

To: Leatha Clark, AICP
USA Properties

From: Matt Weir, P.E., T.E., PTOE, RSP₁

Re: ***DRAFT Access Evaluation***
Terracina at Whitney Ranch Apartments
Rocklin, California

Date: July 9, 2021

Per your request, we have prepared this access evaluation for the above referenced project in Rocklin. The assumptions upon which this evaluation was prepared were identified by the City of Rocklin¹ and the project team. The following is discussion of our project understanding, access evaluation, and findings.

I. Project Overview

The Proposed Project is a 288-unit rental apartment community with a mix of one, two, and three-bedroom units in twelve, three-story buildings (see **Exhibit 1**). The project site is located in Development Unit 8 in the Northwest Rocklin Area General Development Plan. Accordingly the City's General Plan designates the project site as High-Density Residential (HDR), with a density range of 15.5 units and greater per acre. The site is zoned Planned Development-20 units per acre (PD-20). The project (apartments) is consistent with the General Plan designation and is permitted in the PD-20 zone.

As depicted in **Exhibit 1**, vehicular access to the site will be from a single, full-access driveway along University Avenue. A gated emergency vehicle access (EVA) is planned for the southeast corner of the site along Wildcat Boulevard. On-site pedestrian paths will connect to sidewalks on University Avenue and Wildcat Boulevard.

The project is understood to require 396 parking spaces (1.4 spaces per unit) under the State density bonus law and 612 spaces (2.1 spaces/unit) under Rocklin Zoning Code Section 17.66.020. The parking provided ratio is 1.9 spaces per unit, of which one space per unit is carport covered. The project's parking ratio is between the ratios of the State density bonus law (1.4 spaces per unit) and the Zoning Ordinance (2.1 spaces per unit). Bicycle parking is planned throughout the site adjacent to apartment buildings.

II. Trip Generation and Access

The following is an overview of primary project characteristics that are contemplated in this focused access evaluation:

- *Trip Generation*
 - 288 multi-family (apartment) units, peak-hour volume²:
 - 30-trips IN, 100-trips OUT (AM Peak-Hour)
 - 95-trips IN, 56-trips OUT (PM Peak-Hour)

¹ Telephone conference, June 21, 2021.

² *Trip Generation Manual, 10th Edition*, Land Use 220 Multifamily Housing (Low-Rise) regression equation, Institute of Transportation Engineers (ITE). No trip reductions are incorporated.

- *University Avenue Access*

The project site plan (**Exhibit 1**) details that the project will be served by a single, consolidated access driveway along University Avenue. This access location is intended to facilitate all routine site ingress and egress. As evident by the current status of University Avenue, the current two-lane (ultimate four-lane) facility has previously constructed median islands that will eventually form the left-turn lanes (southbound into the project site and northbound into the future development area west of University Ave). As a result, the interim access to the project site is anticipated to be accomplished via the existing two-lane roadway without a southbound left-turn pocket, with side street stop control (SSSC). Ultimately, the full construction of University Avenue will provide two lanes in each direction and left-turn lanes, also initially anticipated to be SSSC.

- *Wildcat Boulevard Access (EVA Only)*

An Emergency Vehicle Access (EVA) driveway is proposed along Wildcat Boulevard. As shown in **Exhibit 1**, this access location is in the southeast corner of the project site and would use an existing driveway cut along Wildcat Boulevard, just south of the existing traffic signal that serves Whitney High School (southern access location). In the event of an emergency, this driveway is anticipated to be used by emergency personnel to both access the site and, as needed, facilitate egress maneuvers to supplement the primary driveway on University Avenue. See the discussion later in this memorandum regarding the challenges associated with creating a permanent egress-only driveway at this location.

III. Access Conditions and Trip Assignment

The study intersections for this evaluation are depicted in **Exhibit 2**. The following is a summary of the analysis scenarios and their associated geometric and access conditions:

- *Existing Conditions*

1. University Ave (2-lane) @ Site Access Dwy: full access, side-street stop control (SSSC)
2. University Ave @ Whitney Ranch Pkwy: all-way stop control* (AWSC)

- *Near-Term Conditions*

1. University Ave (4-lane) @ Site Access Dwy: full access, side-street stop control (SSSC)
2. University Ave @ Whitney Ranch Pkwy: roundabout*

* The conversion from AWSC to roundabout control is consistent with the City's recent comprehensive Intersection Control Evaluation (ICE)³.

Lastly it was necessary to approximate the peak-hour turning movements associated with the project at the above-noted study facilities to allow for an evaluation and recommendation of treatments. These trips were developed as summarized below:

- *Global Trip Assignment*

Consistent with the prior study³:

- ~20% of the trips originate from or are destined for points north
- ~80% of the trips originate from or are destined for points south (including those using SR-65)

- *Approximate Peak-Hour Intersection Volumes (see **Exhibit 2**)*

³ Intersection Control Evaluation – Whitney Ranch Parkway @ University Avenue, Kimley-Horn, May 11, 2021.

