

April 14, 2017

Mr. Guy Byrne Leslie Rudd Investment Company, Inc. PO Box 105 Oakville, CA 94562-0105

Level of Service Analysis for Rudd Wines Winery & Tasting Room

Dear Mr. Byrne;

As requested by County of Sonoma staff, W-Trans has prepared an operational analysis for the Rudd Wines Winery & Tasting Room project. This work builds on information presented in the "Revised Traffic Study for Rudd Wines Winery & Tasting Room," May 11, 2016, W-Trans. Following are our findings.

Level of Service Methodology

The roadway segment Level of Service methodology found in Chapter 15, "Two-Lane Highways," of the *Highway Capacity Manual*, 2010, is the basis of the automobile LOS analysis. The methodology considers traffic volumes, terrain, roadway cross-section, the proportion of heavy vehicles, and the availability of passing zones. Westside Road was considered a Class II highway facility as motorists do not necessarily expect to travel at high speeds on these types of roadways, which often function as scenic or recreational routes and typically serve shorter trips. The measure of effectiveness by which Level of Service is determined on a Class II highway is percent time spent following (PTSF), or the proportion of time that drivers on the highway are limited in their speed by a driver in front of them.

A summary of the breakpoints for the PTSF (and Percent of Free-Flow Speed, or PFFS, for Class III Highways) is shown in Table 1.

Table	Table 1 – Two-Lane Highway Level of Service Criteria					
LOS	Class I Highways	Class II Highways	Class III Highways			
	PTSF (%)	PTSF (%)	PFFS (%)			
Α	≤35	≤40	>91.7			
В	>35-50	>40-55	>83.3-91.7			
C	>50-65	>55-70	>75.0-83.3			
D	>65-80	>70-85	>66.7-75.0			
E	>80	≤85	≤66.7			

Notes: LOS = Level of Service; PTSF = Percent Time Spent Following

PFFS = Percent of Free-Flow Speed

Reference: Highway Capacity Manual, Transportation Research Board, 2010

The Level of Service criterion for County roadway operations is to maintain a Level of Service C per Policy CT-3.1. For purposes of the analysis it was assumed that no passing is allowed in the study segment; in other words, the "no passing" zone represents 100 percent of the study segment.

Existing Conditions

Traffic counts were provided by County staff for Westside Road north of Felta Road; copies of this data are enclosed. These volumes are substantially higher than the counts obtained further south, near the site, so were

used to present a more conservative assessment. It is noted that counts as well as future volumes are only readily available for a weekday, so the following assessment represents this time period only. It is further noted that weekday p.m. peak hour counts are typically higher than weekend counts, so this time period normally reflects worst case conditions. Based on this available data, Westside Road carried 364 vehicles during the p.m. peak hour, which translates to LOS C operation in both directions.

The LOS results as well as the volumes on which they are based are summarized in Table 2 and copies of the calculations for all scenarios are enclosed for reference.

Table 2 – Two-Lane Highway Levels of Service for Westside Road (Felta Road to Mill Creek Road)						
Scenario	Northbound			Southbound		
	Volume	PTSF	LOS	Volume	PTSF	LOS
Existing Conditions	187	59.5	С	177	57.8	С
Existing plus Project plus Event Conditions	226	61.9	C	232	62.1	C
Future Conditions	257	64.8	C	250	63.1	C
Future plus Project plus Event Conditions	296	65.1	C	305	66.5	C

Notes: LOS determined using the Two-Lane Highway methodology from the Highway Capacity Manual, 2010

Future Conditions

Future volumes on this segment of Westside Road were obtained from the travel demand model maintained by the Sonoma County Transportation Authority (SCTA). Based on the data reviewed, an estimated future volume of 507 vehicles per hour was used for the analysis, resulting in continued LOS C operation in both directions.

Plus Project Conditions

The proposed project is expected to generate 54 weekday peak hour trips during harvest, with 15 in (southbound) and 39 out (northbound). Assuming that a 100-person special event would begin during the weekday peak hour, and conservatively assigning all trips to one direction (southbound, from Healdsburg), 40 event-related trips were added to the trips associated with typical daily operation. It is noted that some employees would likely remain at the site for an event, if one were to start during the peak hour, but no deductions were taken to reflect this. Even using these conservative assumptions, Westside Road would be expected to continue operating at LOS C in both directions upon adding project-generated trips to either existing or future volumes.

Conclusions

- Westside Road is currently operating at LOS C and is expected to continue doing so in the future, including the worst case analysis of adding trips associated with operation of the winery during harvest together with a 100-person event.
- Traffic volumes on weekend days would be expected to be less than those during the weekday p.m. peak commute
- Volumes would need to increase beyond the levels projected for 2040 and using a worst case assessment with
 trips added based on both the harvest-period trip generation and a special event; this condition would be
 unlikely to occur even once a year. It therefore appears reasonable to conclude that the project has a lessthan-significant impact on traffic operation.

