

ATTACHMENT D

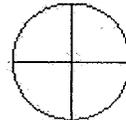
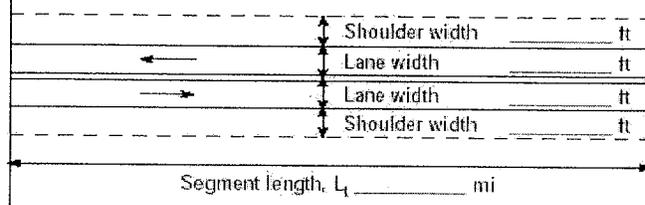
**TWO-LANE HIGHWAY
LEVEL OF SERVICE CALCULATION WORKSHEETS
BUILDOUT "WITHOUT FOREST RANCH" SCENARIO**

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling	
Grade Length, 4.00 mi	Up/down 3.0
Peak-hour factor, PHF	0.88
No-passing zone	55%
% Trucks and Buses, P_T	6%
% Recreational vehicles, P_R	2%
Access points/ mi	2

Analysis direction vol., V_d 1040veh/h
 Opposing direction vol., V_o 1768veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	5.7	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.780	0.994
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	0.95	1.00
Directional flow rate ² , v_i (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1595	2021
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , $BFFS_{FM}$ 60.0 mi/h	
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width ³ , f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5) 0.5 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.7 mi/h	Free-flow speed, FFS_d ($FFS=BFFS \cdot f_{LS} \cdot f_A$) 59.5 mi/h	
	Average travel speed, $ATS=FFS \cdot 0.00776 v_p \cdot f_{np}$ 30.8 mi/h	

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	0.97	1.00
Directional flow rate ² , v_i (pc/h) $=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1218	2009
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-a v_d^b})$	87.2	
Adj. for no-passing zone, f_{np} (Exhibit 20-20)	45.3	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	104.3	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, $v/c=V_f/1,700$	0.94
Peak 15-min veh-miles of travel, VMT_{15} (veh-m) $=0.25L_1(V/PHF)$	3191
Peak-hour vehicle-miles of travel, VMT_{60} (veh-m) $=V \cdot L_1$	11232
Peak 15-min total travel time, TT_{15} (veh-h) $=VMT_{15}/ATS$	103.7

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If v_i (V_d or V_o) $\geq 1,700$ pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

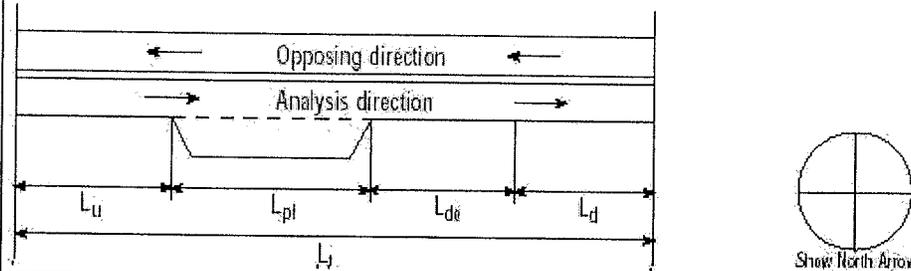
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	10.8
Length of two-lane highway upstream of the passing lane, L_u (mi)	3.0
Length of passing lane including tapers, L_{pl} (mi)	4.9
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	30.8
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	104.3
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	1.20
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	32.5

Percent Time-Spent-Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-0.70
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	80.0

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	E
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15}/ATS_{pl}$	98.2

Notes

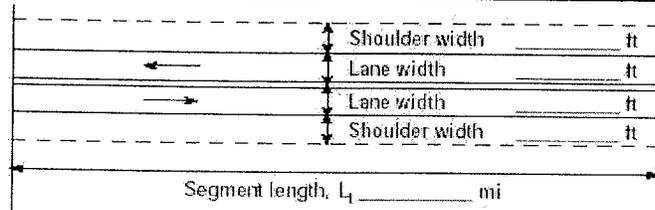
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input type="checkbox"/> Rolling
Grade Length 4.00 mi	Up/down -3.0
Peak-hour factor, PHF 0.88	
No-passing zone 88%	
% Trucks and Buses, P_T 2%	
% Recreational vehicles, P_R 2%	
Access points/ mi 2	

Analysis direction vol., V_d 1768veh/h
 Opposing direction vol., V_o 1040veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.1	5.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.914
Grade adjustment factor f_G (Exhibit 20-7 or 20-13)	1.00	0.95
Directional flow rate ² , v_i (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	2013	1361
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , $BFFS_{FM}$ 60.0 mi/h	
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width ³ , f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5) 0.5 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.9 mi/h	Free-flow speed, FFS_d ($FSS=BFFS \cdot f_{LS} \cdot f_A$) 59.5 mi/h	
	Average travel speed, $ATS=FFS \cdot 0.00776 v_p \cdot f_{np}$ 32.5 mi/h	

Percent Time Spent Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	1.00	0.97
Directional flow rate ² , v_i (pc/h) $=V_i/(PHF \cdot f_{HV} \cdot f_G)$	2009	1218
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-v_d \cdot b})$	94.4	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	48.5	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	124.6	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, $v/c=V_p/1,700$	1.18
Peak 15-min veh-miles of travel, VMT_{15} (veh- m) $=0.25L_i(V/PHF)$	5425
Peak-hour vehicle-miles of travel, VMT_{60} (veh- m) $=V \cdot L_1$	19094
Peak 15-min total travel time, TT_{15} (veh-h) $=VMT_{15}/ATS$	167.1

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If $v_i(V_d \text{ or } v_o) \geq 1,700$ pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

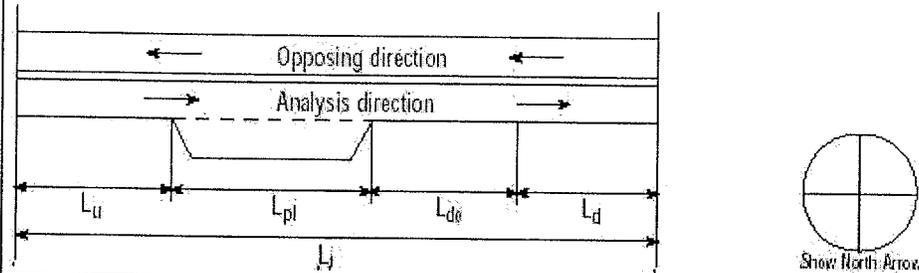
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	10.8
Length of two-lane highway upstream of the passing lane, L_u (mi)	4.8
Length of passing lane including tapers, L_{pl} (mi)	1.3
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	32.5
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	124.6
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	3.00
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	33.1

