uses the Synchro 11 software to calculate LOS at the University Avenue / Sunset Boulevard intersection. The Synchro 11 software applies the methodologies presented in the HCM 6th Edition. The Synchro 11 software considers peak hour traffic volumes, lane configurations, signal timings, signal coordination, and other pertinent parameters of intersection operations.

Analysis Results

As noted above, this study analyzes conditions both with and without a project driveway on Sunset Boulevard.

Table 11 presents the cumulative plus project PM peak hour traffic operations analysis results for the analysis locations along the University Avenue corridor, both with and without a project driveway on Sunset Boulevard. Refer to **Appendix B** for technical calculations.

Table 11: Intersection Operations – Cumulative Plus Project PM Peak Hour

Intersection	Traffic Control	With Driveway on Sunset Blvd.		Without Driveway on Sunset Blvd.	
		Delay[1]	LOS[2]	Delay[1]	LOS[2]
1. Project Driveway 2/William Jessup Center Driveway / University Ave.	Signal	**122**	**F**	**122**	**F**
2. Project Driveway 3/William Jessup South Driveway / University Ave.	Roundabout	**72**	**F**	**70**	**F**
3. Sunset Blvd. / University Ave./Atherton Rd.	Signal	**48**	**D**	**59**	**E**

Notes:
Results for locations 1 and 2 represent the average outputs of ten Vissim microsimulation model runs. Results for location 3 based on outputs from the Synchro 11 software, which calculates delay and LOS based on the HCM 6th Edition methodology.
BOLD indicates LOS D or worse operations (i.e., unacceptable LOS).
1. Average control delay (rounded to nearest second) is the weighted average for all movements.
2. LOS = level of service, determined according to the HCM 6th Edition methodology (see Table 10).
Source: Fehr & Peers, 2022.

Table 12 presents the maximum vehicle queues forecasted at the proposed roundabout and Sunset Boulevard / University Avenue/Atherton Road intersection during the cumulative plus project PM peak hour. The maximum vehicle queue forecasts are based on outputs from the Vissim microsimulation model. Refer to **Appendix B** for technical calculations.

Table 12: Maximum Vehicle Queues – Cumulative Plus Project PM Peak Hour

Intersection	Approach/Movement	Storage[1]	Maximum Vehicle Queue	
			With Driveway on Sunset Blvd.	Without Driveway on Sunset Blvd.
2. Project Driveway 3/William Jessup South Driveway / University Ave.	Northbound	325 ft.	**425 ft.**	**575 ft.**
	Southbound	400 ft.	**875 ft.**	**900 ft.**
	Eastbound	125 ft.	**175 ft.**	**300 ft.**
	Westbound	300 ft.	**425 ft.**	**400 ft.**

Table 12: Maximum Vehicle Queues – Cumulative Plus Project PM Peak Hour

Intersection	Approach/Movement	Storage[1]	Maximum Vehicle Queue	
			With Driveway on Sunset Blvd.	Without Driveway on Sunset Blvd.
3. Sunset Blvd. / University Ave./ Atherton Rd.	Northbound Left-Turn	150 ft.	**625 ft.**	**600 ft.**
	Northbound Through	725 ft.	350 ft.	325 ft.
	Northbound Right-Turn	110 ft.	**450 ft.**	**375 ft.**
	Southbound Left-Turn	175 ft.	**550 ft.**	**575 ft.**
	Southbound Through	300 ft.	75 ft.	75 ft.
	Southbound Right-Turn	325 ft.	**350 ft.**	**375 ft.**
	Eastbound Left-Turn	350 ft.	325 ft.	300 ft.
	Eastbound Through	1,600 ft.	325 ft.	325 ft.
	Eastbound Right-Turn	425 ft.	25 ft.	25 ft.
	Westbound Left-Turn	150 ft.	100 ft.	100 ft.
	Westbound Through	1,900 ft.	1,275 ft.	1,750 ft.
	Westbound Right-Turn	425 ft.	**750 ft.**	**1,275 ft.**

Notes:

Storage and maximum vehicle queue lengths provided in feet. Maximum vehicle queue based on outputs from the Vissim microsimulation model. Maximum queue value is rounded up to nearest 25 feet based on typical spacing of queued vehicles.