TR001552

We appreciate the opportunity to provide these services. Please call us if you have any questions.

Sincerely,

Dalene J. Whitlock, PE, PTOE

Principal

DJW/lgd/SOX508.L2

Enclosures: Traffic Counts

Two-Lane Highway LOS Calculations

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 9417 Street: 8001 State: City: Westside Rd County: N/Felta Rd	(Begin: 08/ Lane: 20.9 Oper: N/B Posted: 45 AADT Fact	00	2:00	End: 08/24/20' Hours: 48:00 Period: 60 Raw Count: 29 AADT Count: 1	96
NC47		18	0	paper.	53 F	Re
Date & Time Range	C	ount	Avg S	peed	Temp	Wet/Dry
08/22/2012				- Napas		
[12:00-13:00]		95	0	mph	121 F	Dry
[13:00-14:00] —	(176	0	mph	128 F	Dry
[14:00-15:00]		104	0	mph	132 F	Dry
[15:00-16:00]		144	0	mph	128 F	Dry
[16:00-17:00]		151	0	mph	101 F	Dry
[17:00-18:00]		114	0	mph	91 F	Dŋ
[18:00-19:00]		56	0	mph	83 F	Dry
[19:00-20:00]		122	0	mph	78 F	Dry
[20:00-21:00]		18	0	mph	74 F	Dry
[21:00-22:00]		13	0	mph	70 F	∘ Dry
[22:00-23:00]		6	0	mph	68 F	Dry
[23:00-00:00]		8	0	mph	68 F	Dry
08/23/2012				300 Table 1		
[00:00-01:00]		4	0	mph	68 F	Dry
[01:00-02:00]		0	0	mph	68 F	Dry
[02:00-03:00]		2	0	mph	68 F	Dry
[03:00-04:00]		1	0	mph	66 F	Dry
[04:00-05:00]		7	0	mph	66 F	Dry
[05:00-06:00]		15	0	mph	64 F	Dn
[06:00-07:00]		34	0	mph	64 F	Dry
[07:00-08:00]		72	0	mph	64 F	Dry
[08:00-09:00]-	/	155	0	mph	68 F	Dry
[09:00-10:00]		47	0	mph	74 F	Dŋ
[10:00-11:00]		86	0	mph	74 F	Dr
[11:00-12:00]		93	0	mph	101 F	Dr
[12:00-13:00]		93	0	mph	119 F	Dr
[13:00-14:00]		91	0	mph	126 F	Dry
[14:00-15:00] =	(187	0	mph	130 F	Dr
[15:00-16:00]	_	136	0	mph	128 F	Dr
[16:00-17:00]		153	0	mph	101 F	Dr
[17:00-18:00]		112	0	mph	91 F	Dr
[18:00-19:00]		63	0	mph	83 F	Dr
[19:00-20:00]		27	0	mph	78 F	Dr
[20:00-21:00]		27	0	mph	76 F	Dr
[21:00-22:00]		24	0	mph	72 F	Dr
[22:00-23:00]	ADT = 1447	13	0	mph	70 F	Dr
[23:00-00:00]		5	0	mph	66 F	Dr
08/24/2012						
[00:00-01:00]		0	0	mph	66 F	Dr
[01:00-02:00]		0	0		64 F	Dr

