FEHR PEERS

FINAL TECHNICAL MEMORANDUM

Date: August 25, 2022

To: Jack Varozza, PE, City of Roseville

From: John Gard, PE, RSP1, Fehr & Peers

Subject: ***Access Evaluation for Ivy at Campus Oaks Senior Living Center***

RS22-4215

This memorandum presents the data collection, analysis, and recommendations for an access evaluation of the Ivy at Campus Oaks Senior Living Center project, which would be situated in the northeast quadrant of the Roseville Parkway/Painted Desert Drive intersection in the City of Roseville. This memorandum is organized into the following sections:

I. Background
II. Project Site Plan and Proposed Access
III. Existing Conditions
IV. Project Travel Characteristics
V. Project Access Review
VI. Recommendations

I. Background

In 2018, Fehr & Peers completed an access study for Campus Oaks Town Center (COTC), which is bounded by Blue Oaks Boulevard on the north, Woodcreek Oaks Boulevard on the west, Painted Desert Drive on the south, and Roseville Parkway on the east (including four vacant lots situated directly to the east).

The site plan analyzed for the COTC study included a 51,000 square-foot assisted living facility in the northeast quadrant of the Roseville Parkway/Painted Desert Drive intersection. Notably, the site plan showed a single driveway on the east side of Roseville Parkway located 300 feet south of Blue Oaks Boulevard. The recommendations from the *Campus Oaks Town Center Access Study Technical Memo* (Fehr & Peers, July 2018) are shown in **Image 1**. The memo contained the following footnote regarding the South COTC Driveway on Roseville Parkway (i.e., Driveway 5 in image):

> The provision of full access at this driveway was evaluated in light of prior analyses by Fehr & Peers showing that this segment of Roseville Parkway could ultimately carry over 25,000 vehicles per day. However, the following factors were critical in reaching a determination that full-access could be provided:
> - Gaps in through traffic would be provided by the roundabout at Painted Desert Drive and traffic signal on Blue Oaks Boulevard.
> - The full-access driveway would form a T-intersection (i.e., not have an opposing driveway).
> - Treatments (i.e., dedicated left- and right-turn lanes and two-way left-turn lane on Roseville Parkway) have been recommended to improve ingress/egress at this driveway.