BOLD indicates maximum vehicle queue exceeds available storage.

1. Storage estimated based on roadway drawings provided by the project applicant.

Source: Fehr & Peers, 2022.

The over 500-foot vehicle queue for the southbound left-turn movement at Sunset Boulevard / University Avenue/ Atherton Road and over 800-foot vehicle queue for the southbound approach at the proposed roundabout indicate the vehicle queue on southbound University Avenue would extend back from Sunset Boulevard through the proposed roundabout and beyond the proposed signal at the center driveway.

These results reflect the planned cumulative lane configurations at Sunset Boulevard / University Avenue/ Atherton Road that are also analyzed in the Final TIS for the Estia at Rocklin project. As shown in **Table 11**, these cumulative lane configurations result in unacceptable operations (i.e., LOS D or worse). Furthermore, the results in **Table 12** and a review of the Vissim microsimulation model show southbound vehicles queues on University Avenue would regularly extend back through the roundabout and beyond the proposed signal during the PM peak hour. This would cause operational breakdowns in the roundabout and along the University Avenue corridor.

Potential Improvement Options

To address the unacceptable traffic operations and vehicle queues that are forecast to occur during the PM peak hour under cumulative conditions, this analysis evaluates a couple options to improve traffic flow along the University Avenue corridor. This includes the following improvements to the Sunset Boulevard / University Avenue/Atherton Road intersection:

Option A:

- Convert the planned southbound through lane to a shared left/through lane, resulting in three lanes for southbound left turns (two dedicated left-turn pockets and the shared left/through lane). Operate the signal with split phasing for northbound and southbound, which is how the signal operates today.
- Add a right-turn overlap phase for westbound right-turns. This requires prohibiting southbound U-turn movements. However, demand for southbound U-turns should be very low since no driveways are located between Sunset Boulevard and the William Jessup south driveway/Project Driveway 3.
- Add a right-turn overlap phase for southbound right-turns for the "No Driveway on Sunset Boulevard" condition only. This would require prohibiting eastbound U-turn movements. Without a project driveway on Sunset Boulevard, the eastbound U-turn demand should be very low since there would be no driveways located between University Avenue and SR 65 on Sunset Boulevard. However, for the "With Driveway on Sunset Boulevard," a southbound right-turn overlap is not advisable due to conflicting eastbound U-turn demand.

The third lane for southbound left-turn movements would provide more storage capacity (i.e., queueing space), which reduces the maximum queue on the southbound left-turn movement. The right-turn overlap phase(s) would reduce both queues and delays for the associated right-turn movements.

Option B

- Convert the planned southbound through lane to a shared left/through lane. See Option A for further details.
- Add a right-turn overlap phase for westbound right-turns. This requires prohibiting southbound U-turn movements. See Option A for further details.
- Modify the southbound approach to provide a channelized southbound free right turn. Provide a corresponding westbound receiving/acceleration lane on Sunset Boulevard.

Similar to Option A, the third lane for southbound left-turn movements would provide additional storage capacity, while the free southbound right-turn would reduce the delay and the vehicle queue for the southbound right-turn.

Option A and B Analysis Results

Table 13 presents the traffic operations analysis results for Options A and B with a project driveway on Sunset Boulevard. Refer to **Appendix C** for technical calculations.