Thor

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 3959 Street: 8001 State: City: Westside Rd County: N/Felta Rd		Begin: 08 Lane: 20. Oper: S/E Posted: 4 AADT Fac	5	12:00	End: 08/24/20 Hours: 48:00 Period: 60 Raw Count: 30 AADT Count:	047
NC47		21	0	mpal	98 0	Dn
Date & Time Range		Count	Avg S	peed	Temp	Wet/Dry
08/22/2012		7 T 186		- Annah	98.6	
[12:00-13:00]		80	0	mph	125 F	Dry
[13:00-14:00] -		158	0	mph	130 F	Dry
[14:00-15:00]		106	0	mph	132 F	Dry
[15:00-16:00]		122	0	mph	103 F	Dry
[16:00-17:00]		102	0	mph	91 F	Dry
[17:00-18:00]		100	0	mph	85 F	Dry
[18:00-19:00]		98	0	mph	80 F	Dry
[19:00-20:00]		43	0	mph	76 F	Dry
[20:00-21:00]		35	0	mph	70 F	Dry
[21:00-22:00]		25	0	mph	68 F	Dry
[22:00-23:00]		14	0	mph	66 F	Dry
[23:00-00:00]		10	0	mph	66 F	Dry
08/23/2012						La
[00:00-01:00]		5	0	mph	66 F	Dry
[01:00-02:00]		3	0	mph	66 F	Dry
[02:00-03:00]		0	0	mph	66 F	Dry
[03:00-04:00]		2	0	mph	66 F	Dry
[04:00-05:00]		2	0	mph	64 F	Dry
[05:00-06:00]		28	0	mph	62 F	Dry
[06:00-07:00]		69	0	mph	62 F	Dry
[07:00-08:00]		93	0	mph	62 F	Dry
[08:00-09:00] -		175	0	mph	66 F	Dry
[09:00-10:00]		73	0	mph	72 F	Dry
[10:00-11:00]		77	0	mph	85 F	Dry
[11:00-12:00]		111	0	mph	111 F	Dry
[12:00-13:00]		99	0	mph	121 F	Dry
[13:00-14:00]		90	0	mph	128 F	Dry
[14:00-15:00] —		177	0	mph	128 F	Dry
[15:00-16:00]		126	0	mph	101 F	Dry
[16:00-17:00]		104	0	mph	91 F	Dry
[17:00-18:00]		70	0	mph	85 F	Dry
[18:00-19:00]		65	0	mph	82 F	Dry
[19:00-20:00]		46	0	mph	76 F	Dry
[20:00-21:00]		39	0	mph	72 F	Dry
[21:00-22:00]	ADT = 1621	20	0	mph	70 F	Dry
[22:00-23:00]	ADI - 1021	16	0	mph	66 F	Dry
[23:00-00:00]		5	0	mph	64 F	Dry
08/24/2012						
[00:00-01:00]		3	0	mph	62 F	Dry
[01:00-02:00]		2	0	mph	62 F	Dry

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DINLOTI	ONAL TWO-LANE HIGHWA	AT SEGMENT WORK	3HEE I	
General Information		Site Information		
Analyst Agency or Company	Dalene Whitlock W-Trans	Highway / Direction of Travel From/To	Westside Road	
Date Performed	4/10/2017	Jurisdiction	Sonoma County	
Analysis Time Period Project Description: Rudd Wines W	Weekday Peak Period	Analysis Year	2014	
Input Data	vinory			
· 				
	\$\frac{1}{2} \text{ Shoulder width } \tag{tt}		_	
	Lane width ft	Class I hi	ighway 🗹 Class II	
28 20 30 30 30 30 30 30 30 30 30 30 30 30 30	Lane widthtt Shoulder widthtt	highway 🗌 (Class III highway	
L		Terrain	Level Rolling	
Segment le	ngth, L _t mi	Grade Length Peak-hour fac No-passing zo		
Analysis direction vol., V _d 1	187veh/h	Show North Arrow % Trucks and	Buses , P _T 4 %	
•	177veh/h	% Recreations	•	
Shoulder width ft	0.0	Access points	.,	
Lane Width ft 10 Segment Length mi 2.	0.0 0			
Average Travel Speed				
· · · · · · · · · · · · · · · · · · ·		Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks	s, E _T (Exhibit 15-11 or 15-12)	2.3	2.3	
Passenger-car equivalents for RVs,	E _R (Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, f _H \	_{V,ATS} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.948	0.948	
Grade adjustment factor ¹ , f _{g,ATS} (E	xhibit 15-9)	0.76	0.75	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* f _{g,ATS} * f _{HV,ATS})	288	277	
Free-Flow Speed	from Field Measurement	Estimated Fre	e-Flow Speed	
		Base free-flow speed ⁴ , BFFS	45.0 mi/h	
		Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 5.3 mi/h	
Mean speed of sample ³ , S _{FM} Total demand flow rate, both direction	one W	Adj. for access points ⁴ , f _A (Exhibit 15-8) 1.5 mi/h		
Free-flow speed, FFS=S _{FM} +0.00776		Free-flow speed, FFS (FSS=BFF	S-f _{1.6} -f _{4.}) 38.2 mi/h	
	*	Average travel speed, ATS _d =FFS	20 /.	
Adj. for no-passing zones, f _{np,ATS} (E	EXHIBIT 19-19) 3.9 IIII/II		30.3 mi/h	
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	79.4 %	
Percent Time-Spent-Following		•		
		Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks	s, E _T (Exhibit 15-18 or 15-19)	1.7	1.8	
Passenger-car equivalents for RVs,	E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{H\}	_V =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.973	0.969	
Grade adjustment factor ¹ , f _{g,PTSF} (E	Exhibit 15-16 or Ex 15-17)	0.80	0.80	
Directional flow rate ² , $v_i(pc/h)$ $v_i=V_i/(h)$	(PHF*f _{HV,PTSF} * f _{g,PTSF})	267	254	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)		28.9		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		59	9.7	
Percent time-spent-following, PTSF $_{\rm d}$ (%)=BPTSF $_{\rm d}$ +f $_{\rm np,PTSF}$ *(v $_{\rm d,PTSF}$ / v $_{\rm d,PTSF}$ +		50	9.5	
v _{o,PTSF})		3.		
Level of Service and Other Perfor Level of service, LOS (Exhibit 15-3)		ı		
			C	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.4
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	207.8
Effective width, Wv (Eq. 15-29) ft	10.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.97
Bicycle level of service (Exhibit 15-4)	Е
Notes	