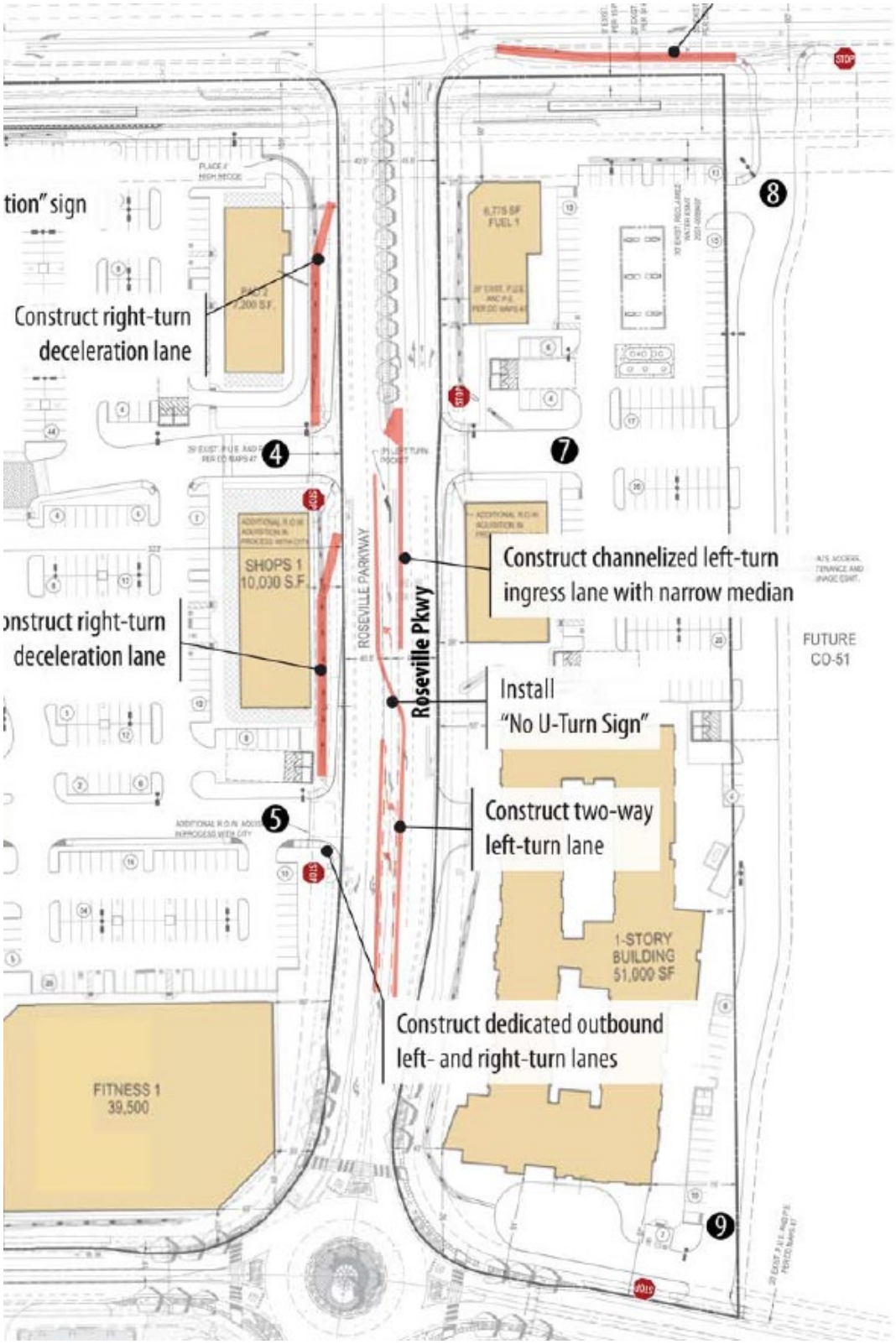


Image 1: Recommendations along Roseville Parkway from 2018 study

II. Project Site Plan and Proposed Access

According to the project site plan (*IVY @ Campus Oaks Town Center – Lot 15*, Morton & Pitalo, June 2022), the site would consist of a 98,082 square foot senior living center featuring 57 parking spaces. Refer to **Figure 1** for project site plan.

Figure 1 shows approved, planned, and proposed land uses and their vehicular access points for the parcels east of Roseville Parkway. Approved or proposed uses include:

1. Approved 7-Eleven Convenience Store (4,872 sq. ft.) and Gas Station (with 16 fueling positions) in the southeast quadrant of the Blue Oaks Boulevard/Roseville Parkway intersection
2. Proposed Ivy at Campus Oaks Senior Living Center
3. Future 6,500 square foot retail pad located between the 7-Eleven Store and Ivy at Campus Oaks Senior Living Center.
4. 15-acre Business Park on Parcel CO-51 situated directly east of the above three parcels.

Access would be provided by the following driveways (see Figure 1):

- Driveway 1 on Roseville Parkway – assumed (for analysis purposes) to permit all turning movements.
- Driveway 2 on Roseville Parkway – restricted to right-turns in and right-turns out only
- Driveway 3 on Blue Oaks Boulevard – restricted to right-turns in and right-turns out only
- Driveway 4 on Painted Desert Drive – all turning movements permitted

Driveway 1 would be situated directly opposite the full-access COTC south driveway. Although the site plan specifies placement of a right-turn only sign exiting Driveway 1, full access has been assumed in lieu of further preventative measures for analysis purposes. A 30-foot-wide access easement runs along the eastern edge of the property continuously between Blue Oaks Boulevard and Painted Desert Drive. This easement allows the Business Park property to utilize Driveways 1 – 4. Note that the Business Park would also be accessible from a new south leg at the Blue Oaks Boulevard/New Meadow Drive intersection and from a direct connection to Painted Desert Drive.

From the information provided in these two sections, a critical conclusion is drawn:

- Recommendations from the 2018 study for the COTC south driveway (situated opposite Driveway 1) were predicated on the assumption that an east leg to the intersection would not be present and that a TWLTL would be provided on Roseville Parkway to allow for two-stage gap acceptance for motorists turning left out of that driveway. The proposed project would alter at least one, but potentially both, of those conditions.

III. Existing Conditions

Figure 1 shows the current configuration of Roseville Parkway between Blue Oaks Boulevard and Painted Desert Drive. As shown, two northbound lanes and two southbound lanes are provided. The COTC south and north driveways on the west side of the street are constructed, with northbound left-turn pockets providing access to each. **Image 2** shows the view of Roseville Parkway looking north from Driveway 1.

Image 2: View of Roseville Parkway (looking north from Driveway 1 toward COTC north driveway)

The Roseville Parkway/Blue Oaks Boulevard intersection is controlled by a traffic signal, while the Roseville Parkway/Painted Desert Drive intersection features a roundabout.

Field observations indicate that many motorists turn out of the COTC north driveway and then immediately perform a u-turn within the above pictured northbound left-turn lane.[1]

[1] Observations revealed this movement can occur as often as four times per minute during peak periods.

IV. Project Travel Characteristics

Trip Generation

The trip generation of the 7-Eleven Convenience Store and Gas Station, Ivy Senior Living Center, 6,500 square foot retail pad, and Business Park on Parcel CO-51 was estimated using data from the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021). **Table 1** shows the estimated weekday PM peak hour trip generation. As shown, the four projects would generate approximately 550 PM peak hour trips, with 290 being pass-by[2].