Percent Time Spent Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	1.10
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	111.0

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	F
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	163.8

Notes

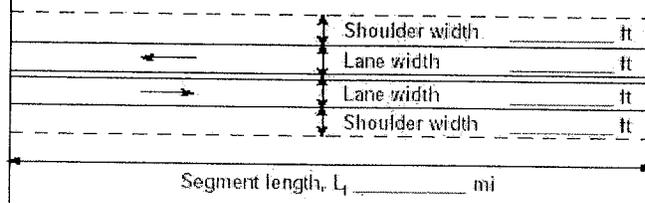
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v.c., VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input checked="" type="checkbox"/> Rolling
Grade Length 1.70 mi	Up/down 3.4
Peak-hour factor, PHF	0.75
No-passing zone	29%
% Trucks and Buses, P_T	3%
% Recreational vehicles, P_R	2%
Access points/ mi	4

Analysis direction vol., V_d 1160veh/h
 Opposing direction vol., V_o 1215veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	4.3	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.909	0.997
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , v_i (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1702	1625
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , $BFFS_{FM}$ 60.0 mi/h	
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width ³ , f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5) 1.0 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.5 mi/h	Free-flow speed, FFS_d ($FFS=BFFS \cdot f_{LS} \cdot f_A$) 59.0 mi/h	
	Average travel speed, $ATS=FFS \cdot 0.00776 v_p \cdot f_{np}$ 32.6 mi/h	

Percent Time Spent Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	0.94	1.00
Directional flow rate ² , v_i (pc/h) $=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1638	1620
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-av_d^b})$	92.7	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	4.6	
Percent time-spent-following, $PTSF(\%)=BPTSF \cdot f_{np}$	95.0	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, $v/c=V_p/1,700$	1.00
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $=0.25L_i(V/PHF)$	657
Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $=V \cdot L_i$	1972
Peak 15-min total travel time, TT_{15} (veh-h) $=VMT_{15}/ATS$	20.1

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If v_i (v_d or v_o) $\geq 1,700$ pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

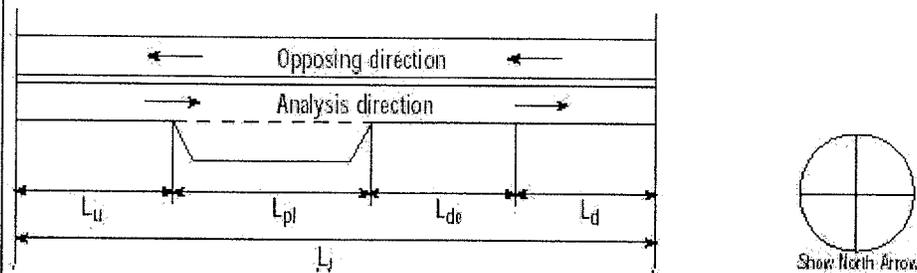
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	1.7
Length of two-lane highway upstream of the passing lane, L_u (mi)	0.3
Length of passing lane including tapers, L_{pl} (mi)	1.2
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	32.6
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	95.0
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.50
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	35.5

Percent Time-Spent-Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.40
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl} L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	65.4

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	E
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15}/ATS_{pl}$	18.5

Notes

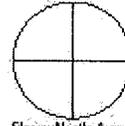
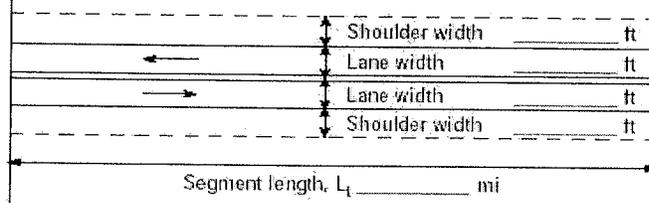
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input type="checkbox"/> Rolling
Grade Length 1.70 mi	Up/down -3.4
Peak-hour factor, PHF 0.88	No-passing zone 100%
% Trucks and Buses, P_T 2%	% Recreational vehicles, P_R 2%
Access points/ mi 5	

Analysis direction vol., V_d 1215veh/h
 Opposing direction vol., V_o 1160veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.1	4.3
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.937
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , $v_i(\text{pc/h}) = V_i / (\text{PHF} * f_{HV} * f_G)$	1383	1406
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , BFFS_{FM} 60.0 mi/h	
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width ³ , f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, $\text{FFS}_d = \text{FFS}_{FM} + 0.00776(V_f / f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5) 1.3 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.9 mi/h	Free-flow speed, FFS_d ($\text{FSS} = \text{BFFS} - f_{LS} - f_A$) 58.8 mi/h	
	Average travel speed, $\text{ATS} = \text{FFS} - 0.00776v_p - f_{np}$ 36.2 mi/h	

Percent Time Spent Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	1.00	0.94
Directional flow rate ² , $v_i(\text{pc/h}) = V_i / (\text{PHF} * f_{HV} * f_G)$	1381	1396
Base percent time-spent-following ⁴ , $\text{BPTSF}(\%) = 100(1 - e^{-v_i})^b$	88.8	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	17.0	
Percent time-spent-following, $\text{PTSF}(\%) = \text{BPTSF} + f_{np}$	97.3	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c = V_p / 1,700$	0.81
Peak 15-min veh-miles of travel, $\text{VMT}_{15}(\text{veh} \cdot \text{mi}) = 0.25L_i(V/\text{PHF})$	587
Peak-hour vehicle-miles of travel, $\text{VMT}_{60}(\text{veh} \cdot \text{mi}) = V * L_i$	2066
Peak 15-min total travel time, $\text{TT}_{15}(\text{veh} \cdot \text{h}) = \text{VMT}_{15}/\text{ATS}$	16.2

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If $v_i(v_d \text{ or } v_o) \geq 1,700$ pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

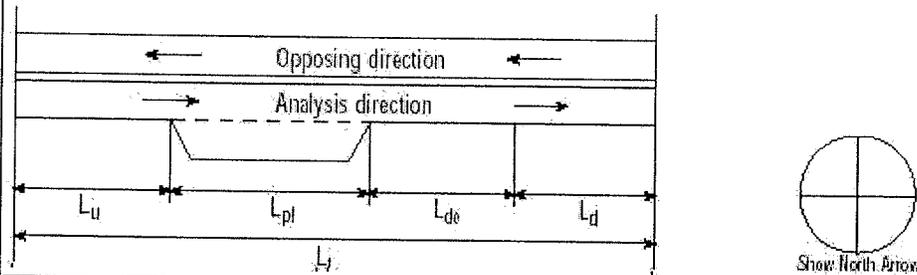
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	1.7
Length of two-lane highway upstream of the passing lane, L_u (mi)	1.7
Length of passing lane including tapers, L_{pl} (mi)	0.0
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	36.2
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	97.3
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	E