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If $v_i(v_d \text{ or } v_o) >= 1,700 \text{ pc/h}$, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

	NAL TWO-LANE HIGHWA		SHEET	
General Information		Site Information		
Analyst Agency or Company Date Performed	Dalene Whitlock W-Trans 4/10/2017	Highway / Direction of Travel From/To Jurisdiction	Westside Road Mill Creek to Felt (SB) Sonoma County	
Analysis Time Period	Weekday Peak Period	Analysis Year	2014	
Project Description: Rudd Wines Wine	ry			
Input Data	7			
	Shoulder widthft			
-	Lane widthft	Class I h	ighway 🗹 Class II	
	Lane widthtt	highway	Class III highway	
	Shoulder widthtt	Terrain	Level Rolling	
Segment length	, L ₁ mi	Grade Length Peak-hour fac No-passing zo	mi Up/down ctor, PHF <i>0.90</i>	
Analysis direction vol., V _d 177v	eh/h	Show North Arrow % Trucks and	Buses , P _T 4 %	
Opposing direction vol., V 187v	eh/h	% Recreation	al vehicles, P _R 3%	
Shoulder width ft 0.0		Access points	• • •	
Lane Width ft 10.0 Segment Length mi 1.0				
Average Travel Speed				
		Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E-	_Γ (Exhibit 15-11 or 15-12)	2.3	2.3	
Passenger-car equivalents for RVs, E _R	(Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, f _{HV,AT}	$_{S}$ =1/(1+ $P_{T}(E_{T}$ -1)+ $P_{R}(E_{R}$ -1))	0.948	0.948	
Grade adjustment factor ¹ , f _{g,ATS} (Exhib	it 15-9)	0.75	0.76	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		277	288	
Free-Flow Speed fro	m Field Measurement	Estimated Fre	e-Flow Speed	
		Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Manager and of assertal C		Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 5.3 <i>mi/h</i>	
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions,	V	Adj. for access points ⁴ , f _A (Exhibit 15-8) 1.5 mi/h		
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> /		Free-flow speed, FFS (FSS=BFFS- f_{LS} - f_{Δ}) 38.2 mi/t		
	,	Average travel speed, ATS _d =FFS	20 //	
Adj. for no-passing zones, f _{np,ATS} (Exhil	5.4 min	v _{o.ATS}) - f _{np.ATS}	30.4 mi/h	
Developed Times Count Following		Percent free flow speed, PFFS	79.5 %	
Percent Time-Spent-Following		Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E-	(Exhibit 15-18 or 15-19)	1.8	1.7	
Passenger-car equivalents for RVs, E _R	(Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/	(1+ P _T (E _T -1)+P _R (E _R -1))	0.969	0.973	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhil	oit 15-16 or Ex 15-17)	0.80	0.80	
Directional flow rate ² , $v_i(pc/h)$ $v_i=V_i/(PHI)$	•	254	267	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)		28.7		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		5	9.7	
Percent time-spent-following, PTSF $_{\rm d}$ (%)=BPTSF $_{\rm d}$ +f $_{\rm np,PTSF}$ *(v $_{d,{\rm PTSF}}$ / v $_{d,{\rm PTSF}}$ +		5	7.8	
V _{o,PTSF})	W			
Level of Service and Other Performal	nce Measures	1	C	
Level of service, LOS (Exhibit 15-3)		Ī	U	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	196.7
Effective width, Wv (Eq. 15-29) ft	10.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.94
Bicycle level of service (Exhibit 15-4)	Е
Notes	