TABLE 1
PM PEAK HOUR TRIP GENERATION

Land Use	ITE Code	Quantity	Trip Rate[1]			Trips		
			In	Out	Total	In	Out	Total
Convenience Market and Gas Station	945	16 fueling positions	11.38	11.38	22.76	182	182	364
Assisted Living Center	254	98.1 KSF	0.15	0.33	0.48	15	32	47
Retail Pad	822	6.5 KSF	3.22	3.38	6.60	21	22	43
Light Industrial	110	150 KSF	0.09	0.56	0.65	14	84	98
					Gross Trips	232	320	552
					Pass-by Trips	-145	-145	-290
					New Trips	87	175	262

Notes:
[1] Trip rates from the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021).
[2] Business Park assumed to be developed with 150 KSF of Light Industrial uses consistent with previous studies for Camus Oaks Master Plan in 2015 and 2017.
[3] The following pass-by percentages were applied based on data in the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021):
- Convenience Market/Gas Station: 75%
- General Retail: 40%

Trip Distribution

Table 2 displays the project's estimated distribution of new trips. As shown, the majority of new trips are expected to arrive and depart via Blue Oaks Boulevard. These percentages are applicable to a cumulative condition, which assumes the Roseville Parkway bridge between Foothills Boulevard and Washington Boulevard is constructed, thereby allowing continuous travel along Roseville Parkway between eastern, central, and northwest Roseville.

[2] A "pass-by" trip is made by a motorist already on the roadway that enters the project site while en route to a different primary destination. Pass-by trips do not add new trips to the adjacent roadway but do utilize project driveway(s).

TABLE 2 TRIP DISTRIBUTION	
Trip Distribution	**Percentage [1]**
Blue Oaks Blvd toward SR 65 (East)	35%
Blue Oaks Blvd toward Woodcreek Oaks Blvd (West)	35%
Roseville Parkway toward Foothills Blvd (South)	20%
Painted Desert Drive toward Woodcreek Oaks Blvd (West)	10%
Total	100%

Note:
[1] Trip distribution percentages obtained from the *Campus Oaks Town Center Access Study Technical Memo* (Fehr & Peers, July 2018).

Pass-by trips would divert traffic off of Blue Oaks Boulevard and Roseville Parkway. The City's cumulative (2035) travel demand model shows Blue Oaks Boulevard carrying substantially more traffic than Roseville Parkway in this area. Accordingly, the majority of pass-by trips would come from that arterial. The major pass-by traffic generator (7-Eleven Convenience Market and Gas Station) is situated at the Roseville Parkway/Blue Oaks Boulevard intersection.

Trip Assignment

Trips generated by each of the four land uses were assigned to the project accesses in accordance with each project's location, trip generation, and permitted driveway turning movements. Trips generated by Parcel CO-51 (Business Park) would be distributed across several access points including the signalized access at Blue Oaks Boulevard, a direct driveway on Painted Desert Drive, and Driveways 1 and 2 on Roseville Parkway.

Figure 2 shows the PM peak hour volumes at each driveway. This figure also shows volumes for the two COTC driveways on Roseville Parkway derived from the 2018 memo.

V. Project Access Review

The project access review focuses on the following project access aspects:

1. Traffic operations analysis at project driveways and COTC driveways
2. Evaluation of left-turn ingress from Roseville Parkway
3. Driveway throat depth requirements
4. Need for deceleration lanes/tapers at project driveways

Refer to **Figure 3** for study recommendations.

Traffic Operations Analysis

A SimTraffic micro-simulation model was developed for the study area, including the four project driveways, two COTC driveways on Roseville Parkway, the Blue Oaks Boulevard/Roseville Parkway signalized intersection, and the Painted Desert Drive/Roseville Parkway roundabout[3].

The latest version of the City of Roseville cumulative (2035) travel demand model was used to analyze for cumulative (2035) PM peak hour conditions. [4]

Table 3 shows the average delay and level of service (LOS) during the PM peak hour at the project driveways on Roseville Parkway and Painted Desert Drive and at two COTC driveways. Refer to **Appendix A** for technical calculations. All but one of these movements would operate at LOS A. Delays are modest due to the frequent gaps in Roseville Parkway traffic due to the traffic signal at Blue Oaks Boulevard and roundabout at Painted Desert Drive.

