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 1 – Two-Lane Highway Level of Service Criteria

LOS	Class I Highways PTSF (%)	Class II Highways PTSF (%)	Class III Highways PFFS (%)
A	≤35	≤40	>91.7
B	>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	C	177	57.8	C
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 less-than-significant impact on traffic operation.

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	Begin: 08/22/2012 12:00	End: 08/24/2012 12:00
Street: 8001	Lane: 20.90	Hours: 48:00
State:	Oper: N/B	Period: 60
City: Westside Rd	Posted: 45	Raw Count: 2996
County: N/Felta Rd	AADT Factor: 1	AADT Count: 1498

NC47

Date & Time Range	Count	Avg Speed	Temp	Wet/Dry
08/22/2012				
[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	Dry
[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				
[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	Dry
[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	Dry
[10:00-11:00]	86	0 mph	74 F	Dry
[11:00-12:00]	93	0 mph	101 F	Dry
[12:00-13:00]	93	0 mph	119 F	Dry
[13:00-14:00]	91	0 mph	126 F	Dry
[14:00-15:00]	187	0 mph	130 F	Dry
[15:00-16:00]	136	0 mph	128 F	Dry
[16:00-17:00]	153	0 mph	101 F	Dry
[17:00-18:00]	112	0 mph	91 F	Dry
[18:00-19:00]	63	0 mph	83 F	Dry
[19:00-20:00]	27	0 mph	78 F	Dry
[20:00-21:00]	27	0 mph	76 F	Dry
[21:00-22:00]	24	0 mph	72 F	Dry
[22:00-23:00]	13	0 mph	70 F	Dry
[23:00-00:00]	5	0 mph	66 F	Dry
08/24/2012				
[00:00-01:00]	0	0 mph	66 F	Dry
[01:00-02:00]	0	0 mph	64 F	Dry

Thur

ADT = 1447

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 3959	Begin: 08/22/2012 12:00	End: 08/24/2012 12:00
Street: 8001	Lane: 20.90	Hours: 48:00
State:	Oper: S/B	Period: 60
City: Westside Rd	Posted: 45	Raw Count: 3047
County: N/Felta Rd	AADT Factor: 1	AADT Count: 1524

NC47

Date & Time Range	Count	Avg Speed	Temp	Wet/Dry
08/22/2012				
[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				
[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]	20	0 mph	70 F	Dry
[22:00-23:00]	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

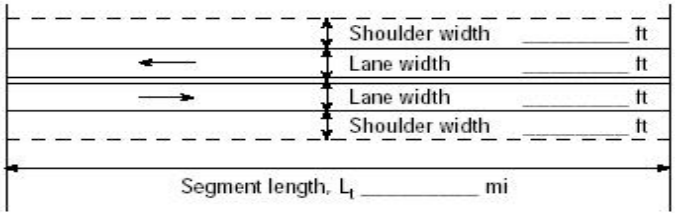
ADT = 1621

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Weekday Peak Period*	Analysis Year	*2014*

Project Description: *Rudd Wines Winery*

Input Data



Show North Arrow

☐ Class I highway ☑ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

Analysis direction vol., V_d *187*veh/h

Opposing direction vol., V_o *177*veh/h

% Trucks and Buses , P_T *4 %*

% Recreational vehicles, P_R *3%*

Access points *mi* *6*/mi

Shoulder width ft *0.0*

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_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, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.948*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 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 Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*45.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*38.2 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*30.3 mi/h*
		Percent free flow speed, PFFS	*79.4 %*

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*	*1.8*
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*	*0.969*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.80*	*0.80*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*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)	*59.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*59.5*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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)	*79.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{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)	*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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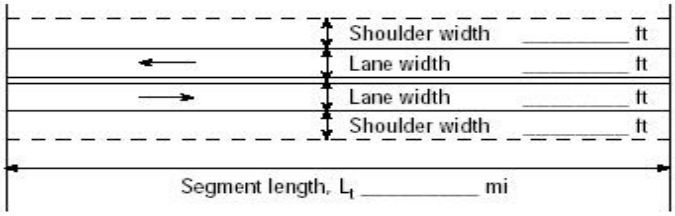
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*Mill Creek to Felt (SB)*
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Weekday Peak Period*	Analysis Year	*2014*