IV. Access Review

Based on our coordination with the City and project team, review of the prior study³ and related project documentation, and the technical analyses completed herein we offer the following recommendations for the conditions anticipated to result from the completion of the project:

- *Exterior Roadways*

The following assumptions are inherent to the technical analyses completed herein, and are the foundation on which the project's localized access conditions are based:

- Existing Conditions
 - 2-lane University Avenue
 - Side-street stop-controlled driveway access
 - No adjacent development⁴
- Near-Term Conditions
 - 4-lane University Avenue
 - Full adjacent development⁴
 - Side-street stop-controlled driveway intersection

- *University Avenue Access Intersection (Intersection #1)*

The operations at this intersection are largely influenced by the timing of the adjacent development⁴. This intersection operates acceptably under Existing (Side-Street Stop Control) with the addition of the Proposed Project. Under the Near-Term conditions when the adjacent development is assumed to be fully developed, both Side-Street and All-Way Stop Control are shown to be ineffective to accommodate the mix of traffic (excessive delays and queuing). While a traffic signal was evaluated as a possible solution, its application in this location has its own operational issues (some movements' delays are higher than with All-Way Stop Control) and is not anticipated to be desired by the City as it wasn't originally planned and the observed conflicting volumes (heavy northbound left-turn, eastbound right-turn, and westbound left-turns) could be better served using an alternate traffic control treatment. Accordingly, we also evaluated the effectiveness of a compact roundabout intersection. The application of a roundabout at this location, anticipated to generally fit within the same intersection footprint as the traffic signal, is shown to result in lower intersection delays and provides an overall better intersection Level of Service (LOS). These findings are summarized in **Table 1** and the technical analysis worksheets are provided in **Appendix A**.

Table 1 – Project Access Intersection Operations Summary

Intersection	Control	Peak Hour	Near-Term	
			Delay (sec)	LOS
University Avenue @ Site Driveway	SSSC*	AM	300+	F
		PM	300+	F
	AWSC	AM	193	F
		PM	99	F
	Signal	AM	53	D
		PM	110	F
	Roundabout	AM	11	B
		PM	8	A

Note: * The reported LOS corresponds to the worst minor street approach.

⁴ "Hospital Site" development as defined by the City of Rocklin.

- *University Avenue @ Whitney Ranch Parkway (Intersection #2)*
Consistent with the prior study³, this intersection operates acceptably under both Existing (All Way Stop Control) and Near-Term (Roundabout) conditions. The addition of the Proposed Project does not change the conclusions or recommendations of the prior evaluation.
- *Wildcat Boulevard Access*
As previously discussed, the project proposes an Emergency Vehicle Access (EVA) in the southeast corner of the project site, just south of the existing traffic signal that serves Whitney High School (southern access location). Although originally contemplated by the project team, we strongly discourage creating a permanent egress-only driveway at this location. This driveway location is just south of the existing traffic signal and a significant safety concern would be created by allowing egressing vehicles from the project site to access Wildcat Boulevard. This driveway location would be hampered by sight distance obstructions for vehicles looking left (to the north), challenged by confusion regarding the signal phasing and which conflicting vehicles have the right-of-way, and further complicated by vehicles being tempted to illegally cut across the intersection to access the high school or to travel north along Wildcat Boulevard into Lincoln. Lastly, if this driveway was to be realigned and become the fourth-leg to the existing signalized intersection, while safer for egressing vehicles, this connection would create the potential for cut-through traffic by providing a link between University Avenue and Wildcat Boulevard that may be perceived as a shortcut for local traffic. In summary, it is strongly recommended to only allow an EVA at Wildcat Boulevard and, therefore, concentrate all project site access to University Avenue.

V. Summary of Findings

Based on the assessment documented above, the following is a summary of our findings and recommendations:

- Under Existing conditions, the project driveway access intersection to University Avenue operates acceptably with only a 2-lane University Avenue with side-street stop control on the project site. This is a condition that currently exists at the adjacent apartment complex to the north.
- Under Near-Term conditions, a snapshot in time in which the adjacent development is assumed to be complete, the project driveway access intersection to University Avenue only operates acceptably using roundabout traffic control.
- Under all conditions, the adjacent University Avenue intersection with Whitney Ranch Parkway operates acceptably based on the assumptions inherent to the intersection's prior technical studies.
- All project access is recommended to be achieved from University Avenue, with only an EVA along Wildcat Boulevard. Permanent egress is not recommended due to significant safety concerns associated with this movement.