TABLE 3
PM PEAK HOUR DRIVEWAY OPERATIONS – CUMULATIVE CONDITIONS

Driveway	Movement	Volume	Average Delay	LOS
Project Driveway 1 on Roseville Parkway	Southbound Left	15	2 sec/veh	A
	Westbound Left/Through/Right	87	9 sec/veh	A
Project Driveway 2 on Roseville Parkway	Westbound Right	100	4 sec/veh	A
Project Driveway 4 on Painted Desert Drive)	Southbound Left/Right	10	3 sec/veh	A
COTC North Driveway on Roseville Parkway	Northbound Left	77	6 sec/veh	A
	Eastbound Right	103	4 sec/veh	A
COTC South Driveway on Roseville Parkway	Northbound Left	16	8 sec/veh	A
	Eastbound Left	82	13 sec/veh	B
	Eastbound Right	32	7 sec/veh	A

Note:
[1] Analyzed using SimTraffic micro-simulation model.

[3] The analysis is focused on driveway operations rather than operations at the signalized intersection and roundabout. They are included to replicate the effects of platooned arrivals of traffic approaching project driveways.

[4] The 2035 model projects 10,800 ADT on Roseville Parkway south of Blue Oaks Boulevard and 17,600 ADT on the two-lane segment (posted 35 mph) from Painted Desert Drive to east of Blue Dog Drive. A sensitivity test of the model was performed by modifying the two-lane mid-block segment to have four lanes and a 40 mph free flow speed. The resulting model output showed 22,000 ADT south of Blue Oaks Boulevard and 28,000 ADT south of Painted Desert Drive. Thus, the current design of the mid-block segment of Roseville Parkway limits traffic volumes along this segment of Roseville Parkway. There are no current plans to widen the two-lane segment of Roseville Parkway.

Table 4 shows the maximum queue lengths for stop or yield-controlled movements at the study driveways. Refer to **Appendix A** for technical calculations.

TABLE 4
PM PEAK HOUR DRIVEWAY QUEUING – CUMULATIVE CONDITIONS

Driveway	Movement	Available Storage [1]	Maximum Queue [2]
Project Driveway 1 on Roseville Parkway	Southbound Left	- [3]	25 ft.
	Westbound Left/Through/Right	50 ft.	**100 ft.**
Project Driveway 2 on Roseville Parkway	Westbound Right	100 ft.	75 ft.
Project Driveway 4 on Painted Desert Drive)	Southbound Left/Right	100 ft.	25 ft.
COTC North Driveway on Roseville Parkway	Northbound Left	- [3]	75 ft.
	Eastbound Right	125 ft.	75 ft.
COTC South Driveway on Roseville Parkway	Northbound Left	125 ft.	25 ft.
	Eastbound Left	100 ft.	125 ft.
	Eastbound Right	100 ft.	125 ft.

Note:
[1] Based on project site plan or aerial imagery.
[2] Analyzed using SimTraffic micro-simulation model. Rounded to the nearest 25 feet.
[3] A distance of 285 feet would be provided between these turn lanes, which would utilize the same median space if southbound left-turn ingress is permitted at Driveway 1. No storage amount is shown in this table due to the uncertainty of how that median space would be allocated.
Bolded cells represent queues that exceed the available storage.

Table 4 indicates that a maximum outbound queue of four vehicles (100 feet) is expected at Driveway 1 on Roseville Parkway, which would exceed the available storage by two vehicles. This queue occurs as a result of the driveway's single left/right lane and the large proportion of left-turn outbound traffic (two-thirds of outbound trips) which require more time to find gaps in both directions of Roseville Parkway. Additionally, the addition of a fourth leg to the Roseville Parkway/COTC South Driveway would cause the maximum queue exiting the COTC South Driveway to exceed the available storage.

Evaluation of Left-Turn Ingress from Roseville Parkway

The following guidance related to driveway placement and left-turn ingress lanes is contained in the *City of Roseville Design and Construction Standards* (2021):

1. *The centerline of driveways on opposite sides of the street shall either be in direct line, or have a minimum offset distance as listed below (measured from the centerline of the driveways):*
    - *For driveways on arterials and expressways the minimum offset shall be as specified in detail ST-47 (600 feet).*

    Where a raised median is provided along the center of the street separating conflicting turning movements, the offset requirements as stated above will not apply.
2. *On arterials and expressways and where left turns in will be permitted, a left turn deceleration lane shall be provided. This may be in the form of a separate left turn pocket on a six (6)-lane road, or a continuous two (2)-way-left-turn-lane on a four (4)-lane road. The minimum left turn pocket length shall be 200 feet plus a 120 foot entry taper.*

Since the City of Roseville 2035 General Plan (2020) shows this segment of Roseville Parkway as a minor arterial, the above guidance applies to both the project and COTC driveways.[5]

Driveway 1 would be situated directly opposite the COTC south driveway, which achieves consistency with #1 above. However, Driveway 1 would be offset 310 feet from the COTC north driveway. Because conflicting (inbound) left-turns would be allowed at each driveway, the minimum required offset distance of 600 feet (as indicated in City standards detail ST-47) would not be met. Thus, Driveway 1 would not be consistent with this part of #1 above.