Project Description: *Rudd Wines Winery*

Input Data



Analysis direction vol., V_d *177*veh/h

Opposing direction vol., V_o *187*veh/h

Shoulder width ft *0.0*

Lane Width ft *10.0*

Segment Length mi *1.0*

☐ Class I highway ☑ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

% Trucks and Buses , P_T *4 %*

% Recreational vehicles, P_R *3%*

Access points *mi* *6*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, 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, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.948*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 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 from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*45.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*38.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*30.4 mi/h*
		Percent free flow speed, PFFS	*79.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(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], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.80*	*0.80*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*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)	*59.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*57.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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)	*79.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{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)	*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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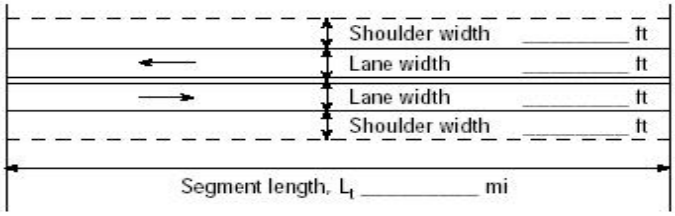
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*Felta to Mill Creek (NB)*
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Weekday + Project + Event*	Analysis Year	*2014*

Project Description: *Rudd Wines Winery*

Input Data



Analysis direction vol., V_d *226*veh/h

Opposing direction vol., V_o *232*veh/h

Shoulder width ft *0.0*

Lane Width ft *10.0*

Segment Length mi *2.0*

☐ Class I highway ☑ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

% Trucks and Buses , P_T *4 %*

% Recreational vehicles, P_R *3%*

Access points *mi* *6*/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, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*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		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.2 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*39.9 mi/h*
		Percent free flow speed, PFFS	*82.7 %*

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], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.83*	*0.83*
Directional flow rate[2], v_i(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, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*61.9*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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_{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)	*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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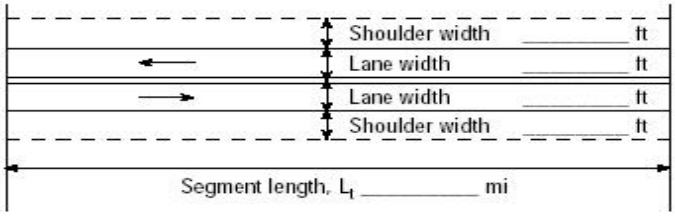
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*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 Winery*

Input Data



Class I highway ☐ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

% Trucks and Buses , P_T *4 %*

% Recreational vehicles, P_R *3%*

Access points *mi* *6*/mi

Show North Arrow

Analysis direction vol., V_d *232*veh/h

Opposing direction vol., V_o *226*veh/h

Shoulder width ft *0.0*

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)	*2.2*	*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)	*0.80*	*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 from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*45.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*38.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*29.8 mi/h*
		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], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.83*	*0.83*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*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)	*55.1*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*62.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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.
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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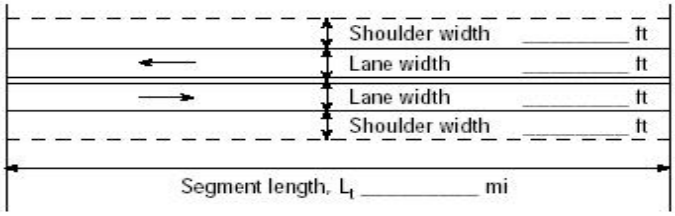
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*Felta to Mill Creek (NB)*
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Weekday Plus Project & Event*	Analysis Year	*2014*

Project Description: *Rudd Wines Winery*

Input Data



Class I highway ☐ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

Show North Arrow

Analysis direction vol., V_d	*257*veh/h	% Trucks and Buses , P_T	*4* %
Opposing direction vol., V_o	*250*veh/h	% Recreational vehicles, P_R	*3%*
Shoulder width ft	*0.0*	Access points *mi*	*6*/mi
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_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)	*0.82*	*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 Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(v/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*3.0 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*39.6 mi/h*
		Percent free flow speed, PFFS	*82.2 %*