Table 13: Intersection Operations – Cumulative Plus Project PM Peak Hour with Improvements – With Project Driveway on Sunset Boulevard

Intersection	Traffic Control	Before Improvements		Option A Improvements		Option B Improvements	
		Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1. Project Driveway 2/William Jessup Center Driveway / University Ave.	Signal	**121**	**F**	20	B	19	B
2. Project Driveway 3/William Jessup South Driveway / University Ave.	Roundabout	**71**	**F**	21	C	16	C
3. Sunset Blvd. / University Ave./Atherton Rd.	Signal	**48**	**D**	**46**	**D**	**38**	**D**

Notes:
Results for locations 1 and 2 represent the average outputs of ten Vissim microsimulation model runs. Results for location 3 based on outputs from the Synchro 11 software, which calculates delay and LOS based on the HCM 6th Edition methodology.
BOLD indicates LOS D or worse operations (i.e., unacceptable LOS).
1. Average control delay (rounded to nearest second) is the weighted average for all movements.
2. LOS = level of service, determined according to the HCM 6th Edition methodology (see Table 10).
Source: Fehr & Peers, 2022.

The results presented in **Table 13** show that the proposed signal and roundabout at the project driveways would operate at an acceptable LOS C or better with either Option A or Option B improvements. This is due to southbound vehicle queues approaching Sunset Boulevard being substantially reduced in length and frequency. This reduces the impact of vehicles queueing back from the Sunset Boulevard intersection on southbound University Avenue, which encumbers operations at the proposed roundabout and signal under the cumulative plus project base condition. However, the Sunset Boulevard / University Avenue/ Atherton Road intersection would continue to operate at LOS D due to the heavy westbound demand on Sunset Boulevard.

Table 14 presents the traffic operations analysis results for Options A and B without a project driveway on Sunset Boulevard. Refer to **Appendix C** for technical calculations.

Table 14: Intersection Operations – Cumulative Plus Project PM Peak Hour with Improvements – Without Project Driveway on Sunset Boulevard

Intersection	Traffic Control	Before Improvements		Option A Improvements		Option B Improvements	
		Delay[1]	LOS[2]	Delay[1]	LOS[2]	Delay[1]	LOS[2]
1. Project Driveway 2/William Jessup Center Driveway / University Ave.	Signal	**122**	**F**	**53**	**D**	24	C
2. Project Driveway 3/William Jessup South Driveway / University Ave.	Roundabout	**70**	**F**	**48**	**E**	25	C
3. Sunset Blvd. / University Ave./Atherton Rd.	Signal	**59**	**E**	**46**	**D**	**38**	**D**

Notes:

Results for locations 1 and 2 represent the average outputs of ten Vissim microsimulation model runs. Results for location 3 based on outputs from the Synchro 11 software, which calculates delay and LOS based on the HCM 6th Edition methodology.

BOLD indicates LOS D or worse operations (i.e., unacceptable LOS).

1. Average control delay (rounded to nearest second) is the weighted average for all movements.
2. LOS = level of service, determined according to the HCM 6th Edition methodology (see Table 10).

Source: Fehr & Peers, 2022.

The results presented in **Table 14** show that the proposed signal and roundabout at the project driveways would improve traffic flow on University Avenue. The intersections at the project driveways would continue to operate at an unacceptable LOS D or worse with Option A improvements but would improve to an acceptable LOS C with Option B improvements.

Without the project driveway on Sunset Boulevard, project trips would shift from the Sunset Boulevard driveway to Project Driveway 3 (i.e., the roundabout). This results in higher traffic demand on southbound University Avenue approaching Sunset Boulevard, which explains the higher delay and worse LOS for this scenario when compared to the "with Project Driveway on Sunset Boulevard" condition presented in **Table 13**. The additional demand on southbound University Avenue approaching Sunset Boulevard results in longer queues and delays, which affects operations at the proposed roundabout and signal. However, the southbound free-right turn (i.e., Option B) reduces delay and vehicle queues on southbound University Avenue, which improves traffic flow along the whole corridor.

The results in **Table 14** continue to show that the Sunset Boulevard / University Avenue/ Atherton Road intersection would continue to operate at LOS D. Like the "With Project Driveway on Sunset Boulevard" condition, this is due to the heavy westbound demand on Sunset Boulevard.