With respect to #2 above, a two-way left-turn lane (TWLTL) is not recommended because it likely would result in continued u-turns by motorists after they exit the COTC north driveway.

Evaluation of Deceleration Lane/Taper at Driveway 1

According to Figure 2, northbound right-turns at Driveway 1 would be modest (less than 10 vehicles per hour). A right-turn curb flare (deceleration taper) is also constructed. Thus, no additional deceleration is required at this driveway.

[5] General Plan & Development Guidelines - City of Roseville

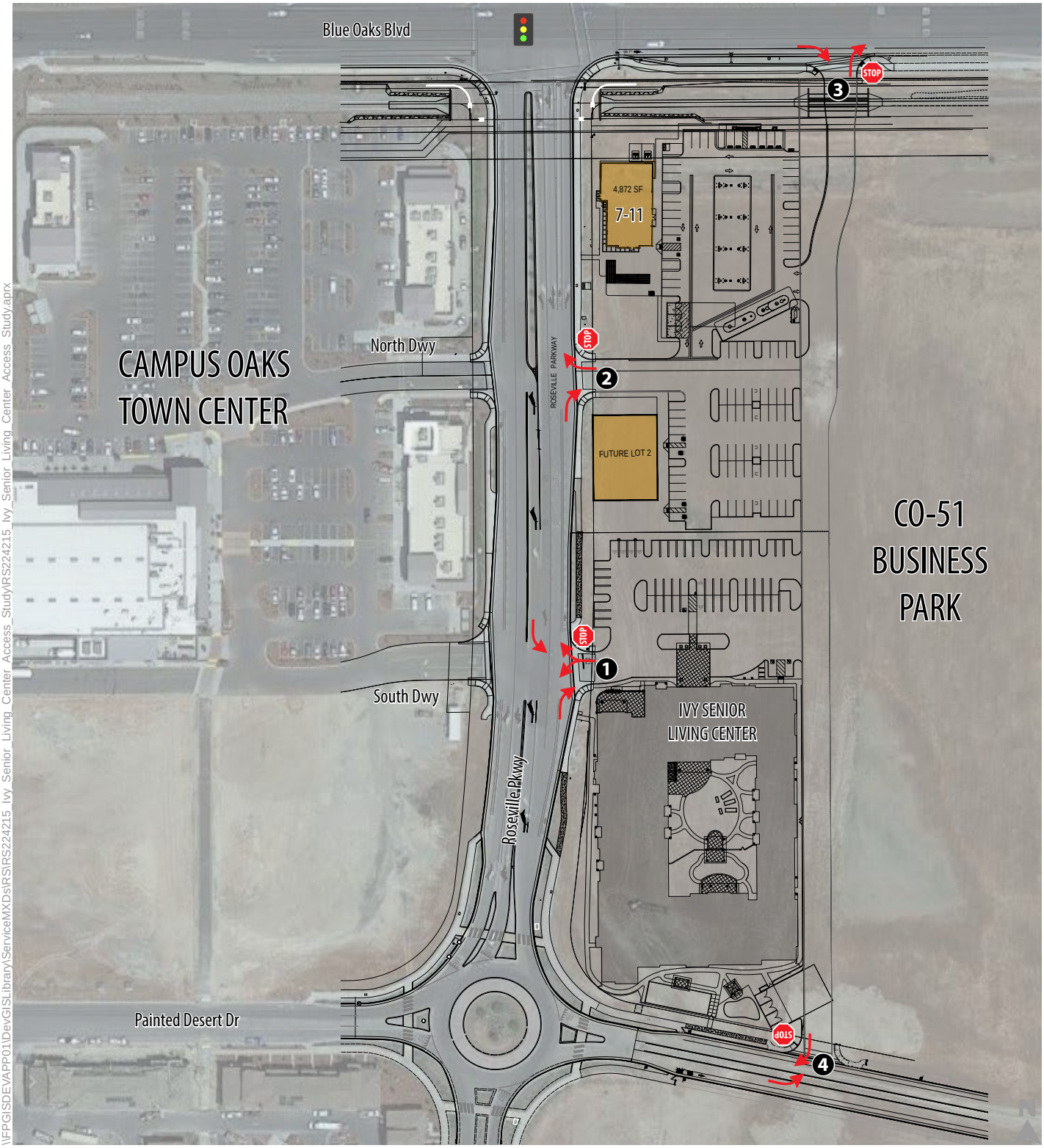
VI. Recommendations

If all movements were allowed at Project Driveway 1 on Roseville Parkway, vehicle queues exiting this driveway would exceed the available storage. Additionally, by adding a fourth (project) leg to the Roseville Parkway/COTC South Driveway, the maximum queue exiting the COTC South Driveway would also exceed its available storage. Finally, the resulting configuration would be inconsistent with City standards related to driveway placement and left-turn ingress as described on the previous page. For these reasons, the following is recommended (see Figure 3):

- Maintain Project Driveway 1 in current location and install a triangular raised median within the intersection to restrict movements at Driveway 1 to right-turns only while maintaining full access to the COTC South Driveway.[6]
- Extend narrow raised median along Roseville Parkway to connect with the COTC North Driveway/Project Driveway 2 intersection (so as to physically prevent u-turns from occurring on southbound Roseville Parkway).

