LSC TRANSPORTATION CONSULTANTS, INC.



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June 22, 2023

Scott Mathot, PE Town of Truckee 10183 Truckee Airport Road Truckee, CA 96161

RE: Truckee Silver Creek Residential Transportation Analysis

Dear Mr. Mathot:

Per your request, LSC Transportation Consultants, Inc. has prepared an analysis for a proposed residential project located on Winter Creek Loop about 400 feet south of Brockway Road, in Truckee, California. This project contains 40 multi-family dwelling units including 8 studios, 16 one-bedrooms, and 16 two-bedrooms. First, the existing conditions and volumes are presented. Then trip generation analysis and trip distribution are evaluated to create plus project conditions. Future conditions are then estimated based on the TransCAD model, then level of service (LOS) and queueing are evaluated at Brockway Road/Winter Creek Loop. Note that a VMT analysis is not included, as the project appears to be located within the Town's residential VMT exemption zone.

EXISTING CONDITIONS

The proposed project is located in the eastern portion of the Winter Creek residential development. The access driveway is located on Winter Creek Loop approximately 350 feet south of Brockway Road. At the driveway location Winter Creek Loop is approximately 22 feet in width, and the sight distance is acceptable looking both north and south, so long as vegetation remains trimmed.

A multi-use path is located on the east side of Winter Creek Loop and is separated from the roadway by approximately two feet of dirt. The path would cross the proposed access driveway.

The intersection of Brockway Road/ Winter Creek is stop-controlled on the Winter Creek Loop approach. Brockway Road has a speed limit of 45 mph in the vicinity of the project. The Winter Creek Loop approach to the intersection is flared and has a width of 41 feet. A westbound left turn lane is provided at the intersection.

This study is based on typical peak summer traffic conditions. Due to the timing of this project, new summer counts could not be conducted. PM Peak Hour turning-movement counts were conducted by LSC on Wednesday May 31, 2023, from 3:00 PM to 6:00 PM. The PM peak hour occurred from 4:30 PM to 5:30 PM. As the volumes were collected in the spring, a seasonal adjustment factor of 39 percent increase was calculated based on season variation at the closest Caltrans station (SR 267/Brockway Road). The through volumes on Brockway Road were adjusted and the resulting 'existing no-project' intersection volumes are shown in Table 1.

	North	bound	Eastb	ound	West		
	Left	Right	Thru	Right	Left	Thru	Total
Existing 2023	1	4	596	5	11	595	1,212
Project Net Impact	6	7	0	11	10	0	34
Existing Plus Project	7	11	596	16	21	595	1,246
Future No Project	1	4	716	5	11	672	1,409
Future Plus Project	7	11	716	16	21	672	1,443

Source: LSC Transportation Consultants, Inc.

TRIP GENERATION AND DISTRIBUTION

Trip generation is the evaluation of the number of vehicle-trips that will either have an origin or destination at the project site. Standard rates from the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 11th Edition* (2021) were used for the analysis. The most appropriate land use category for these units is ITE Code 220 – Multifamily Housing (Low-Rise).

Non-auto trips, such as trips made to/from the site via bike, walking or transit, reduce the number of vehicle trips generated by the project. The project is located less than one mile from Downtown Truckee. Due to the project's location relative to businesses/shops/restaurants as well as the Truckee River Regional Park, the connecting bike and pedestrian paths, and near-by bus stops, a conservative reduction of 10 percent non-auto travel is applied to the residential units.

Multiplying the land use quantities by the trip rates and applying reductions for non-auto trips yields the vehicle trips generated at the site driveways for proposed project conditions. As

shown in Table 2, the proposed land uses are forecasted to generate a total of approximately 243 one-way daily vehicle trips (DVTE) at the site driveways on a weekday, including 34 PM peak-hour vehicle-trips (21 inbound plus 13 outbound).

Table 2: Truc	Fable 2: Truckee Silver Creek - Trip Generation														
					Trip (Gener	ation F	Rates ¹	Percent Reduction	V S	ehicle 1 ite Driv	Frips at veways	:		
			ITE Land Use	ITE Land		PM	l Peak I	Hour	for Non-		PM	Peak H	lour		
Land Use	Quantity	Unit	Category	Use Code	Daily	In	Out	Total	Auto Access	Daily	In	Out	Total		
Multi-Family Units	40	Units	Multifamily Housing (Low- Rise)	220	6.74	T=0.43*X+20.55		10%	243	21	13	34			
									Total	243	21	13	34		

The distribution of site-generated trips is based upon observed patterns of existing traffic movements. The estimated distribution is as follows:

- 52% to/from the east (SR 267)
- 48% to/from the west (Downtown Truckee, Donner Pass Road)

The site-generated traffic volumes are assigned at the site driveway by applying the distribution percentages to the peak-hour vehicle trips. The resulting PM peak-hour traffic volumes estimated to be generated by the full buildout of the project are shown in Table 1. The project-generated peak-hour intersection turning movement volumes are then added to the 'existing no-project' volumes, yielding the 'existing with project' peak-hour intersection traffic volumes presented in Table 1.