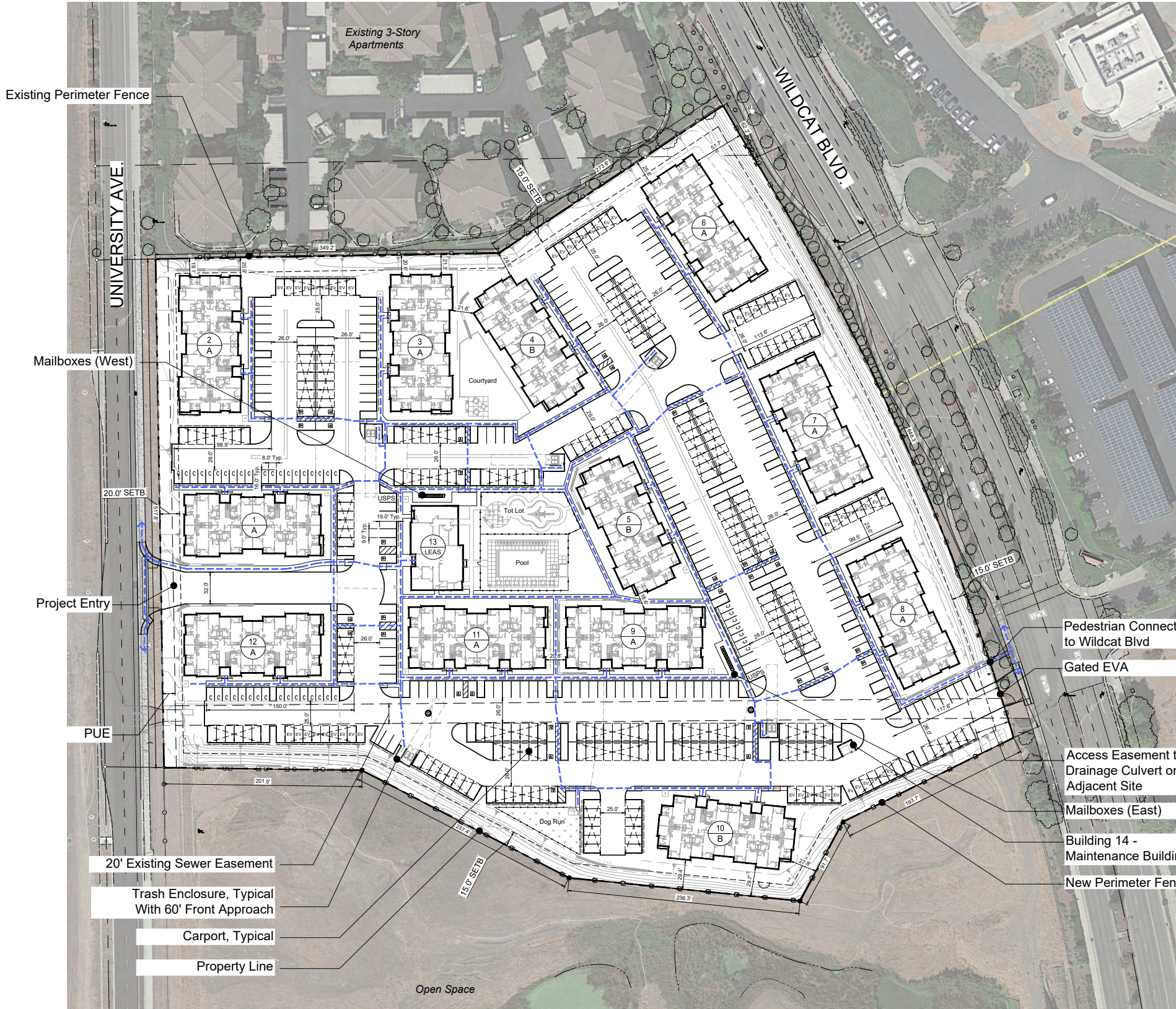
Attachment:

Exhibit 1 – Project Site Plan

Exhibit 2 – Study Intersections, Traffic Control, and Peak-Hour Volumes

Appendix A – Analysis Worksheets

Rocklin Terracina at Whitney Ranch Apartments - Access Evaluation



Site Summary			
Assessor Parcel Number	017-172-014-000	Unit Count	288 Units
Site Area	11.0 Acres (Net) 11.7 Acres (Gross)	Gross Density	24.6 units/acre
		General Plan	HDR (High Density Residential)
		Zoning	PD-20

Residential Development Standards			
Required per Northwest Rocklin GDP Table 9 - Residential Development Standards		Proposed	
Max DU per Gross Acre	20 units/acre	Gross Density	24.6 units/ acre
Min Lot Area	2 acres	Lot Area	11.7 acres
Min Lot Width	70'	Lot Width	±518'
Min Setbacks:			
Front Yard	20'		
Side, Interior	15'		
Rear	15'		
Max Lot Coverage	60%	Lot Coverage	±97,447 SF (19.1%)
Max Building Height	35'	Building Height	±34'-10" (3 Stories)

Project Summary				
Building Summary:				
(12) 3-Story Apartment Buildings				
(01) 1-Story Leasing/ Amenity/ Laundry Building				
(01) 1-Story Maintenance Building				
(05) Trash Enclosures				
(27) 8-Stall Carports				
(12) 6-Stall Carports				

Apartment Unit Summary	1Bd/1Bath	2Bd/2Bath	3Bd/2Bath	Total
Building No. 01 (Type A)	06	10	08	24
Building No. 02 (Type A)	06	10	08	24
Building No. 03 (Type A)	06	10	08	24
Building No. 04 (Type B)	06	18	00	24
Building No. 05 (Type B)	06	18	00	24
Building No. 06 (Type A)	06	10	08	24
Building No. 07 (Type A)	06	10	08	24
Building No. 08 (Type A)	06	10	08	24
Building No. 09 (Type A)	06	10	08	24
Building No. 10 (Type B)	06	18	00	24
Building No. 11 (Type A)	06	10	08	24
Building No. 12 (Type A)	06	10	08	24
	72	144	72	288
	25.0%	50.0%	25.0%	