The restriction of left-turns from Project Driveway 1 would result in the rerouting of most of these movements through the Roseville Parkway/Painted Desert Drive roundabout to access driveways on Painted Desert Drive to the east. The added traffic to the roundabout would not adversely affect operations, as it is anticipated to operate at LOS A during the PM peak hour under cumulative conditions.

[6] This design would be comparable to similar installations on Rocky Ridge Drive east of Eureka Road and on Fairway Drive at the Lowes Home Improvement Store Driveway.



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1 Project Driveway

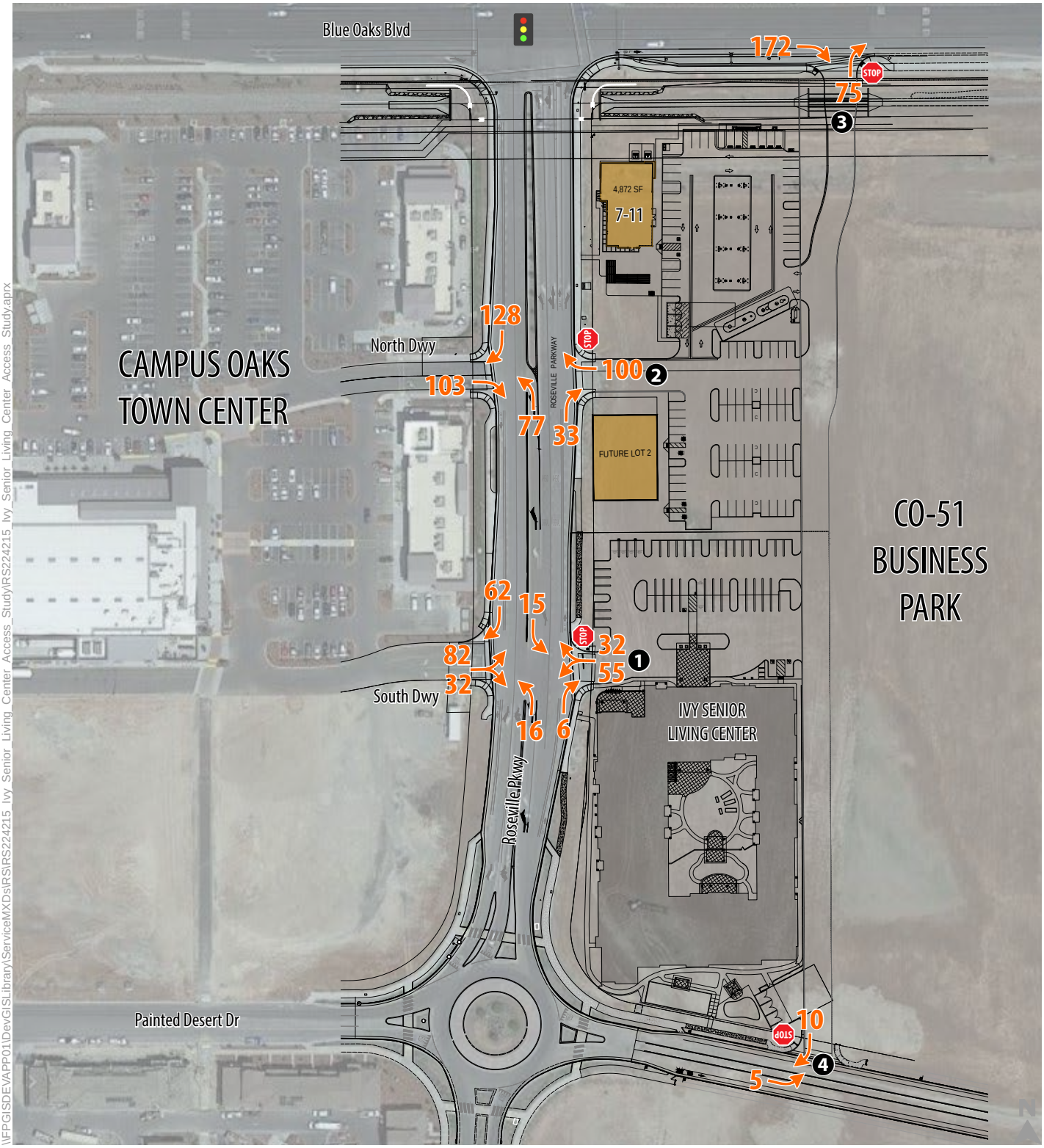
Permitted Movement

Traffic Signal

STOP Stop Sign

Figure 1

Project Site Plan and Access



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1 Project Driveway

Permitted Movement