This analysis reviewed potential additional capacity enhancement options to address the LOS D operations at the Sunset Boulevard / University Avenue/ Atherton Road intersection. This review

determined that only a fourth westbound through lane on Sunset Boulevard would improve traffic operations to LOS C. However, a fourth westbound through lane is not likely feasible given the right-of-way constraints and utility easements along Sunset Boulevard.

Table 15 presents the maximum vehicle queues forecasted at the proposed roundabout and Sunset Boulevard / University Avenue/Atherton Road intersection for Options A and B with a project driveway on Sunset Boulevard. Refer to **Appendix C** for technical calculations.

Table 15: Maximum Vehicle Queues – Cumulative Plus Project PM Peak Hour with Improvements – With Project Driveway on Sunset Boulevard

Intersection	Approach/Movement	Storage[1]	Maximum Vehicle Queue		
			Before Improvements	Option A Improvements	Option B Improvements
2. Project Driveway 3/ William Jessup South Driveway / University Ave.	Northbound	325 ft.	**425 ft.**	200 ft.	225 ft.
	Southbound	400 ft.	**875 ft.**	**450 ft.**	400 ft.
	Eastbound	125 ft.	**175 ft.**	100 ft.	75 ft.
	Westbound	300 ft.	**425 ft.**	200 ft.	200 ft.
3. Sunset Blvd. / University Ave./ Atherton Rd.	Northbound Left-Turn	150 ft.	**625 ft.**	**475 ft.**	**500 ft.**
	Northbound Through	725 ft.	350 ft.	175 ft.	175 ft.
	Northbound Right-Turn	110 ft.	**450 ft.**	**250 ft.**	**250 ft.**
	Southbound Left-Turn	175 ft.	**550 ft.**	**475 ft.**	**475 ft.**
	Southbound Through	300 ft.	75 ft.		
	Southbound Right-Turn	325 ft.	**350 ft.**	300 ft.	300 ft.
	Eastbound Left-Turn	350 ft.	325 ft.	325 ft.	325 ft.
	Eastbound Through	1,600 ft.	325 ft.	350 ft.	375 ft.
	Eastbound Right-Turn	425 ft.	25 ft.	25 ft.	25 ft.
	Westbound Left-Turn	150 ft.	100 ft.	75 ft.	75 ft.
	Westbound Through	1,900 ft.	1,275 ft.	1,775 ft.	1,750 ft.
	Westbound Right-Turn	425 ft.	**750 ft.**	**1,225 ft.**	**1,200 ft.**

Notes:

Storage and maximum vehicle queue lengths provided in feet. Maximum vehicle queue based on outputs from the Vissim microsimulation model. Maximum queue value is rounded up to nearest 25 feet based on typical spacing of queued vehicles.

BOLD indicates maximum vehicle queue exceeds available storage.

1. Storage estimated based on roadway drawings provided by the project applicant.

Source: Fehr & Peers, 2022.

The maximum vehicle queues are reduced with Option A or Option B improvements. Although **Table 15** shows the maximum queues on southbound University Avenue would continue to extend back to the proposed roundabout, the review of the Vissim microsimulation model shows that these maximum queue events occur infrequently, typically during the peak 15-minute interval, and dissipate quickly without greatly impacting traffic flow along the corridor, as demonstrated by the LOS C or better results presented in **Table 13**.

Table 16 presents the maximum vehicle queues forecasted at the proposed roundabout and Sunset Boulevard / University Avenue/Atherton Road intersection for Options A and B without a project driveway on Sunset Boulevard. Refer to **Appendix C** for technical calculations.