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If $v_i(v_d \text{ or } v_o) >= 1,700 \text{ pc/h}$, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWA	1	VOUCEI	
General Information Dalene Whitlock Analyst Dalene Whitlock Agency or Company W-Trans Date Performed 4/10/2017 Analysis in Time Parish Weather the Periods of t	Site Information Highway / Direction of Travel From/To Jurisdiction	Westside Road Felta to Mill Creek (NB) Sonoma County	
Analysis Time Period Weekday + Project + Event Project Description: Rudd Wines Winery	Analysis Year	2014	
Input Data			
Shoulder width tt Lane width tt Lane width tt Shoulder width tt Shoulder width tt Shoulder width tt Shoulder width tt Segment length, L ₁ mi Analysis direction vol., V _d 226veh/h Opposing direction vol., V. 232veh/h	highway Terrain Grade Lengt Peak-hour fa No-passing z % Trucks an	octor, PHF 0.90 zone 100%	
Opposing direction vol., V _o 232veh/h Shoulder width ft 0.0 Lane Width ft 10.0 Segment Length mi 2.0	Access point	• •	
Average Travel Speed	<u> </u>		
<u> </u>	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	2.2	2.2	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, $f_{HV,ATS}$ =1/ (1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	0.951	0.951	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.79	0.80	
Demand flow rate ² , $v_i(pc/h) v_i = V_i / (PHF^* f_{g,ATS}^* f_{HV,ATS})$	334	339	
Free-Flow Speed from Field Measurement	1	ee-Flow Speed	
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, <i>v</i> Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.1 mi/h	Base free-flow speed ⁴ , BFFS 55.0 $^{\circ}$ Adj. for lane and shoulder width, 4 f _{LS} (Exhibit 15-7) 5.3 $^{\circ}$ Mdj. for access points ⁴ , f _A (Exhibit 15-8) 1.5 $^{\circ}$ Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 48.2 $^{\circ}$ Average travel speed, ATS _d =FFS-0.00776($^{\circ}$ d,ATS + $^{\circ}$ V _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 82.7 5.0 $^{\circ}$		
Percent Time-Spent-Following	T	T	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.7	1.7	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0 0.973	1.0 0.973	
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ P_T (E_T -1)+ P_R (E_R -1)) Grade adjustment factor ¹ , $f_{\alpha,PTSF}$ (Exhibit 15-16 or Ex 15-17)	0.83	0.83	
Directional flow rate ² , v/(pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	311	319	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	34.7		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	55.1		
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} /v _{d,PTSF} +		61.9	
V _{o,PTSF})			
Level of Service and Other Performance Measures Level of service, LOS (Exhibit 15-3)		С	
Volume to capacity ratio, <i>v/c</i>		0.53	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	82.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	251.1
Effective width, Wv (Eq. 15-29) ft	10.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	5.06
Bicycle level of service (Exhibit 15-4)	Е
Notes	

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If $v_i(v_d \text{ or } v_o) >= 1,700 \text{ pc/h}$, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

	NAL TWO-LANE HIGHWA	1	OHLLI
General Information		Site Information	
Analyst Agency or Company	Dalene Whitlock W-Trans	Highway / Direction of Travel From/To	Westside Road Mill Creek to Felt (SB)
Date Performed	4/10/2017	Jurisdiction	Sonoma County
Analysis Time Period	Existing plus Project	Analysis Year	2014
Project Description: Rudd Wines Wir	pery		
Input Data		•	
	1 Shoulder width ft		
-	Lane width ft		
	Lane width ft	Class I h	
***	Shoulder width ft	highway 🔲	Class III highway
		Terrain	Level Rolling
Segment lend	th, L _t mi	Grade Length	mi Up/down
1		Peak-hour fact No-passing zo	
A	2	Show North Arrow % Trucks and	
Analysis direction vol., V _d 23.	2veh/h	70 Trucks and	•
-11 3 , 0	6veh/h		al vehicles, P _R 3%
Shoulder width ft 0.0 Lane Width ft 10.0		Access points	<i>mi</i> 6/mi
Segment Length mi	,		
Average Travel Speed			
·		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks,	E _T (Exhibit 15-11 or 15-12)	2.2	2.2
Passenger-car equivalents for RVs, E	R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, f _{HV,}	$_{\rm TS}$ =1/(1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	0.951	0.951
Grade adjustment factor ¹ , f _{g,ATS} (Exh	ibit 15-9)	0.80	0.79
Demand flow rate ² , v_i (pc/h) v_i = V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		339	334
Free-Flow Speed f	rom Field Measurement	Estimated Fre	e-Flow Speed
		Base free-flow speed ⁴ , BFFS	45.0 mi/h
		Adj. for lane and shoulder width, ⁴	f _{1.0} (Exhibit 15-7) 5.3 <i>mi/h</i>
Mean speed of sample ³ , S _{FM}		Adj. for access points ⁴ , f _Δ (Exhibi	
Total demand flow rate, both direction	s, v	1	
Free-flow speed, FFS=S _{FM} +0.00776(// f _{HV,ATS})	Free-flow speed, FFS (FSS=BFF	S-f _{LS} -f _A) 38.2 mi/h
Adj. for no-passing zones, f _{np.ATS} (Ex	nibit 15-15) 3.1 mi/h	Average travel speed, ATS _d =FFS	i-0.00776(v _{d.ATS} +
пр,дто	,	v _{o,ATS}) - f _{np,ATS}	``d,ATS
		Percent free flow speed, PFFS	78.1 %
Percent Time-Spent-Following			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks,	E _T (Exhibit 15-18 or 15-19)	1.7	1.7
Passenger-car equivalents for RVs, E	R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =	1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.973	0.973
Grade adjustment factor ¹ , f _{g,PTSF} (Ex	nibit 15-16 or Ex 15-17)	0.83	0.83
Directional flow rate ² , v _i (pc/h) v _i =V _i /(P	HF*f _{HV,PTSF} * f _{g,PTSF})	319	311
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)		34.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		5	5.1
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f $_{\rm np,PTSF}$ *($_{\rm d,PTSF}$ / $_{\rm d,PTSF}$ +			2.1
v _{o,PTSF})		0.	<u>. </u>
Level of Service and Other Perform	ance Measures		
Level of service, LOS (Exhibit 15-3)			С
Volume to capacity ratio, <i>v/c</i>		0	.53