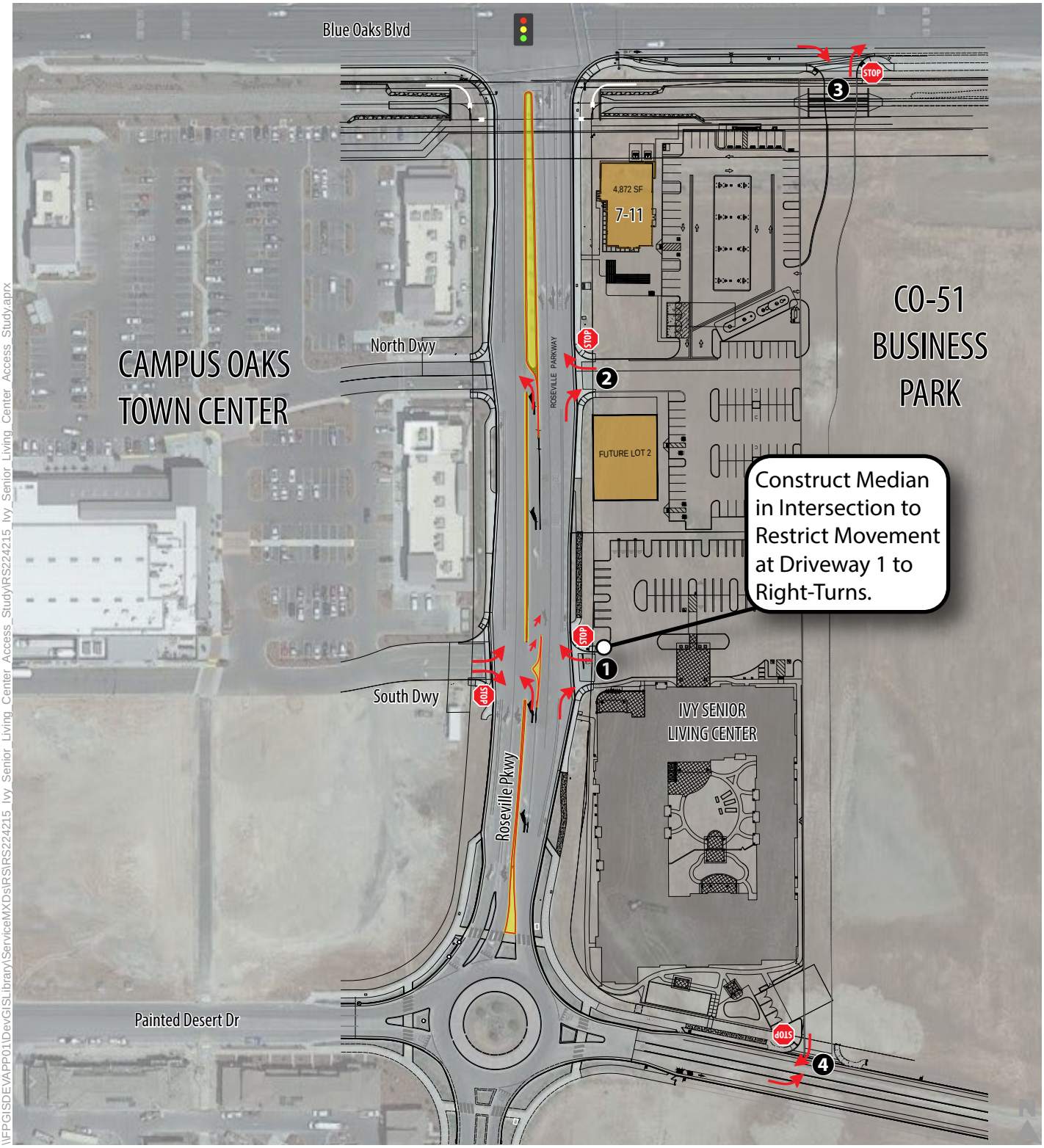
X X PM Peak Hour Volume

Traffic Signal

STOP Stop Sign

Figure 2

PM Peak Hour Driveway Volumes



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Raised Median

Traffic Signal

Stop Sign

Figure 3

Appendix A – Year 2035 Intersection Operations Technical Calculations

Intersection 2 **Roseville Pkwy/North Drwy** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	77	80	104.3%	5.5	1.2	A
	Through	253	255	100.8%	0.6	0.1	A
	Right Turn	33	33	100.9%	0.3	0.1	A
	Subtotal	363	369	101.6%	1.6	0.3	A
SB	Left Turn						
	Through	492	441	89.7%	1.4	0.2	A
	Right Turn	128	114	88.9%	1.2	0.2	A
	Subtotal	620	555	89.5%	1.4	0.2	A
EB	Left Turn						
	Through						
	Right Turn	103	108	104.6%	3.8	0.7	A
	Subtotal	103	108	104.6%	3.8	0.7	A
WB	Left Turn						
	Through						
	Right Turn	100	98	97.8%	3.6	0.9	A
	Subtotal	100	98	97.8%	3.6	0.9	A
Total		1,186	1,129	95.2%	1.9	0.2	A