FUTURE CONDITIONS

To estimate the future background traffic volumes growth along Brockway Road, the Truckee TransCAD model was used. The existing model volumes were subtracted from the future General Plan model volumes on Brockway just east of Estates Drive (the closest location to Winter Creek Loop). This growth was then added to the 'existing no project' volumes to establish the 'future no project' volumes as shown in Table 1.

The project-generated peak-hour intersection turning movement volumes are then added to the 'future no-project' volumes, yielding the 'future plus project' peak-hour intersection traffic volumes presented in Table 1.

LEVEL OF SERVICE

Traffic operations at the study intersections were assessed in terms of level of service (LOS) and delay. LOS is a concept that was developed by transportation engineers to quantify the level of operation of intersections and roadways. LOS calculations are based on standard *Highway*

Capacity Manual 6th Edition (HCM) methodology. LOS measures are classified in grades "A" through "F," indicating the range of operation. LOS "A" signifies the best level of operation, while "F" represents the worst. Detailed LOS calculations are attached.

As stated in the Truckee 2040 General Plan, the Town's LOS standards are as follows:

"Policy M-4.4 – Establish and maintain the following summer weekday PM peak hour level of service (LOS) standards in the portions of the town that are outside of the Downtown area depicted in Figure M-6:

- LOS D or better on road segments
- Total intersection LOS D or better for signalized intersections and roundabouts
- Individual turning movements at unsignalized intersections shall not be allowed to reach LOS F and to exceed a cumulative vehicle delay of four vehicle hours. Both of these conditions shall be met for traffic operations to be considered unacceptable.

As shown in Table 3, the study intersection attains the LOS threshold under all scenarios.

Table 3: Truckee Silver Creek - Intersection LOS Summary at Brockway Road/Winter Creek Loop														
			No Proj	ect	With Pro	oject								
			Delay		Delay									
Scenario	Control	Threshold ¹	(sec/veh)	LOS	(sec/veh)	LOS								
Existing Year	TWSC	F	15.4	С	19.3	С								
Future Year	TWSC	F	18.1	С	23.9	С								
BOLD text indica	ates that LO	S standard is e	exceeded.											
TWSC = Two-Wa	y Stop-Cont	rolled												
Note 1: Level of service threshold for unsignalized intersections (not including roundabouts) in the Town of Truckee outside of downtown are exceeded if Level of Service is F and 4 hours of vehicle delay is exceeded.														
Source: LSC Trans	sportation (Consultants, Inc	:											

INTERSECTION QUEUING ANALYSIS

Traffic queues that exceed the storage capacity of turn lanes or ramps, or that block turn movements at important nearby intersections or driveways can cause operational problems beyond those identified in the LOS analysis. The 95th-percentile traffic queue lengths (the length that is only exceeded 5 percent of the time during the analysis period) were reviewed for

the northbound left and the westbound left where queuing could potentially interfere with adjacent roads or driveways. The results indicate that no traffic queuing issues are identified. All 95th percentile queues were less than one car length.

TURN LANE WARRANTS

Traffic volumes at the site access intersection were reviewed regarding the need for new tun lanes along Brockway Road. The need for left-turn lanes at the project site driveways is evaluated using the American Association of State Highway Transportation Officials (AASHTO) guidelines. According to the guidelines, westbound left-turn treatment is warranted for all project scenarios along Brockway Road. As a westbound left-turn lane is currently provided, no additional turn lanes are necessary.

Right-turn lane warrants are based on a comparison of right-turning vehicles compared to the total volume of advancing vehicles (traveling in the same direction). The peak-hour traffic volumes do not meet the warrant for the addition of a right turn lane on Brockway Road under any project scenario.

CONCLUSIONS

The results of this analysis are as follows:

- The total number of trips generated by the project would be 243 daily trips with 34 occurring in the peak hour.
- The study intersection LOS is adequate under all project scenarios existing and future.
- There are no queuing concerns identified with the project.
- No additional turn lanes are warranted.