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	257.8
Effective width, Wv (Eq. 15-29) ft	10.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	5.08
Bicycle level of service (Exhibit 15-4)	E
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If $v_i(v_d \text{ or } v_o) >= 1,700 \text{ pc/h}$, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

	ONAL TWO-LANE HIGHWA		
General Information		Site Information	
Analyst	Dalene Whitlock	Highway / Direction of Travel	Westside Road
Agency or Company Date Performed	W-Trans 4/10/2017	From/To Jurisdiction	Felta to Mill Creek (NB) Sonoma County
Analysis Time Period	Weekday Plus Project & Event	Analysis Year	2014
Project Description: Rudd Wines W		,	
Input Data			
	Shoulder widthft		
-	t Lane width	Class I I	nighway 🗹 Class II
	Lane width ft		Class III highway
	Shoulder widthft	I Ingriway 🗆	
-		/ Terrain	Level Rolling
Segment ler	ngth, L _t mi	Grade Length	
ş l		Peak-hour fa No-passing z	ctor, PHF 0.90 one 100%
		Ct. M. d. A.	
Analysis direction vol., V _d 2	57veh/h	% Trucks and Buses , P _T 4 %	
Opposing direction vol., V _o 2	<i>50</i> veh/h	% Recreation	nal vehicles, P _R 3%
Shoulder width ft 0	0.0	Access points	s <i>mi</i> 6/mi
	0.0		
Segment Length mi 2.0 Average Travel Speed	0		
Average Traver Opecu		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks	s. E ₊ (Exhibit 15-11 or 15-12)	2.1	2.1
Passenger-car equivalents for RVs,	•	1.1	1.1
		0.955	0.955
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$ Grade adjustment factor ¹ , $f_{g,ATS}$ (Exhibit 15-9)		0.82	0.81
Demand flow rate ² , v_i (pc/h) v_i = V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		365	359
Free-Flow Speed from Field Measurement		Estimated Fro	ee-Flow Speed
		Base free-flow speed ⁴ , BFFS	55.0 mi//
		Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 5.3 <i>mi/h</i>
Mean speed of sample ³ , S _{FM}			
Total demand flow rate, both direction	ons, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 1.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776	S(V/fin/ATC)	Free-flow speed, FFS (FSS=BFI	FS-f _{I.S} -f _A) 48.2 <i>mi/l</i>
• • • • • • • • • • • • • • • • • • • •	,	Average travel speed, ATS _d =FFS	25 /.
Adj. for no-passing zones, f _{np,ATS} (E	(xhibit 15-15) 3.0 mi/h		39.6 mi/l
		v _{o,ATS}) - f _{np,ATS}	
		Percent free flow speed, PFFS	82.2 %
Percent Time-Spent-Following		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks	s, E ₊ (Exhibit 15-18 or 15-19)	1.7	1.7
Passenger-car equivalents for RVs,	'	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV}		0.973	0.973
Grade adjustment factor ¹ , f _{q,PTSF} (Exhibit 15-16 or Ex 15-17)		0.84	0.84
Directional flow rate ² , $v_f(pc/h)$ $v_i^2 = v_i^2/(PHF^*f_{HV,PTSF}^* f_{g,PTSF})$		349	340
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)		38.5	
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)		52.0	
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +			
v _{o,PTSF})			64.8
Level of Service and Other Perford	mance Measures		
Level of service, LOS (Exhibit 15-3)			С
Volume to capacity ratio, <i>v/c</i>		•	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	82.2	
Bicycle Level of Service		
Directional demand flow rate in outside lane, $v_{ m OL}$ (Eq. 15-24) veh/h	285.6	
Effective width, Wv (Eq. 15-29) ft	10.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	5.13	
Bicycle level of service (Exhibit 15-4)	E	
Notes		