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (m) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (m) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.70
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	

Percent Time Spent Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (m) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (m) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.60
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	97.3

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15}/ATS_{pl}$	

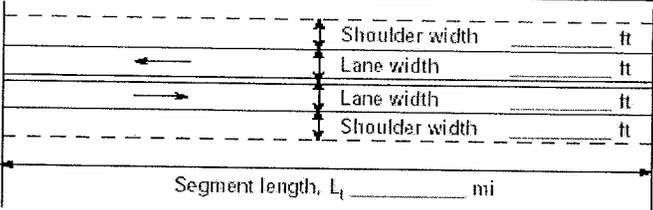
Notes

1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data	
 <p style="text-align: center;">Segment length, L_1 _____ mi</p>	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">  <p>Show North Arrow</p> </div> <div> <input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling Grade Length 1.20 mi Up/down 3.0 Peak-hour factor, PHF 0.59 No-passing zone 17% % Trucks and Buses, P_T 2% % Recreational vehicles, P_R 2% Access points/ mi 3 </div> </div>
Analysis direction vol., V_d	1129veh/h
Opposing direction vol., V_o	1082veh/h

Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	3.7	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.948	0.998
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , $v_i(\text{pc/h})=V_i/(\text{PHF} \cdot f_{HV} \cdot f_G)$	2018	1838
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , BFFS_{FM} 60.0 mi/h	
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width, ³ f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, $\text{FFS}_d = \text{FFS}_{FM} + 0.00776(V_f / f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5) 0.8 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.5 mi/h	Free-flow speed, $\text{FFS}_d = (\text{FFS}_{FM} \cdot f_{LS} \cdot f_A)$ 59.3 mi/h	
	Average travel speed, $\text{ATS} = \text{FFS}_d - 0.00776 v_p \cdot f_{np}$ 28.8 mi/h	

Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	0.93	1.00
Directional flow rate ² , $v_i(\text{pc/h})=V_i/(\text{PHF} \cdot f_{HV} \cdot f_G)$	2049	1834
Base percent time-spent-following ⁴ , $\text{BPTSF}(\%)=100(1-e^{-a v_d^b})$	95.7	
Adj. for no-passing zone, f_{np} (Exhibit 20-20)	6.0	
Percent time-spent-following, $\text{PTSF}(\%)=\text{BPTSF}+f_{np}$	98.9	

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, $v/c=V_p/1,700$	1.19
Peak 15-min veh-miles of travel, $\text{VMT}_{15}(\text{veh-mi})=0.25L_t(V/\text{PHF})$	574
Peak-hour vehicle-miles of travel, $\text{VMT}_{60}(\text{veh-mi})=V \cdot L_t$	1355
Peak 15-min total travel time, $\text{TT}_{15}(\text{veh-h})=\text{VMT}_{15}/\text{ATS}$	19.9

- Notes**
1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
 2. If $v_i(v_d \text{ or } v_o) \geq 1,700$ pc/h, terminate analysis--the LOS is F.
 3. For the analysis direction only.
 4. Exhibit 20-21 provides factors a and b.
 5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway

Total length of analysis segment, L_t (mi)	1.2
Length of two-lane highway upstream of the passing lane, L_u (mi)	0.1
Length of passing lane including tapers, L_{pl} (mi)	1.0
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	28.8
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	98.9
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.60
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	31.7

Percent Time-Spent-Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.50
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl} L_{pl} + ((1+f_{pl})/2) L_{de}] / L_t$	64.5

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	E
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	18.1

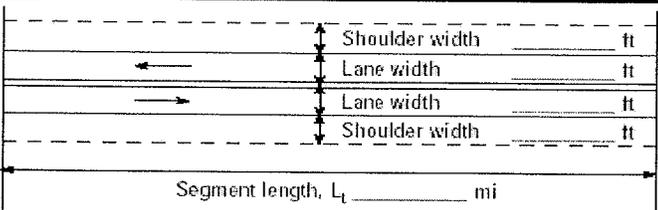
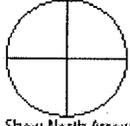
Notes

1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway / Direction of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct.
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data	
 <p>Shoulder width _____ ft</p> <p>Lane width _____ ft</p> <p>Lane width _____ ft</p> <p>Shoulder width _____ ft</p> <p>Segment length, L_t _____ mi</p> <p>Analysis direction vol., V_d 1082veh/h</p> <p>Oposing direction vol., V_o 1129veh/h</p>	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">  <p>Show North Arrow</p> </div> <div> <input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling Grade Length 1.20 mi Up/down -3.0 Peak-hour factor, PHF 0.79 No-passing zone 100% % Trucks and Buses, P_T 2% % Recreational vehicles, P_R 2% Access points/ mi 4 </div> </div>

Average Travel Speed		
	Analysis Direction (d)	Oposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.1	3.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV} = 1 / (1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.998	0.948
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , v_i (pc/h) $v_i = V_i / (PHF * f_{HV} * f_G)$	1372	1507
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , $BFFS_{FM}$ 60.0 mi/h	
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width, ³ f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS_d $FFS = S_{FM} + 0.00776(V_f / f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5) 1.0 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.8 mi/h	Free-flow speed, FFS_d ($FSS = BFFS - f_{LS} - f_A$) 59.0 mi/h	
	Average travel speed, $ATS = FFS - 0.00776v_p - f_{np}$ 35.9 mi/h	

Percent Time-Spent-Following		
	Analysis Direction (d)	Oposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV} = 1 / (1 + P_T(E_T - 1) + P_R(E_R - 1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	1.00	0.93
Directional flow rate ² , v_i (pc/h) $= V_i / (PHF * f_{HV} * f_G)$	1370	1530
Base percent time-spent-following ⁴ , $BPTSF(\%) = 100(1 - e^{-av_d^b})$	89.3	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	12.3	
Percent time-spent-following, $PTSF(\%) = BPTSF + f_{np}$	95.1	

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c = V_p / 1,700$	0.81
Peak 15-min veh-miles of travel, VMT_{15} (veh-mi) $= 0.25L_t(V/PHF)$	411
Peak-hour vehicle-miles of travel, VMT_{60} (veh-mi) $= V * L_t$	1298
Peak 15-min total travel time, TT_{15} (veh-h) $= VMT_{15} / ATS$	11.5