Respectfully Submitted,

LSC TRANSPORTATION CONSULTANTS, INC.

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Leslie Suen, PE, Associate

Encl: LOS Calculations

		H	HCS ⁻	Two-	Way	Stop	-Cor	ntrol	Repo	ort									
General Information							Site	Inforr	natio	n									
Analyst	SMB						Inters	ection			Brock	way Rd	/ Winter	Creek L					
Agency/Co.	LSC						Jurisc	liction				- j							
Date Performed	6/19/	2023					East/	West Stre	eet		Brock	way Roa	ad						
Analysis Year	2023						North	n/South	Street		Winter Creek Loop								
Time Analyzed	PM P	eak Hou	ır				Peak	Hour Fac	ctor		0.92	0.92							
Intersection Orientation	East-	West					Analy	sis Time	Period (hrs)	1.00								
Project Description	Truck	ee Silve	r Creek -	Existing	No Proj	ect													
Lanes	anes																		
				<u> 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 </u>	ň ň Mai	Y or Street: Ea	st-West	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1											
Vehicle Volumes and Adj	ustme	nts																	
Approach		East	oound			West	bound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0			
Configuration				TR		L	Т				LR								
Volume (veh/h)			596	5		11	595			1		4							
Percent Heavy Vehicles (%)						0				0		0							
Proportion Time Blocked																			
Percent Grade (%)								0											
Right Turn Channelized																			
Median Type Storage				Undi	vided														
Critical and Follow-up He	eadwa	ys																	
Base Critical Headway (sec)						4.1				7.1		6.2							
Critical Headway (sec)						4.10				6.40		6.20							
Base Follow-Up Headway (sec)						2.2				3.5		3.3							
Follow-Up Headway (sec)						2.20				3.50		3.30							
Delay, Queue Length, and	d Leve	l of S	ervice																
Flow Rate, v (veh/h)	<u> </u>		T			12					5								
Capacity, c (veh/h)						943					350								
v/c Ratio						0.01					0.02								
95% Queue Length, Q ₉₅ (veh)						0.0					0.0								
Control Delay (s/veh)						8.9	0.1				15.4								
Level of Service (LOS)						A	А				С			<u> </u>					

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Approach Delay (s/veh)

Approach LOS

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0.3

А

15.4

С

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		ł	HCS ⁻	Two-	Way	Stop	o-Cor	ntrol	Repo	ort									
General Information							Site	Inforr	natio	n									
Analyst	SMB						Inters	ection			Brock	wav Rd	/ Winter	Creek L	000				
Agency/Co.	LSC						Jurisc	liction											
Date Performed	6/19/	/2023					East/	West Stre	eet		Brock	way Roa	ad						
Analysis Year	2023						North	n/South :	Street		Winte	er Creek	Loop						
Time Analyzed	PM P	eak Hou	ır				Peak	Hour Fac	ctor		0.92								
Intersection Orientation	East-	West					Analy	sis Time	Period ((hrs)	1.00								
Project Description	Truck	ee Silve	r Creek -	Existing	Plus Pro	oject													
Lanes																			
				J 4 4 4 4 4 4 4	n Maj	۲ or Street: Ea	t ≁ r ıst-West	1 1 4 4 7 1 4 7											
Vehicle Volumes and Ad	justme	nts																	
Approach		East	bound			West	bound			North	bound			South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R			
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0			
Configuration				TR		L	Т				LR				<u> </u>	<u> </u>			
Volume (veh/h)			596	16		21	595			7		11				<u> </u>			
Percent Heavy Vehicles (%)						0				0		0			<u> </u>	<u> </u>			
Proportion Time Blocked																			
Percent Grade (%)											0								
Right Turn Channelized																			
Median Type Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)						4.1				7.1		6.2							
Critical Headway (sec)						4.10				6.40		6.20							
Base Follow-Up Headway (sec)						2.2				3.5		3.3							
Follow-Up Headway (sec)						2.20				3.50		3.30							
Delay, Queue Length, an	d Leve	l of S	ervice	•															
Flow Rate, v (veh/h)	T					23					20								
Capacity, c (veh/h)						934					272								
v/c Ratio						0.02					0.07								
95% Queue Length, Q ₉₅ (veh)						0.1					0.2								
Control Delay (s/veh)						9.0	0.2				19.3								
Level of Service (LOS)			1			A	А				С		1			1			

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Approach Delay (s/veh)