Building Area Summary	1st Floor	2nd Floor	3rd Floor	Total
Building No. 01 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 02 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 03 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 04 (Type B)	7344 SF	6986 SF	6986 SF	21,316 SF
Building No. 05 (Type B)	7344 SF	6986 SF	6986 SF	21,316 SF
Building No. 06 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 07 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 08 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 09 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 10 (Type B)	7344 SF	6986 SF	6986 SF	21,316 SF
Building No. 11 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 12 (Type A)	7893 SF	7525 SF	6986 SF	22,404 SF
Building No. 13 (Lease/Amenity)	4186 SF	-	-	4,186 SF
Building No. 14 (Maintenance)	192 SF	-	-	192 SF
	±97,447 SF	±88,683 SF	±83,832 SF	±269,962 SF

Unit Mix	Net Area	Gross Area	Total	
Plan 1-1	539 SF	583 SF	72 units	25.0%
Plan 2-1	772 SF	820 SF	72 units	25.0%
Plan 2-2	840 SF	899 SF	72 units	25.0%
Plan 3-1	968 SF	1034 SF	72 units	25.0%
Total			288 units	

Parking Summary		
<i>Per CA Density Bonus Law</i>		
Required	Ratio	Total
1 Bedroom	1 space/ unit	072 spaces
2 Bedrooms	1.5 space/ unit	216 spaces
3 Bedrooms	1.5 space/ unit	108 spaces
		396 spaces

<i>Per Rocklin Municipal Code 17.66.020</i>		
Required	Ratio	Total
1 Bedroom	1.5 space/ unit	108 spaces
2 Bedrooms	2 space/ unit	288 spaces
3 Bedrooms	2 space/ unit	144 spaces
Guest	0.25 space/ unit	72 spaces
		612 spaces

Proposed	
Carport Parking	288 spaces
Compact Open Parking	043 spaces
Standard Open Parking	219 spaces
Total	550* spaces
	1.91 spaces/unit

Legend	
1 — Building No.	Building Label
A — Building Type	
— Accessible Path of Travel	
EV	Pre-wired For Electric Vehicle Charging
USPS	Dedicated Parking For USPS

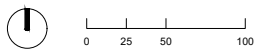


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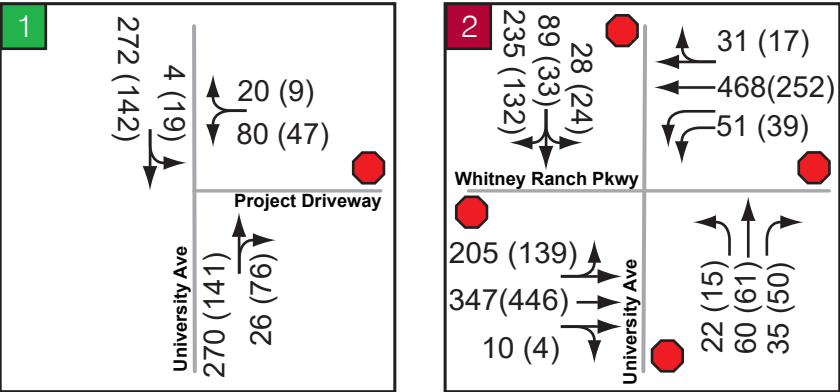
ENTITLEMENT DESIGN
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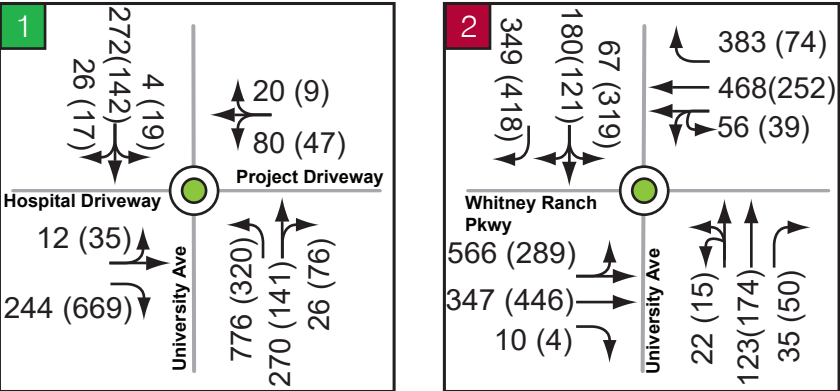
SITE PLAN

A1.0

Existing Conditions



Near-Term Conditions (Preferred Control)