- Notes**
1. If the highway is extended segment (level) or rolling terrain, $f_G = 1.0$.
 2. If v_i (v_d or v_o) $\geq 1,700$ pc/h, terminate analysis--the LOS is F.
 3. For the analysis direction only.
 4. Exhibit 20-21 provides factors a and b.
 5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct.
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data

Class I highway Class II highway

L_u L_{pl} L_{de} L_d

L_t

Show North Arrow

Total length of analysis segment, L_t (mi)	1.2
Length of two-lane highway upstream of the passing lane, L_u (mi)	1.2
Length of passing lane including tapers, L_{pl} (mi)	0.0
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	35.9
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	95.1
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	E

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.70
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	

Percent Time-Spent-Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.60
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl} L_{pl} + (((1+f_{pl})/2) L_{de}) / L_t$	95.1

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	

Notes

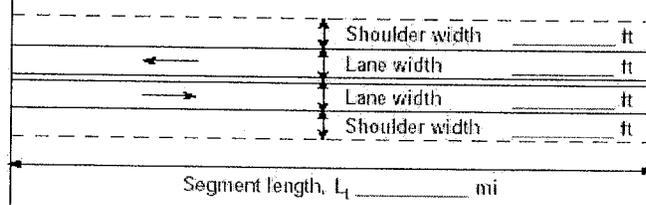
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Building Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input type="checkbox"/> Rolling
Grade Length 4.00 mi	Up/down 3.0
Peak-hour factor, PHF 0.88	No-passing zone 55%
% Trucks and Buses, P _T 1%	% Recreational vehicles, P _R 2%
Access points/ mi 2	

Analysis direction vol., V_d 1574veh/h
 Opposing direction vol., V_o 1210veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-9 or 20-15)	5.7	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	0.955	0.999
Grade adjustment factor ¹ , f _G (Exhibit 20-7 or 20-13)	0.95	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV} *f _G)	1971	1376
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S _{FM} mi/h	Base free-flow speed ³ , BFFS _{FM} 60.0 mi/h	
Observed volume ³ , V _f veh/h	Adj. for lane width and shoulder width ³ , f _{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS _d FFS=S _{FM} +0.00776(V _f /f _{HV}) mi/h	Adj. for access points ³ , f _A (Exhibit 20-5) 0.5 mi/h	
Adjustment for no-passing zones, f _{np} (Exhibit 20-19) 0.8 mi/h	Free-flow speed, FFS _d (FSS=BFFS-f _{LS} -f _A) 59.5 mi/h	
	Average travel speed, ATS=FFS-0.00776v _p -f _{np} 32.8 mi/h	

Percent Time Spent Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _G (Exhibit 20-8 or 20-14)	0.97	1.00
Directional flow rate ² , v _i (pc/h)=V _i /(PHF*f _{HV} *f _G)	1844	1375
Base percent time-spent-following ⁴ , BPTSF(%)=100(1-e ^{-av_d})	93.7	
Adj. for no-passing zone, f _{np} (Exhibit. 20-20)	33.3	
Percent time-spent-following, PTSF(%)=BPTSF+f _{np}	112.8	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, v/c=V _p /1,700	1.16
Peak 15-min veh-miles of travel, VMT ₁₅ (veh- mi)=0.25L _t (V/PHF)	4829
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh- mi)=V*L _t	16999
Peak 15-min total travel time, TT ₁₅ (veh-h)=VMT ₁₅ /ATS	147.3

Notes

1. If the highway is extended segment (level) or rolling terrain, f_G=1.0.
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.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

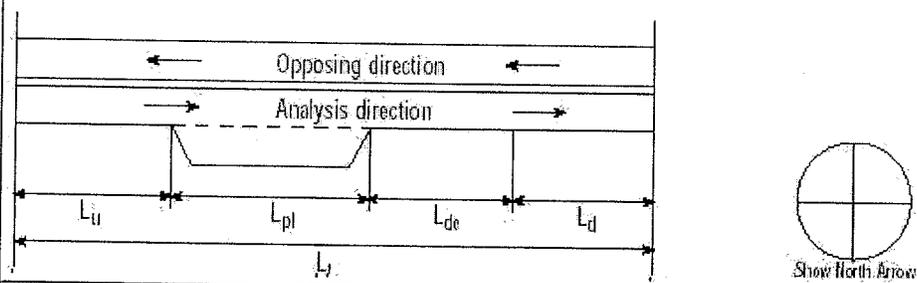
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Building Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	10.8
Length of two-lane highway upstream of the passing lane, L_u (mi)	3.0
Length of passing lane including tapers, L_{pl} (mi)	4.9
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	32.8
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	112.8
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	1.20
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	34.6

Percent Time Spent Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-0.70
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	86.5

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	E
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15}/ATS_{pl}$	139.5

Notes

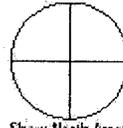
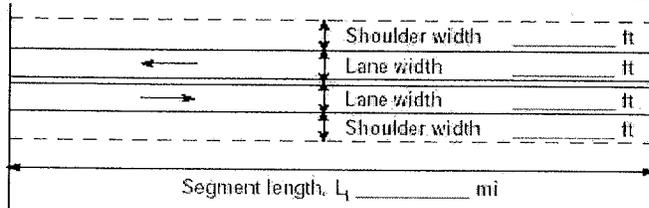
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input type="checkbox"/> Rolling
Grade Length 4.00 mi	Up/down -3.0
Peak-hour factor, PHF 0.76	No-passing zone 88%
% Trucks and Buses, P _T 4%	% Recreational vehicles, P _R 2%
Access points/ mi 2	

Analysis direction vol., V_d 1210veh/h

Opposing direction vol., V_o 1574veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-9 or 20-15)	1.1	5.7
Passenger-car equivalents for RVs, E _R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	0.996	0.842
Grade adjustment factor ¹ , f _G (Exhibit 20-7 or 20-13)	1.00	0.95
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV} *f _G)	1598	2590
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S _{FM} mi/h	Base free-flow speed ³ , BFFS _{FM} 60.0 mi/h	
Observed volume ³ , V _i veh/h	Adj. for lane width and shoulder width ³ , f _{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS _d FFS=S _{FM} +0.00776(V _i /f _{HV}) mi/h	Adj. for access points ³ , f _A (Exhibit 20-5) 0.5 mi/h	
Adjustment for no-passing zones, f _{np} (Exhibit 20-19) 0.7 mi/h	Free-flow speed, FFS _d (FSS=BFFS-f _{LS} -f _A) 59.5 mi/h	
	Average travel speed, ATS=FFS-0.00776v _p -f _{np} 26.3 mi/h	