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], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*0.84*	*0.84*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*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 Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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)	*82.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{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.
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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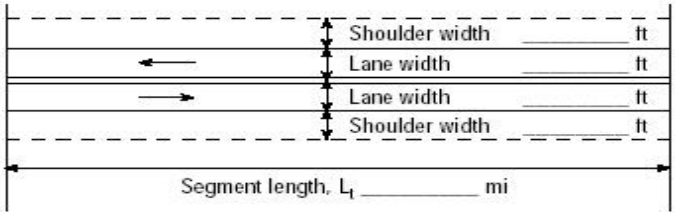
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*Mill Creek to Felta (SB)*
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Future*	Analysis Year	*2040*

Project Description: *Rudd Wines Winery*

Input Data



Class I highway ☑ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

Analysis direction vol., V_d	*250*veh/h	% Trucks and Buses , P_T	*4* %
Opposing direction vol., V_o	*257*veh/h	% Recreational vehicles, P_R	*3*%
Shoulder width ft	*0.0*	Access points *mi*	*6*/mi
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)	*0.81*	*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 Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*45.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.9 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*38.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*29.7 mi/h*
		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], $f_{g,PTSF}$ (Exhibit 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)	*52.0*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*63.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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)	*77.6*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{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.
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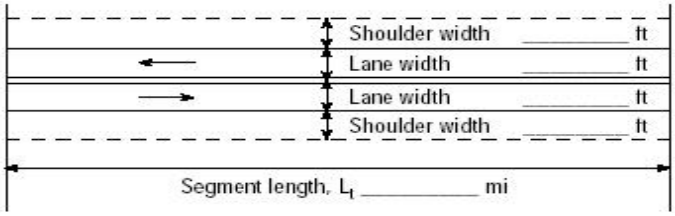
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*Felta to Mill Creek (NB)*
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Future + Project + Event*	Analysis Year	*2040*

Project Description: *Rudd Wines Winery*

Input Data



Analysis direction vol., V_d *296*veh/h

Opposing direction vol., V_o *305*veh/h

Shoulder width ft *0.0*
Lane Width ft *10.0*
Segment Length mi *2.0*

☐ Class I highway ☑ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling
Grade Length mi Up/down
Peak-hour factor, PHF *0.90*
No-passing zone *100%*
% Trucks and Buses , P_T *4 %*
% Recreational vehicles, P_R *3%*
Access points *mi* *6*/mi

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)	*0.85*	*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 Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*55.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.6 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*48.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*39.2 mi/h*
		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_i(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, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*65.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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)	*81.3*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{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)	*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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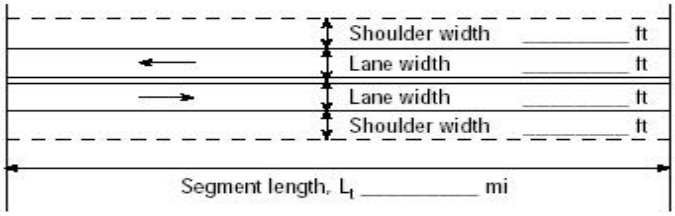
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Dalene Whitlock*	Highway / Direction of Travel	*Westside Road*
Agency or Company	*W-Trans*	From/To	*Mill Creek to Felta (SB)*
Date Performed	*4/10/2017*	Jurisdiction	*Sonoma County*
Analysis Time Period	*Future plus Project*	Analysis Year	*2040*

Project Description: *Rudd Wines Winery*

Input Data



Analysis direction vol., V_d *305*veh/h

Opposing direction vol., V_o *296*veh/h

Shoulder width ft *0.0*

Lane Width ft *10.0*

Segment Length mi *1.0*

☐ Class I highway ☑ Class II highway ☐ Class III highway

Terrain ☐ Level ☑ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.90*

No-passing zone *100%*

% Trucks and Buses , P_T *4 %*

% Recreational vehicles, P_R *3%*

Access points *mi* *6*/mi

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 Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*45.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*5.3 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.5 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*2.7 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*38.2 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*29.2 mi/h*
		Percent free flow speed, PFFS	*76.4 %*

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)	*0.87*	*0.86*
Directional flow rate[2], v_i(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, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*66.5*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*C*
Volume to capacity ratio, *v/c*	*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)	*76.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{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.
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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