Appendix A
Analysis Worksheets

Rocklin Terracina Whitney Ranch Apartments Intersection Analysis

1: Project Driveway & University Ave

Near Term plus Project

Timing Plan: AM Peak









Intersection												
Int Delay, s/veh	260.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	0	244	80	0	20	776	270	26	4	272	26
Future Vol, veh/h	12	0	244	80	0	20	776	270	26	4	272	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	100	-	0	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	0	265	87	0	22	843	293	28	4	296	28
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2151	-	162	2149	-	161	324	0	0	321	0	0
Stage 1	318	-	-	1993	-	-	-	-	-	-	-	-
Stage 2	1833	-	-	156	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	27	0	854	~ 27	0	855	1233	-	-	1236	-	-
Stage 1	668	0	-	~ 62	0	-	-	-	-	-	-	-
Stage 2	79	0	-	831	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	~ 12	-	854	~ 8	-	855	1233	-	-	1236	-	-
Mov Cap-2 Maneuver	~ 12	-	-	~ 8	-	-	-	-	-	-	-	-
Stage 1	211	-	-	~ 20	-	-	-	-	-	-	-	-
Stage 2	24	-	-	571	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	43.8			\$ 4278.9			10.1			0.1		
HCM LOS	E			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1233	-	-	12	854	8	855	1236	-	-		
HCM Lane V/C Ratio	0.684	-	-	1.087	0.311	10.87	0.025	0.004	-	-		
HCM Control Delay (s)	14	-	-	\$ 708.1	11.1	\$ 5346.3	9.3	7.9	-	-		
HCM Lane LOS	B	-	-	F	B	F	A	A	-	-		
HCM 95th %tile Q(veh)	5.8	-	-	2.3	1.3	12.5	0.1	0	-	-		
Notes												
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon												

Rocklin Terracina Whitney Ranch Apartments Intersection Analysis

1: Project Driveway & University Ave

Near Term plus Project

Timing Plan: PM Peak

Intersection												
Int Delay, s/veh	25.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	0	669	47	0	9	320	141	76	19	142	17
Future Vol, veh/h	35	0	669	47	0	9	320	141	76	19	142	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	0	100	-	0	150	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	0	727	51	0	10	348	153	83	21	154	18
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	978	-	86	1010	-	118	172	0	0	236	0	0
Stage 1	205	-	-	891	-	-	-	-	-	-	-	-
Stage 2	773	-	-	119	-	-	-	-	-	-	-	-
Critical Hdwy	7.54	-	6.94	7.54	-	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	6.54	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	-	3.32	3.52	-	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	205	0	956	194	0	912	1402	-	-	1328	-	-
Stage 1	778	0	-	304	0	-	-	-	-	-	-	-
Stage 2	358	0	-	873	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	162	-	956	~ 37	-	912	1402	-	-	1328	-	-
Mov Cap-2 Maneuver	162	-	-	~ 37	-	-	-	-	-	-	-	-
Stage 1	585	-	-	229	-	-	-	-	-	-	-	-
Stage 2	266	-	-	206	-	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	20.3			\$ 377.7			5			0.8		
HCM LOS	C			F								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1402	-	-	162	956	37	912	1328	-	-		
HCM Lane V/C Ratio	0.248	-	-	0.235	0.761	1.381	0.011	0.016	-	-		
HCM Control Delay (s)	8.4	-	-	33.9	19.6	448.3	9	7.8	-	-		
HCM Lane LOS	A	-	-	D	C	F	A	A	-	-		
HCM 95th %tile Q(veh)	1	-	-	0.9	7.5	5.3	0	0	-	-		
Notes												
~: Volume exceeds capacity		\$: Delay exceeds 300s			+: Computation Not Defined				*: All major volume in platoon			









Rocklin Terracina Apartments Intersection Analysis

1: Project Driveway & University Ave

Near Term plus Project AWSC

Timing Plan: AM Peak

Intersection												
Intersection Delay, s/veh	192.5											
Intersection LOS	F											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	0	244	80	0	20	776	270	26	4	272	26
Future Vol, veh/h	12	0	244	80	0	20	776	270	26	4	272	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	13	0	265	87	0	22	843	293	28	4	296	28
Number of Lanes	1	0	1	1	0	1	1	2	0	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	2	2
HCM Control Delay	22.3	15.8	298.8	17.9
HCM LOS	C	C	F	C

Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	78%	0%	0%	0%	0%	0%	100%	78%
Vol Right, %	0%	0%	22%	0%	100%	0%	100%	0%	0%	22%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	776	180	116	12	244	80	20	4	181	117
LT Vol	776	0	0	12	0	80	0	4	0	0
Through Vol	0	180	90	0	0	0	0	0	181	91
RT Vol	0	0	26	0	244	0	20	0	0	26
Lane Flow Rate	843	196	126	13	265	87	22	4	197	127
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	1.845	0.4	0.252	0.032	0.573	0.23	0.05	0.011	0.453	0.286
Departure Headway (Hd)	7.874	7.362	7.202	10.077	8.859	10.737	9.51	9.872	9.355	9.194
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	464	489	499	357	411	337	379	365	388	393
Service Time	5.608	5.097	4.936	7.777	6.559	8.437	7.21	7.572	7.055	6.894
HCM Lane V/C Ratio	1.817	0.401	0.253	0.036	0.645	0.258	0.058	0.011	0.508	0.323
HCM Control Delay	407.4	14.9	12.4	13.1	22.8	16.6	12.7	12.7	19.6	15.5
HCM Lane LOS	F	B	B	B	C	C	B	B	C	C
HCM 95th-tile Q	53.9	1.9	1	0.1	3.5	0.9	0.2	0	2.3	1.2