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _G (Exhibit 20-8 or 20-14)	1.00	0.97
Directional flow rate ² , v _i (pc/h)=V _i /(PHF*f _{HV} *f _G)	1592	2135
Base percent time-spent-following ⁴ , BPTSF(%)=100(1-e ^{-av_d})	92.3	
Adj. for no-passing zone, f _{np} (Exhibit 20-20)	48.7	
Percent time-spent-following, PTSF(%)=BPTSF+f _{np}	113.1	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, v/c=V _p /1,700	0.94
Peak 15-min veh-miles of travel, VMT ₁₅ (veh-mi)=0.25L _t (V/PHF)	4299
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh-mi)=V*L _t	13068
Peak 15-min total travel time, TT ₁₅ (veh-h)=VMT ₁₅ /ATS	163.4

Notes

1. If the highway is extended segment (level) or rolling terrain, f_G=1.0 .
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.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

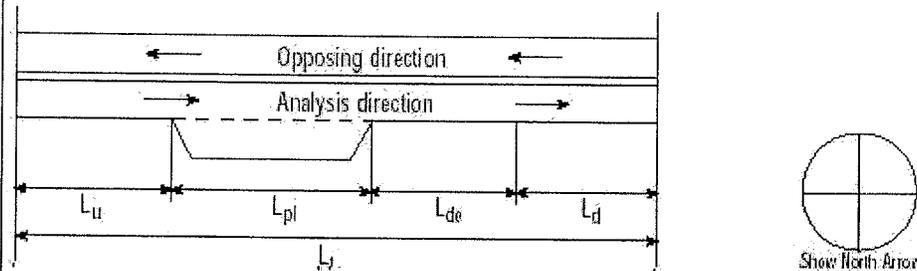
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	10.8
Length of two-lane highway upstream of the passing lane, L_u (mi)	4.8
Length of passing lane including tapers, L_{pl} (mi)	1.3
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	26.3
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	113.1
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	3.00
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	26.8

Percent Time Spent Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	1.10
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	100.7

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	F
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15}/ATS_{pl}$	160.1

Notes

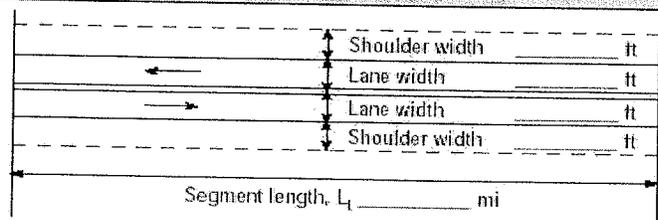
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_{de} < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input type="checkbox"/> Rolling
Grade Length 1.70 mi	Up/down 3.4
Peak-hour factor, PHF 0.88	No-passing zone 29%
% Trucks and Buses, P _T 2%	% Recreational vehicles, P _R 2%
Access points/ mi 4	

Analysis direction vol., V_d 1117veh/h
 Opposing direction vol., V_o 1305veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-9 or 20-15)	4.3	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	0.937	0.998
Grade adjustment factor ¹ , f _G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV} *f _G)	1354	1486
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S _{FM} mi/h	Base free-flow speed ³ , BFFS _{FM} 60.0 mi/h	
Observed volume ³ , V _i veh/h	Adj. for lane width and shoulder width ³ , f _{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS _d FFS=S _{FM} +0.00776(V _i /f _{HV}) mi/h	Adj. for access points ³ , f _A (Exhibit 20-5) 1.0 mi/h	
Adjustment for no-passing zones, f _{np} (Exhibit 20-19) 0.5 mi/h	Free-flow speed, FFS _d (FSS=BFFS-f _{LS} -f _A) 59.0 mi/h	
	Average travel speed, ATS=FFS-0.00776V _p -f _{np} 36.4 mi/h	

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _G (Exhibit 20-8 or 20-14)	0.94	1.00
Directional flow rate ² , v _i (pc/h)=V _i /(PHF*f _{HV} *f _G)	1345	1483
Base percent time-spent-following ⁴ , BPTSF(%)=100(1-e ^{-av_d^b})	88.7	
Adj. for no-passing zone, f _{np} (Exhibit. 20-20)	32.6	
Percent time-spent-following, PTSF(%)=BPTSF+f _{np}	104.2	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, v/c=V _p /1,700	0.80
Peak 15-min veh-miles of travel, VMT ₁₅ (veh- mi)=0.25L ₁ (V/PHF)	539
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh- mi)=V*L ₁	1899
Peak 15-min total travel time, TT ₁₅ (veh-h)=VMT ₁₅ /ATS	14.8

Notes

1. If the highway is extended segment (level) or rolling terrain, f_G=1.0.
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.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

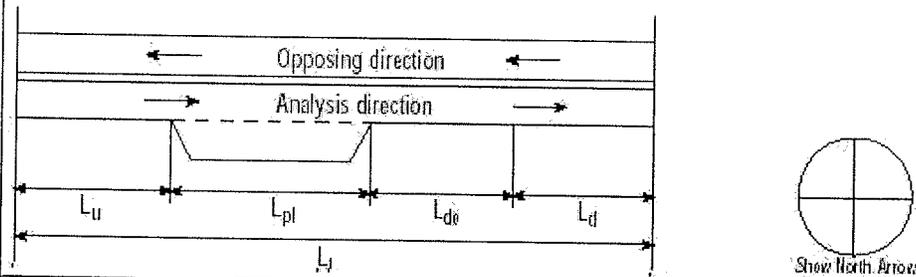
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	1.7
Length of two-lane highway upstream of the passing lane, L_u (mi)	0.3
Length of passing lane including tapers, L_{pl} (mi)	1.2
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	36.4
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	104.2
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	F

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.50
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	39.6

Percent Time Spent Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.40
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	71.7

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	E
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	13.6

Notes

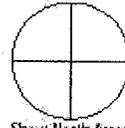
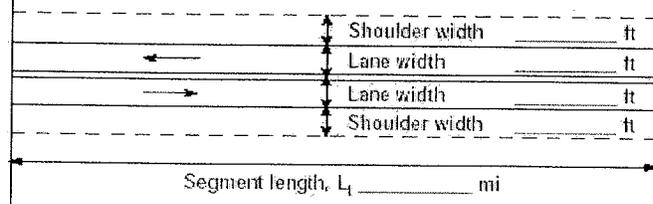
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v.c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data