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

	IAL TWO-LANE HIGHWA		SHEET
General Information		Site Information	
Analyst Agency or Company Date Performed	Dalene Whitlock W-Trans 4/10/2017	Highway / Direction of Travel From/To Jurisdiction	Westside Road Mill Creek to Felta (SB) Sonoma County
Analysis Time Period	Future	Analysis Year	2040
Project Description: Rudd Wines Winer	У		
Input Data	§ F	1	
	Shoulder widthft		
-	, Lane widthtt	Class I h	ighway 🗹 Class II
	, Lane widthtt		Class III highway
	Shoulder widthft		Level Rolling
Segment length, L _t mi		Grade Length mi Up/down Peak-hour factor, PHF 0.90 No-passing zone 100%	
Analysis direction vol., V _d 250ve	eh/h	Show North Arrow % Trucks and Buses , P _T 4 %	
Opposing direction vol., V ₀ 257ve	eh/h	% Recreation	al vehicles, P _R 3%
Shoulder width ft 0.0		Access points	• • •
Lane Width ft 10.0 Segment Length mi 1.0			
Average Travel Speed		•	
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T	(Exhibit 15-11 or 15-12)	2.1	2.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, f _{HV,ATS}	_S =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.955	0.955
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		0.81	0.82
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		359	365
Free-Flow Speed from Field Measurement		Estimated Fre	e-Flow Speed
		Base free-flow speed ⁴ , BFFS	45.0 mi/h
M		Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 5.3 <i>mi/h</i>
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions,	V	Adj. for access points ⁴ , f _A (Exhibi	t 15-8) 1.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(v/ f		Free-flow speed, FFS (FSS=BFF	·S-f _{LS} -f _A) 38.2 mi/h
Adj. for no-passing zones, f _{np.ATS} (Exhib	,	Average travel speed, ATS _d =FFS	3-0.00776(v _{d ATS} +
Adj. for no-passing zones, inp,ATS (Exhib	2.5 //////	v _{o.ATS}) - f _{np.ATS}	``d,ATS
Paragrat Time Spant Fallowing		Percent free flow speed, PFFS	77.6 %
Percent Time-Spent-Following		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T	(Exhibit 15-18 or 15-19)	1.7	1.7
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/	(1+ P _T (E _T -1)+P _R (E _R -1))	0.973	0.973
Grade adjustment factor ¹ , f _{g,PTSF} (Exhib	it 15-16 or Ex 15-17)	0.84	0.84
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})		340	349
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)		37.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		5	2.0
Percent time-spent-following, $PTSF_d(\%) = BPTSF_d + f_{np,PTSF} * (v_{d,PTSF} / v_{d,PTSF} + f_{np,PTSF}) = f_{np,PTSF} + f_{n$		6	3.1
v _{o,PTSF})			
Level of Service and Other Performan	ce Measures	<u> </u>	C
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio, v/c			U

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	77.6	
Bicycle Level of Service		
Directional demand flow rate in outside lane, $v_{ m OL}$ (Eq. 15-24) veh/h	277.8	
Effective width, Wv (Eq. 15-29) ft	10.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	5.11	
Bicycle level of service (Exhibit 15-4)	E	
Notes		

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

- 2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
- 3. For the analysis direction only and for v>200 veh/h.

- 4. For the analysis direction only
 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
 6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIO	NAL TWO-LANE HIGHWA		SHEET
General Information		Site Information	
Analyst Agency or Company Date Performed	Dalene Whitlock W-Trans 4/10/2017	Highway / Direction of Travel From/To Jurisdiction	Westside Road Felta to Mill Creek (NB) Sonoma County
Analysis Time Period	Future + Project + Event	Analysis Year	2040
Project Description: Rudd Wines Wine	ry		
Input Data	7		
	Shoulder widthft		
-	Lane widthft	Class I h	nighway 🗹 Class II
	Lane widthtt	highway	Class III highway
	I Shoulder widthtt	Terrain	Level Rolling
Segment length, L _t mi		Grade Length Peak-hour far No-passing z	n mi Up/down ctor, PHF <i>0.90</i>
Analysis direction vol., V _d 296	reh/h	Show North Arrow % Trucks and Buses , P _T 4 %	
Opposing direction vol., V _o 305v	reh/h	% Recreation	al vehicles, P _R 3%
Shoulder width ft 0.0		Access points	
Lane Width ft 10.0 Segment Length mi 2.0			
Average Travel Speed			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E	(Exhibit 15-11 or 15-12)	2.1	2.1
Passenger-car equivalents for RVs, E _R	(Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, f _{HV,AT}	_S =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.955	0.955
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		0.85	0.86
Demand flow rate ² , v_i (pc/h) v_i = V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		405	413
Free-Flow Speed from Field Measurement		Estimated Fre	ee-Flow Speed
		Base free-flow speed ⁴ , BFFS	55.0 mi/h
Manager and of assemble 3 C		Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 5.3 <i>mi/h</i>
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions,	V	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 1.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> /		Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 48.2 mi/h
	,	Average travel speed, ATS _d =FFS	20 /1
Adj. for no-passing zones, f _{np,ATS} (Exhi	510 10-10) 2.0 m/m	v _{o.ATS}) - f _{np.ATS}	' 39.2 mi/n
Paraget Time Spont Following		Percent free flow speed, PFFS	81.3 %
Percent Time-Spent-Following		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E	_T (Exhibit 15-18 or 15-19)	1.6	1.6
Passenger-car equivalents for RVs, E _R	(Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1	(1+ P _T (E _T -1)+P _R (E _R -1))	0.977	0.977
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)		0.86	0.87
Directional flow rate ² , v _f (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})		392	399
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av_d}^b)$		42.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		46.7	
Percent time-spent-following, $PTSF_d(\%) = BPTSF_d + f_{np,PTSF} * (v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$		6	S5.1
v _{o,PTSF})			
Level of Service and Other Performal	nce Measures	Ī	С
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio, <i>v/c</i>			U