Approach LOS

0.5

А

19.3

С

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		ł	HCS	Iwo-	Way	Stop	-Cor	ntrol	Керс	ort								
General Information							Site	Inform	natio	n								
Analyst	SMB						Inters	ection			Brock	way Rd	/ Winter	Creek Lo	ор			
Agency/Co.	LSC						Jurisd	liction										
Date Performed	6/19/	2023					East/\	West Stre	eet		Brock	way Roa	bad					
Analysis Year	2023						North	n/South S	Street		Winte	er Creek Loop						
Time Analyzed	PM P	eak Hou	r				Peak	Hour Fac	ctor		0.92							
Intersection Orientation	East-	Nest					Analy	sis Time	ne Period (hrs) 1.00									
Project Description	Truck	ee Silver	Creek -	Future N	lo Proje	ct												
Lanes																		
Vehicle Volumes and Adj	ustme	nts		7 4 1 7	۲. ۱۹ Maju	Y Y or Street: Ea	st-West	ት ኑ ር ሆ										
Approach		Eastk	ound			West	oound		Northbound				South	bound				
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0		
Configuration				TR		L	T				LR							
Volume (veh/h)			716	5		11	672			1		4						
Percent Heavy Vehicles (%)				<u> </u>		0	<u> </u>		<u> </u>	0		0	<u> </u>					
Proportion Time Blocked											0							
Percent Grade (%)									<u> </u>		0							
Median Turne Storage																		
Critical and Follow up H	Median Type Storage Undivided																	
	adwa	VC																
Dase Critical Headway (sec)	eadwa	ys				4.1				7 1		6.2						
Critical Headway (coc)	eadwa	ys				4.1				7.1		6.2						
Critical Headway (sec)	eadwa	ys				4.1 4.10				7.1 6.40		6.2 6.20						

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)			12				5			
Capacity, c (veh/h)			844				279			
v/c Ratio			0.01				0.02			
95% Queue Length, Q ₉₅ (veh)			0.0				0.1			
Control Delay (s/veh)			9.3	0.1			18.1			
Level of Service (LOS)			А	А			С			
Approach Delay (s/veh)			0	.3		18	8.1			
Approach LOS		 		4		(2		 	

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		ŀ	ICS -	Гwo-	Way	Stop	o-Cor	ntrol	Repo	ort									
General Information							Site	Inform	natio	n									
Analyst	SMB						Inters	ection			Brock	way Rd	/ Rd / Winter Creek Loop						
Agency/Co.	LSC						Jurisc	liction											
Date Performed	6/19/	2023					East/	West Str	eet		Brock	way Roa	d						
Analysis Year	2023						North	n/South	Street		Winte	er Creek	Loop						
Time Analyzed	PM P	eak Hou	r				Peak	Hour Fa	ctor		0.92								
Intersection Orientation	East-	West					Analy	sis Time	Period (hrs)	1.00								
Project Description	Truck	ee Silvei	Creek -	Future F	Plus Proj	ect													
Lanes																			
				14 t A & b		or Street: Ea	t t t	ት ት በ ካ ቁ ጭ ተ ተ											
Vehicle Volumes and Ad	justme	nts																	
Approach		Eastk	ound			West	bound		Northbound				Southbound						
Movement	U	L	Т	R	U	L T R			U	L	Т	R	U	L	Т	R			
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12			
Number of Lanes	0	0	1	0	0	1	1	0		0	1	0		0	0	0			
Configuration				TR		L	Т				LR								
Volume (veh/h)			716	16		21	672			7		11							
Percent Heavy Vehicles (%)						0				0		0							
Proportion Time Blocked																			
Percent Grade (%)											0								
Right Turn Channelized																			
Median Type Storage				Undi	vided														
Critical and Follow-up H	eadwa	ys																	
Base Critical Headway (sec)						4.1				7.1		6.2							
Critical Headway (sec)						4.10				6.40		6.20							
Base Follow-Up Headway (sec)						2.2				3.5		3.3							
Follow-Up Headway (sec)						2.20				3.50		3.30							
Delay, Queue Length, an	d Leve	l of S	ervice																
Flow Rate, v (veh/h)						23					20								
Capacity, c (veh/h)						835					210								
v/c Ratio						0.03					0.09								
95% Queue Length, Q ₉₅ (veh)						0.1					0.3								

Control Delay (s/veh)

Level of Service (LOS)

Approach LOS

Approach Delay (s/veh)

0.5

А

0.2

А

9.4

А

23.9

С

23.9

С