<input checked="" type="checkbox"/> Class I highway	<input type="checkbox"/> Class II highway
Terrain <input type="checkbox"/> Level	<input checked="" type="checkbox"/> Rolling
Grade Length 1.70 mi	Up/down -3.4
Peak-hour factor, PHF 0.88	No-passing zone 100%
% Trucks and Buses, P _T 3%	% Recreational vehicles, P _R 2%
Access points/ mi 5	

Analysis direction vol., V_d 1305veh/h
 Opposing direction vol., V_o 1117veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-9 or 20-15)	1.1	4.3
Passenger-car equivalents for RVs, E _R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	0.997	0.909
Grade adjustment factor ¹ , f _G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV} *f _G)	1487	1397
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S _{FM} mi/h	Base free-flow speed ³ , BFFS _{FM} 60.0 mi/h	
Observed volume ³ , V _i veh/h	Adj. for lane width and shoulder width ³ , f _{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS _d FFS=S _{FM} +0.00776(V _i /f _{HV}) mi/h	Adj. for access points ³ , f _A (Exhibit 20-5) 1.3 mi/h	
Adjustment for no-passing zones, f _{np} (Exhibit 20-19) 0.9 mi/h	Free-flow speed, FFS _d (FSS=BFFS-f _{LS} -f _A) 58.8 mi/h	
	Average travel speed, ATS=FFS-0.00776v _p -f _{np} 35.5 mi/h	

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/(1+P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _G (Exhibit 20-8 or 20-14)	1.00	0.94
Directional flow rate ² , v _i (pc/h)=V _i /(PHF*f _{HV} *f _G)	1483	1345
Base percent time-spent-following ⁴ , BPTSF(%)=100(1-e ^{-av_d^b})	90.0	
Adj. for no-passing zone, f _{np} (Exhibit 20-20)	16.8	
Percent time-spent-following, PTSF(%)=BPTSF+f _{np}	98.8	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, v/c=V _p /1,700	0.87
Peak 15-min veh-miles of travel, VMT ₁₅ (veh-mi)=0.25L ₁ (V/PHF)	630
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh-mi)=V*L ₁	2219
Peak 15-min total travel time, TT ₁₅ (veh-h)=VMT ₁₅ /ATS	17.8

Notes

1. If the highway is extended segment (level) or rolling terrain, f_G=1.0.
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.
4. Exhibit 20-21 provides factors a and b.
5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

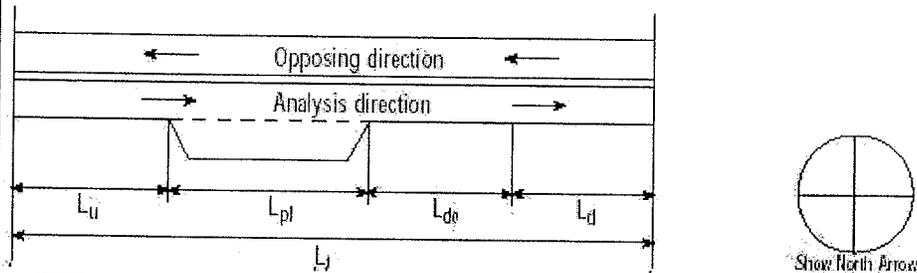
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	1.7
Length of two-lane highway upstream of the passing lane, L_u (mi)	1.7
Length of passing lane including tapers, L_{pl} (mi)	0.0
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	35.5
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	98.8
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	E

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.70
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	

Percent Time Spent Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.60
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	98.8

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15}/ATS_{pl}$	

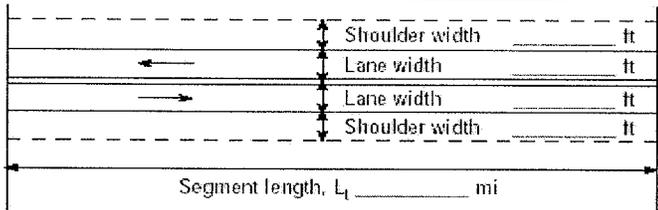
Notes

1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct.
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data	
 <p>Shoulder width _____ ft</p> <p>Lane width _____ ft</p> <p>Lane width _____ ft</p> <p>Shoulder width _____ ft</p> <p>Segment length, L_1 _____ mi</p> <p>Analysis direction vol., V_d 1026veh/h</p> <p>Opposing direction vol., V_o 1233veh/h</p>	<div style="display: flex; align-items: center;"> <div> <p><input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway</p> <p>Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling</p> <p>Grade Length 1.20 mi Up/down 3.0</p> <p>Peak-hour factor, PHF 0.85</p> <p>No-passing zone 17%</p> <p>% Trucks and Buses, P_T 2%</p> <p>% Recreational vehicles, P_R 2%</p> <p>Access points/ mi 3</p> </div> </div> <p style="text-align: center; font-size: small;">Show North Arrow</p>

Average Travel Speed		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)		3.7	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)		1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$		0.948	0.998
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)		1.00	1.00
Directional flow rate ² , v_i (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$		1273	1453
Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h		Base free-flow speed ³ , $BFFS_{FM}$ 60.0 mi/h	
Observed volume ³ , V_f veh/h		Adj. for lane width and shoulder width ³ , f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, FFS_d $FFS=S_{FM}+0.00776(V_f/f_{HV})$ mi/h		Adj. for access points ³ , f_A (Exhibit 20-5) 0.8 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.5 mi/h		Free-flow speed, FFS_d ($FSS=BFFS \cdot f_{LS} \cdot f_A$) 59.3 mi/h	
		Average travel speed, $ATS=FFS-0.00776v_p-f_{np}$ 37.6 mi/h	

Percent Time-Spent-Following		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)		1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)		1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$		1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)		0.93	1.00
Directional flow rate ² , v_i (pc/h)= $V_i/(PHF \cdot f_{HV} \cdot f_G)$		1292	1451
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-av_d^b})$			87.8
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)			25.4
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$			99.7

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c=V_p/1,700$	0.75
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= $0.25L_t(V/PHF)$	362
Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi)= $V \cdot L_t$	1231
Peak 15-min total travel time, TT_{15} (veh-h)= VMT_{15}/ATS	9.6

- Notes**
1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
 2. If $v_i(v_d \text{ or } v_o) \geq 1,700$ pc/h, terminate analysis--the LOS is F.
 3. For the analysis direction only.
 4. Exhibit 20-21 provides factors a and b.
 5. Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