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.3	
Bicycle Level of Service		
Directional demand flow rate in outside lane, $v_{ m OL}$ (Eq. 15-24) veh/h	328.9	
Effective width, Wv (Eq. 15-29) ft	10.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	5.20	
Bicycle level of service (Exhibit 15-4)	Е	
Notes		

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTION	IAL TWO-LANE HIGHWA	AT SEGIVILIAT WORK	SHEET
General Information		Site Information	
Analyst Agency or Company Date Performed	Dalene Whitlock W-Trans 4/10/2017	Highway / Direction of Travel From/To Jurisdiction	Westside Road Mill Creek to Felta (SB) Sonoma County
-	Future plus Project	Analysis Year	2040
Project Description: Rudd Wines Winer	У		
Input Data	§ F	1	
	Shoulder widthft		
-	, Lane widthtt	Class I h	ighway 🗹 Class II
	Lane widthtt		Class III highway
	Shoulder widthft	Terrain	Level Rolling
Segment length, L _t mi		Grade Length Peak-hour fac No-passing zo	mi Up/down ctor, PHF <i>0.90</i>
Analysis direction vol., V _d 305ve	eh/h	Show North Arrow % Trucks and Buses , P _T 4 %	
Opposing direction vol., V ₀ 296ve	eh/h	% Recreation	al vehicles, P _R 3%
Shoulder width ft 0.0		Access points	• • •
Lane Width ft 10.0 Segment Length mi 1.0			
Average Travel Speed			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T	(Exhibit 15-11 or 15-12)	2.1	2.1
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, f _{HV,ATS}	=1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.955	0.955
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		0.86	0.85
Demand flow rate ² , v_i (pc/h) v_i = V_i / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		413	405
Free-Flow Speed from Field Measurement		Estimated Fre	e-Flow Speed
		Base free-flow speed ⁴ , BFFS	45.0 mi/h
		Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 5.3 <i>mi/h</i>
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, v	,	Adj. for access points ⁴ , f _A (Exhibi	t 15-8) 1.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(v/ f		Free-flow speed, FFS (FSS=BFF	·S-f _{LS} -f _A) 38.2 mi/h
	•	Average travel speed, ATS _d =FFS	20 //
Adj. for no-passing zones, f _{np,ATS} (Exhib	2.7 111/11	v _{o.ATS}) - f _{np.ATS}	29.2 mi/n
Percent Time-Spent-Following		Percent free flow speed, PFFS	76.4 %
r ercent rime-opent-ronowing		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T	(Exhibit 15-18 or 15-19)	1.6	1.6
Passenger-car equivalents for RVs, E _R (l	Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/	(1+ P _T (E _T -1)+P _R (E _R -1))	0.977	0.977
Grade adjustment factor ¹ , f _{g,PTSF} (Exhib	it 15-16 or Ex 15-17)	0.87	0.86
Directional flow rate ² , v_h pc/h) v_i = V_i /(PHF* $f_{HV,PTSF}$ * $f_{g,PTSF}$)		399	392
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av_d}^b)$		42.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		46.7	
Percent time-spent-following, $PTSF_d(\%) = BPTSF_d + f_{np,PTSF} * (v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$		6	6.5
v _{o,PTSF})	M		
Level of Service and Other Performant	ce Measures	1	C
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio, <i>v/c</i>		Ī	U

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.4	
Bicycle Level of Service		
Directional demand flow rate in outside lane, $v_{ m OL}$ (Eq. 15-24) veh/h	338.9	
Effective width, Wv (Eq. 15-29) ft	10.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	5.21	
Bicycle level of service (Exhibit 15-4)	E	
Notes		

^{1.} Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.

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^{2.} If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.

^{3.} For the analysis direction only and for v>200 veh/h.

^{4.} For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.