Rocklin Terracina Apartments Intersection Analysis

1: Project Driveway & University Ave

Near Term plus Project AWSC

Timing Plan: PM Peak

Intersection	
Intersection Delay, s/veh	99
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	35	0	669	47	0	9	320	141	76	19	142	17
Future Vol, veh/h	35	0	669	47	0	9	320	141	76	19	142	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	0	727	51	0	10	348	153	83	21	154	18
Number of Lanes	1	0	1	1	0	1	1	2	0	1	2	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	2	3	3
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	3	3	2	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	3	3	2	2
HCM Control Delay	182.1	13.9	26.9	14.4
HCM LOS	F	B	D	B






















Lane	NBLn1	NBLn2	NBLn3	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1	SBLn2	SBLn3
Vol Left, %	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	38%	0%	0%	0%	0%	0%	100%	74%
Vol Right, %	0%	0%	62%	0%	100%	0%	100%	0%	0%	26%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	320	94	123	35	669	47	9	19	95	64
LT Vol	320	0	0	35	0	47	0	19	0	0
Through Vol	0	94	47	0	0	0	0	0	95	47
RT Vol	0	0	76	0	669	0	9	0	0	17
Lane Flow Rate	348	102	134	38	727	51	10	21	103	70
Geometry Grp	8	8	8	8	8	8	8	8	8	8
Degree of Util (X)	0.773	0.213	0.263	0.084	1.353	0.133	0.022	0.051	0.241	0.16
Departure Headway (Hd)	8.9	8.382	7.935	7.903	6.699	10.064	8.834	9.923	9.4	9.207
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	410	431	456	453	545	359	408	363	385	392
Service Time	6.6	6.082	5.635	5.66	4.456	7.764	6.534	7.623	7.1	6.907
HCM Lane V/C Ratio	0.849	0.237	0.294	0.084	1.334	0.142	0.025	0.058	0.268	0.179
HCM Control Delay	36.1	13.3	13.4	11.4	191	14.3	11.7	13.2	15.1	13.7
HCM Lane LOS	E	B	B	B	F	B	B	B	C	B
HCM 95th-tile Q	6.5	0.8	1	0.3	32	0.5	0.1	0.2	0.9	0.6

Rocklin Terracina Apartments Intersection Analysis

Near Term plus Project Signal

1: Project Driveway & University Ave

Timing Plan: AM Peak






















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	0	244	80	0	20	776	270	26	4	272	26
Future Volume (veh/h)	12	0	244	80	0	20	776	270	26	4	272	26
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj (A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Lanes Open During Work Zone												
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	13	0	265	87	0	22	843	293	28	4	296	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Opposing Right Turn Influence	Yes			Yes			Yes			Yes		
Cap, veh/h	27	0	276	101	0	342	852	1936	184	9	385	36
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Prop Arrive On Green	0.02	0.00	0.17	0.06	0.00	0.22	0.48	0.59	0.59	0.01	0.12	0.12
Unsig. Movement Delay												
Ln Grp Delay, s/veh	63.5	0.0	86.1	95.9	0.0	32.4	55.0	9.6	9.6	79.4	50.0	50.5
Ln Grp LOS	E	A	F	F	A	C	E	A	A	E	D	D
Approach Vol, veh/h	278			109			1164			328		
Approach Delay, s/veh	85.0			83.1			42.5			50.6		
Approach LOS	F			F			D			D		
Timer:	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Case No	2.0	4.0	2.0	4.0	2.0	4.0	2.0	4.0				
Phs Duration (G+Y+Rc), s	5.0	65.6	10.4	22.5	54.0	16.6	6.1	26.8				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green (Gmax), s	5.0	63.1	5.9	18.0	49.5	18.6	5.0	18.9				
Max Allow Headway (MAH), s	3.8	5.1	3.9	5.7	3.8	5.1	3.9	5.7				
Max Q Clear (g_c+I1), s	2.2	6.2	7.0	19.2	50.6	11.1	2.7	3.1				
Green Ext Time (g_e), s	0.0	1.9	0.0	0.0	0.0	1.0	0.0	0.0				
Prob of Phs Call (p_c)	0.11	1.00	0.92	1.00	1.00	1.00	0.31	1.00				
Prob of Max Out (p_x)	1.00	0.00	1.00	1.00	1.00	1.00	0.41	1.00	0.00			
Left-Turn Movement Data												
Assigned Mvmt	1	3	5	7								
Mvmt Sat Flow, veh/h	1781	1781	1781	1781								
Through Movement Data												
Assigned Mvmt	2	4	6	8								
Mvmt Sat Flow, veh/h	3280	0	3283	0								
Right-Turn Movement Data												
Assigned Mvmt	12	14	16	18								
Mvmt Sat Flow, veh/h	311	1585	308	1585								
Left Lane Group Data												
Assigned Mvmt	1	0	3	0	5	0	7	0				
Lane Assignment	L (Prot)	L (Prot)	L (Prot)	L (Prot)								