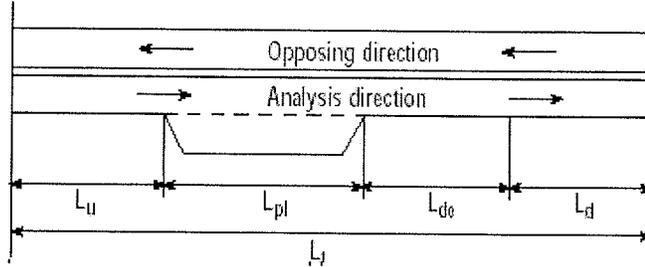
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct.
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway



Total length of analysis segment, L_t (mi)	1.2
Length of two-lane highway upstream of the passing lane, L_u (mi)	0.1
Length of passing lane including tapers, L_{pl} (mi)	1.0
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	37.6
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	99.7
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	E

Average Travel Speed	
Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.60
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	41.3

Percent Time-Spent-Following	
Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.50
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl} L_{pl} + ((1+f_{pl})/2) L_{de}] / L_t$	65.0

Level of Service and Other Performance Measures ⁴	
Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	D
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	8.8

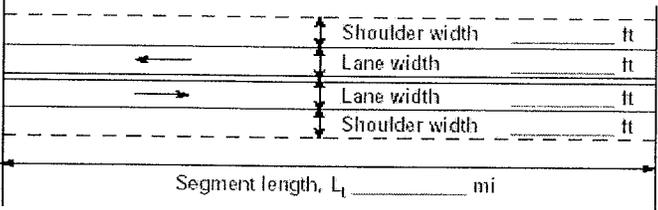
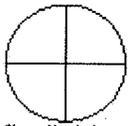
Notes

1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway / Direction of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct.
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data	
 <p>Analysis direction vol., V_d 1233veh/h</p> <p>Opposing direction vol., V_o 1026veh/h</p>	<div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> Class II highway </div> <div style="display: flex; justify-content: space-between;"> Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling </div> <p>Grade Length 1.20 mi Up/down -3.0</p> <p>Peak-hour factor, PHF 0.88</p> <p>No-passing zone 100%</p> <p>% Trucks and Buses, P_T 4%</p> <p>% Recreational vehicles, P_R 2%</p> <p>Access points/ mi 4</p> <div style="text-align: center;">  Show North Arrow </div>

Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.1	3.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV} = 1 / (1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.996	0.901
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	1.00
Directional flow rate ² , v_i (pc/h) $v_i = V_i / (PHF * f_{HV} * f_G)$	1407	1294
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Field measured speed ³ , S_{FM} mi/h	Base free-flow speed ³ , $BFFS_{FM}$	60.0 mi/h
Observed volume ³ , V_f veh/h	Adj. for lane width and shoulder width, ³ f_{LS} (Exh 20-5)	0.0 mi/h
Free-flow speed, $FFS_d = S_{FM} + 0.00776(V_f / f_{HV})$ mi/h	Adj. for access points ³ , f_A (Exhibit 20-5)	1.0 mi/h
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 1.0 mi/h	Free-flow speed, $FFS_d = BFFS - f_{LS} - f_A$	59.0 mi/h
	Average travel speed, $ATS = FFS - 0.00776v_p - f_{np}$	37.0 mi/h

Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-10 or 20-16)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV} = 1 / (1 + P_T(E_T - 1) + P_R(E_R - 1))$	1.000	1.000
Grade adjustment factor ¹ , f_G (Exhibit 20-8 or 20-14)	1.00	0.93
Directional flow rate ² , v_i (pc/h) $v_i = V_i / (PHF * f_{HV} * f_G)$	1401	1248
Base percent time-spent-following ⁴ , $BPTSF(\%) = 100(1 - e^{-av_d^b})$		88.4
Adj. for no-passing zone, f_{np} (Exhibit 20-20)		17.8
Percent time-spent-following, $PTSF(\%) = BPTSF + f_{np}$		97.8

Level of Service and Other Performance Measures	
Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c = V_p / 1,700$	0.83
Peak 15-min veh-miles of travel, $VMT_{15} (\text{veh} \cdot \text{mi}) = 0.25L_t(V/PHF)$	420
Peak-hour vehicle-miles of travel, $VMT_{60} (\text{veh} \cdot \text{mi}) = V * L_t$	1480
Peak 15-min total travel time, $TT_{15} (\text{veh} \cdot \text{h}) = VMT_{15} / ATS$	11.3

Notes

- If the highway is extended segment (level) or rolling terrain, $f_G = 1.0$.
- If $v_i (v_d \text{ or } v_o) \geq 1,700$ pc/h, terminate analysis—the LOS is F.
- For the analysis direction only.
- Exhibit 20-21 provides factors a and b.
- Use alternative Equation 20-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKP	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct.
Date Performed	10/22/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Class I highway Class II highway

Show North Arrow

Total length of analysis segment, L_t (mi)	1.2
Length of two-lane highway upstream of the passing lane, L_u (mi)	1.2
Length of passing lane including tapers, L_{pl} (mi)	0.0
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	37.0
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	97.8
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	E

Average Travel Speed

Downstream length of two-lane highway within effective length of passing lane for average travel speed, L_{de} (mi) (Exhibit 20-23)	1.70
Length of two-lane highway downstream of effective length of the passing lane for avg travel speed, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.70
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.11
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	

Percent Time-Spent-Following

Downstream length of two-lane highway within effective length of passing lane for percent time-spent-following, L_{de} (mi) (Exhibit 20-23)	3.60
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.60
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.62
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl} L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	97.8

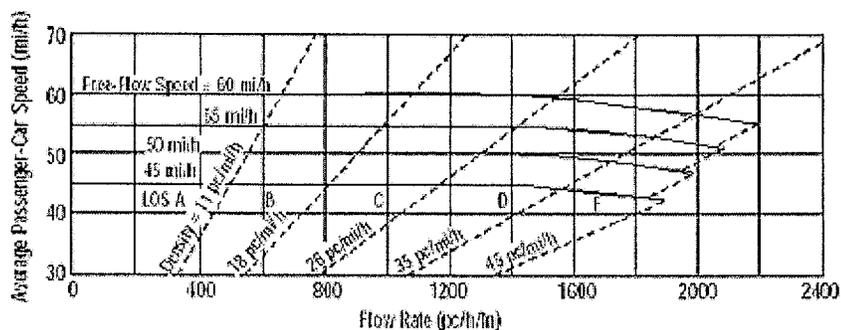
Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	

Notes

1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p , S, D

General Information **Site Information**

Analyst	MKL	Highway/Direction to Travel	Foresthill Road - Mitigated
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Rd
Date Performed	4/3/2007	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description Foresthill Divide Community Plan