Intersection 3 **Roseville Pkwy/South Drwy** **Side-street Stop**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	16	16	100.6%	7.7	3.7	A
	Through	249	255	102.5%	0.6	0.1	A
	Right Turn	6	6	105.0%	0.5	0.8	A
	Subtotal	271	278	102.4%	1.0	0.2	A
SB	Left Turn	15	12	77.3%	2.4	0.6	A
	Through	518	482	93.0%	0.9	0.2	A
	Right Turn	62	55	89.0%	0.5	0.2	A
	Subtotal	595	549	92.2%	0.9	0.2	A
EB	Left Turn	82	84	102.1%	13.2	3.4	B
	Through						
	Right Turn	32	33	102.8%	7.1	3.5	A
	Subtotal	114	117	102.3%	11.5	3.4	B
WB	Left Turn	55	58	106.2%	10.7	2.9	B
	Through						
	Right Turn	32	32	99.4%	5.1	1.8	A
	Subtotal	87	90	103.7%	8.8	2.7	A
Total		1,067	1,033	96.8%	2.9	0.7	A

Intersection 4 **Roseville Pkwy/Painted Desert Dr** **Roundabout**

Direction	Movement	Demand Volume (vph)	Served Volume (vph) Average	Served Volume (vph) Percent	Total Delay (sec/veh) Average	Total Delay (sec/veh) Std. Dev.	LOS
NB	Left Turn	99	96	96.9%	3.8	0.2	A
	Through	200	205	102.4%	5.4	0.4	A
	Right Turn	20	21	104.5%	4.1	0.7	A
	Subtotal	319	322	100.8%	4.8	0.3	A
SB	Left Turn	84	74	88.0%	8.3	2.9	A
	Through	376	356	94.7%	9.6	1.8	A
	Right Turn	145	141	97.0%	5.1	0.7	A
	Subtotal	605	571	94.3%	8.4	1.5	A
EB	Left Turn	38	35	91.3%	4.7	1.4	A
	Through	10	11	108.0%	5.1	2.2	A
	Right Turn	46	45	98.7%	4.3	1.4	A
	Subtotal	94	91	96.7%	4.7	1.0	A
WB	Left Turn	40	40	100.0%	3.6	0.7	A
	Through	20	19	92.5%	5.4	1.3	A
	Right Turn	33	35	106.4%	3.8	1.4	A
	Subtotal	93	94	100.6%	4.0	0.8	A
Total		1,111	1,077	96.9%	6.6	0.8	A

SimTraffic Post-Processor **Ivy Senior Living**
Average Results from 10 Runs **Cumulative Conditions**
Queue Length By Lane Group **PM Peak Hour**

Intersection 2 **Roseville Pkwy/North Drwy** **Side-street Stop**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Right Turn	379	40	3	64	4	83	9	0%	0%
NB	Left Turn	100	25	4	57	7	72	18	0%	0%
	Through	251	0	0	0	0	0	0	0%	0%
	Through/Right	251	0	1	2	6	6	18	0%	0%
SB	Through	302	0	1	1	4	2	8	0%	0%
	Through/Right	302	2	1	11	5	22	8	0%	0%
WB	Right Turn	428	36	3	57	7	67	12	0%	0%

SimTraffic Post-Processor **Ivy Senior Living**
Average Results from 10 Runs **Cumulative Conditions**
Queue Length By Lane Group **PM Peak Hour**

Intersection 3 **Roseville Pkwy/South Drwy** **Side-street Stop**

Direction	Lane Group	Storage (ft)	Average Queue (ft) Average	Average Queue (ft) Std. Dev.	95th Queue (ft) Average	95th Queue (ft) Std. Dev.	Maximum Queue (ft) Average	Maximum Queue (ft) Std. Dev.	Block Time Pocket	Block Time Upstream
EB	Shared	376	53	8	95	19	133	26	0%	0%
NB	Left Turn	100	8	3	30	6	35	9	0%	0%
SB	Left Turn	100	3	2	17	8	28	10	0%	0%
	Through	251	0	0	1	3	2	7	0%	0%
	Through/Right	251	0	1	3	4	11	11	0%	0%
WB	Shared	452	43	6	76	15	97	26	0%	0%