Table 16: Maximum Vehicle Queues – Cumulative Plus Project PM Peak Hour with Improvements – Without Project Driveway on Sunset Boulevard

Intersection	Approach/Movement	Storage[1]	Maximum Vehicle Queue		
			Before Improvements	Option A Improvements	Option B Improvements
2. Project Driveway 3/ William Jessup South Driveway / University Ave.	Northbound	325 ft.	**575 ft.**	**400 ft.**	250 ft.
	Southbound	400 ft.	**900 ft.**	**700 ft.**	**475 ft.**
	Eastbound	125 ft.	**300 ft.**	**225 ft.**	**150 ft.**
	Westbound	300 ft.	**400 ft.**	**325 ft.**	225 ft.
3. Sunset Blvd. / University Ave./ Atherton Rd.	Northbound Left-Turn	150 ft.	**600 ft.**	**475 ft.**	**500 ft.**
	Northbound Through	725 ft.	325 ft.	200 ft.	175 ft.
	Northbound Right-Turn	110 ft.	**375 ft.**	**275 ft.**	**250 ft.**
	Southbound Left-Turn	175 ft.	**575 ft.**	**500 ft.**	**450 ft.**
	Southbound Through	300 ft.	75 ft.		
	Southbound Right-Turn	325 ft.	**375 ft.**	**350 ft.**	275 ft.
	Eastbound Left-Turn	350 ft.	300 ft.	325 ft.	325 ft.
	Eastbound Through	1,600 ft.	325 ft.	350 ft.	350 ft.
	Eastbound Right-Turn	425 ft.	25 ft.	25 ft.	25 ft.
	Westbound Left-Turn	150 ft.	100 ft.	100 ft.	75 ft.
	Westbound Through	1,900 ft.	1,750 ft.	1,450 ft.	1,325 ft.
	Westbound Right-Turn	425 ft.	**1,275 ft.**	**900 ft.**	**800 ft.**

Notes:

Storage and maximum vehicle queue lengths provided in feet. Maximum vehicle queue based on outputs from the Vissim microsimulation model. Maximum queue value is rounded up to nearest 25 feet based on typical spacing of queued vehicles.

BOLD indicates maximum vehicle queue exceeds available storage.

1. Storage estimated based on roadway drawings provided by the project applicant.

Source: Fehr & Peers, 2022.

Similar to the "With Project Driveway on Sunset Boulevard" scenario, the maximum vehicle queues are reduced with Option A or Option B improvements. Consistent with the results in **Table 14**, Option A is less effective at reducing vehicle queues and overall congestion in the study area, with the maximum vehicle queues under Option A being generally longer than Option B. Although **Table 16** shows the maximum queues on southbound University Avenue would continue to extend back to the proposed roundabout, the review of the Vissim microsimulation model shows that these maximum queue events occur less frequently (generally during the peak 15-minute interval). Under Option A, the southbound vehicle queue occasionally extends back through the roundabout and beyond the signal, and may take a signal cycle or two to begin to dissipate. Under Option B, the maximum vehicle queue occurs more infrequently and generally dissipates quickly without greatly impacting traffic flow along the corridor. This is reflected in the LOS results presented in **Table 14**.

IV. Summary

This study determined that the proposed commercial land uses in the updated commercial site plan would result in eight percent fewer net external vehicle trips during the AM and PM peak hour than what was analyzed in the Final TIS for the Estia at Rocklin project. Therefore, the traffic analysis in the Final TIS adequately addresses the potential traffic impacts of the updated commercial site plan at the study intersections.

The Estia at Rocklin mixed-use project would also generate 44 percent fewer PM peak hour trips than the current General Plan land use designation. This indicates that the Estia at Rocklin project would result in lower traffic levels (i.e., less delay, better LOS) than if the site developed according to its current land use designation.

The proposed roundabout at the southern William Jessup University driveway and signal at the center William Jessup University driveway would operate at an acceptable LOS C or better with adjustments to the lane configurations and signal operations at the Sunset Boulevard / University Avenue/Atherton Road intersection. These adjustments include converting the planned southbound through lane to a shared left/through lane, modifying the southbound right-turn to a channelized free right-turn movement, and adding a right-turn overlap phase for westbound right-turns. However, absent these adjustments, vehicle queues on southbound University Avenue would stack back through the proposed roundabout and signal, resulting in unacceptable LOS F conditions along the corridor during the PM peak hour under cumulative conditions.