Rocklin Terracina Apartments Intersection Analysis

Near Term plus Project Signal

1: Project Driveway & University Ave

Timing Plan: PM Peak

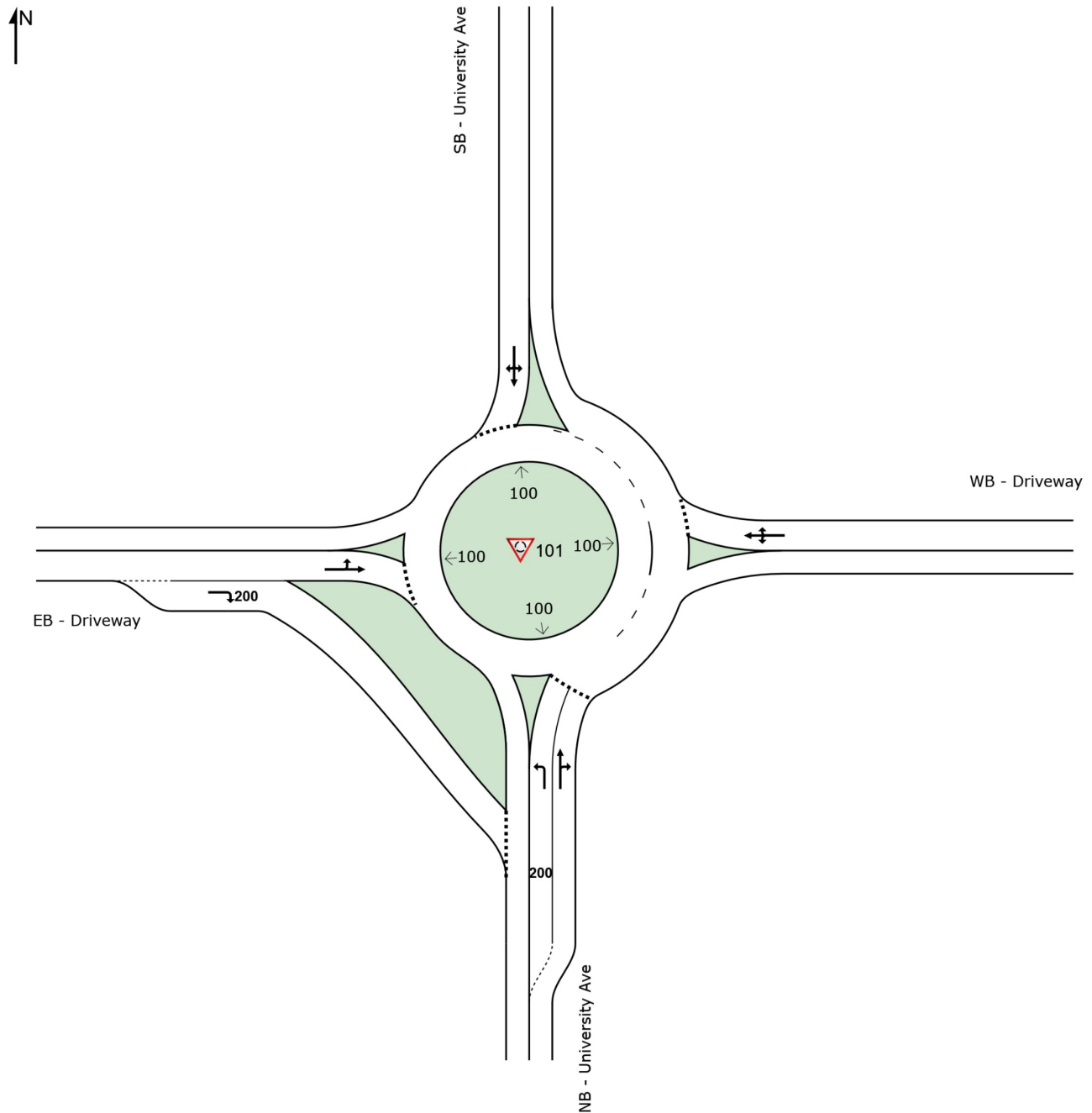
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	0	669	47	0	9	320	141	76	19	142	17
Future Volume (veh/h)	35	0	669	47	0	9	320	141	76	19	142	17
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	38	0	727	51	0	10	348	153	83	21	154	18
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	70	0	521	85	0	535	406	670	345	44	295	34
Arrive On Green	0.04	0.00	0.33	0.05	0.00	0.34	0.23	0.30	0.30	0.02	0.09	0.09
Sat Flow, veh/h	1781	0	1585	1781	0	1585	1781	2268	1168	1781	3210	370
Grp Volume(v), veh/h	38	0	727	51	0	10	348	118	118	21	84	88
Grp Sat Flow(s),veh/h/ln	1781	0	1585	1781	0	1585	1781	1777	1660	1781	1777	1804
Q Serve(g_s), s	1.2	0.0	19.5	1.7	0.0	0.2	11.1	3.0	3.2	0.7	2.7	2.8
Cycle Q Clear(g_c), s	1.2	0.0	19.5	1.7	0.0	0.2	11.1	3.0	3.2	0.7	2.7	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.70	1.00		0.21
Lane Grp Cap(c), veh/h	70	0	521	85	0	535	406	525	490	44	163	166
V/C Ratio(X)	0.54	0.00	1.40	0.60	0.00	0.02	0.86	0.22	0.24	0.48	0.52	0.53
Avail Cap(c_a), veh/h	177	0	521	150	0	535	525	973	909	150	599	608
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.0	0.0	19.9	27.7	0.0	13.1	22.0	15.8	15.9	28.6	25.7	25.7
Incr Delay (d2), s/veh	6.4	0.0	189.5	6.5	0.0	0.0	10.7	0.2	0.3	7.9	2.5	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	33.9	0.8	0.0	0.1	5.4	1.1	1.1	0.4	1.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	34.4	0.0	209.4	34.2	0.0	13.1	32.7	16.0	16.1	36.4	28.2	28.3
LnGrp LOS	C	A	F	C	A	B	C	B	B	D	C	C
Approach Vol, veh/h		765			61			584			193	
Approach Delay, s/veh		200.7			30.8			25.9			29.1	
Approach LOS		F			C			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.0	22.0	7.3	24.0	18.0	10.0	6.8	24.5				
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5				
Max Green Setting (Gmax), s	5.0	32.5	5.0	19.5	17.5	20.0	5.9	18.6				
Max Q Clear Time (g_c+I1), s	2.7	5.2	3.7	21.5	13.1	4.8	3.2	2.2				
Green Ext Time (p_c), s	0.0	1.3	0.0	0.0	0.5	0.7	0.0	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			109.9									
HCM 6th LOS			F									

SITE LAYOUT

 Site: 101 [University at Project Driveway_Alt00b_Near
Term_PP_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



LANE SUMMARY

 Site: 101 [University at Project Driveway_Alt00b_Near Term_PP_AM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance													
	DEMAND FLOWS [Total HV] veh/h %		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh Dist] ft		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: NB - University Ave													
Lane 1 ^d	843	2.0	1368	0.616	100	9.8	LOS A	5.7	145.4	Short	200	0.0	NA
Lane 2	322	2.0	1368	0.235	100	4.6	LOS A	1.1	29.1	Full	1150	0.0	0.0
Approach	1165	2.0		0.616		8.4	LOS A	5.7	145.4				
East: WB - Driveway													
Lane 1 ^d	110	2.0	514	0.214	100	10.0	LOS A	0.7	18.6	Full	500	0.0	0.0
Approach	110	2.0		0.214		10.0	LOS A	0.7	18.6				
North: SB - University Ave													
Lane 1 ^d	328	2.0	513	0.639	100	21.8	LOS C	4.4	111.9	Full	1000	0.0	0.0
Approach	328	2.0		0.639		21.8	LOS C	4.4	111.9				
West: EB - Driveway													
Lane 1 ^d	14	2.0	972	0.015	100	3.8	LOS A	0.1	1.3	Full	500	0.0	0.0
Lane 2	265	2.0	976	0.272	100	6.4	LOS A	1.2	30.7	Short	200	0.0	NA
Approach	279	2.0		0.272		6.3	LOS A	1.2	30.7				
Intersection	1883	2.0		0.639		10.5	LOS B	5.7	145.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY

 Site: 101 [University at Project Driveway_Alt00b_Near Term_PP_PM (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Lane Use and Performance													
	DEMAND FLOWS		Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	95% BACK OF QUEUE		Lane Config	Lane Length	Cap. Adj.	Prob. Block.
	[Total	HV]						[Veh	Dist]				
	veh/h	%	veh/h	v/c	%	sec			ft		ft	%	%
South: NB - University Ave													
Lane 1 ^d	348	2.0	1317	0.264	100	5.0	LOS A	1.3	33.4	Short	200	0.0	NA
Lane 2	236	2.0	1317	0.179	100	4.2	LOS A	0.8	20.5	Full	1150	0.0	0.0
Approach	584	2.0		0.264		4.7	LOS A	1.3	33.4				
East: WB - Driveway													
Lane 1 ^d	62	2.0	872	0.071	100	4.8	LOS A	0.2	6.3	Full	500	0.0	0.0
Approach	62	2.0		0.071		4.8	LOS A	0.2	6.3				
North: SB - University Ave													
Lane 1 ^d	193	2.0	892	0.217	100	6.2	LOS A	1.0	24.8	Full	1000	0.0	0.0
Approach	193	2.0		0.217		6.2	LOS A	1.0	24.8				
West: EB - Driveway													
Lane 1 ^d	39	2.0	1129	0.035	100	3.5	LOS A	0.1	3.3	Full	500	0.0	0.0
Lane 2	727	2.0	1150	0.632	100	11.5	LOS B	6.1	154.9	Short	200	0.0	NA
Approach	766	2.0		0.632		11.1	LOS B	6.1	154.9				
Intersection	1605	2.0		0.632		7.9	LOS A	6.1	154.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Geometric Delay is not included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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