Oper.(LOS) Des. (N) Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1040	Peak-Hour Factor, PHF	0.88
AADT(veh/h)		%Trucks and Buses, P_T	6
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	2
Peak-Hour Direction Prop, D		General Terrain:	Grade
DDHV (veh/h)		Grade Length (mi)	4.00
Driver Type Adjustment	1.00	Up/Down %	3.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	3.0
E_T	2.5	f_{HV}	0.885

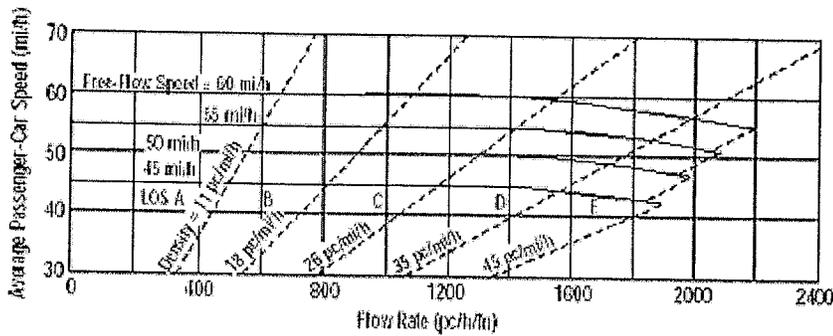
Speed Inputs **Calc Speed Adj and FFS**

Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	2	f_A (mi/h)	0.5
Median Type, M	Undivided	f_M (mi/h)	1.6
FFS (measured)		FFS (mi/h)	57.9
Base Free-Flow Speed, BFFS	60.0		

Operations **Design**

<u>Operational (LOS)</u>		<u>Design (N)</u>	
Flow Rate, v_p (pc/h/ln)	667	Required Number of Lanes, N	
Speed, S (mi/h)	57.9	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	11.5	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

MULTILANE HIGHWAYS WORKSHEET (Direction 2)



Application	Input	Output
Operational (LOS)	FFS, f_p , v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p , S, D

General Information		Site Information	
Analyst	MKL	Highway/Direction to Travel	Foresthill Road - Mitigated
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Rd
Date Performed	4/3/2007	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch
Project Description Foresthill Divide Community Plan			

Oper.(LOS)
 Des. (N)
 Plan. (vp)

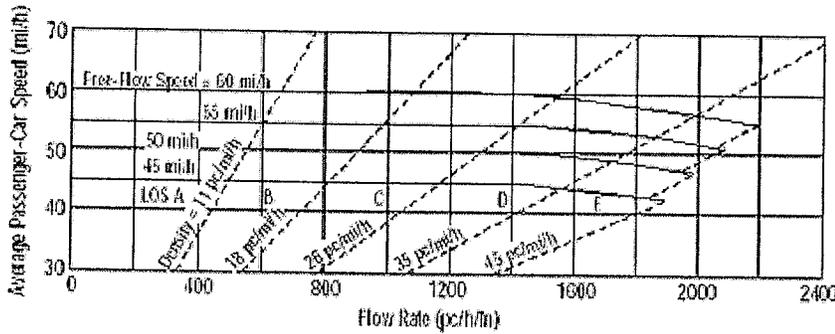
Flow Inputs			
Volume, V (veh/h)	1768	Peak-Hour Factor, PHF	0.88
AADT(veh/h)		%Trucks and Buses, P_T	2
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	2
Peak-Hour Direction Prop, D		General Terrain:	Grade
DDHV (veh/h)		Grade Length (mi)	4.00
Driver Type Adjustment	1.00	Up/Down %	-3.00
		Number of Lanes	2

Calculate Flow Adjustments			
f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	0.986

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	2	f_A (mi/h)	0.5
Median Type, M	Undivided	f_M (mi/h)	1.6
FFS (measured)		FFS (mi/h)	57.9
Base Free-Flow Speed, BFFS	60.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	1018	Required Number of Lanes, N	
Speed, S (mi/h)	57.9	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	17.6	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

MULTILANE HIGHWAYS WORKSHEET (Direction 1)



Application	Input	Output
Operational (LOS)	FFS, H , v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p , S, D

General Information		Site Information	
Analyst	MKL	Highway/Direction to Travel	Foresthill Road - Mitigated
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	4/3/2007	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description Foresthill Divide Community Plan

Oper.(LOS)
 Des. (N)
 Plan. (v_p)

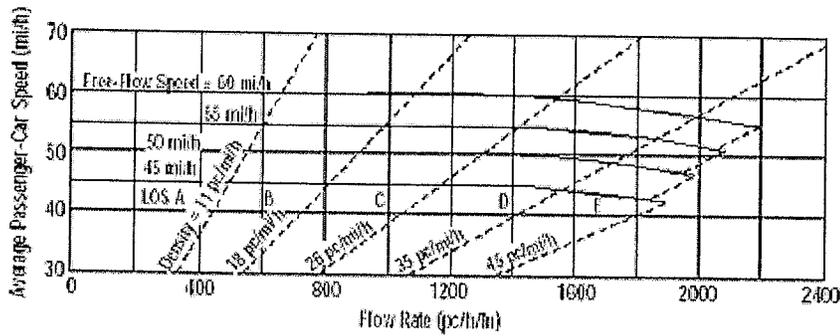
Flow Inputs			
Volume, V (veh/h)	1160	Peak-Hour Factor, PHF	0.75
AADT(veh/h)		%Trucks and Buses, P_T	3
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	2
Peak-Hour Direction Prop, D		General Terrain:	Grade
DDHV (veh/h)		Grade Length (mi)	1.70
Driver Type Adjustment	1.00	Up/Down %	3.40
		Number of Lanes	2

Calculate Flow Adjustments			
f_p	1.00	E_R	3.0
E_T	3.8	f_{HV}	0.891

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	4	f_A (mi/h)	1.0
Median Type, M	Undivided	f_M (mi/h)	1.6
FFS (measured)		FFS (mi/h)	57.4
Base Free-Flow Speed, BFFS	60.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	868	Required Number of Lanes, N	
Speed, S (mi/h)	57.4	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	15.1	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p , S, D

General Information		Site Information	
Analyst	MKL	Highway/Direction to Travel	Foresthill Road - Mitigated
Agency or Company	MRO Engineers, Inc.	From/To	Spring Garden to Todd Valley W
Date Performed	4/3/2007	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch

Project Description Foresthill Divide Community Plan

Oper.(LOS)
 Des. (N)
 Plan. (vp)

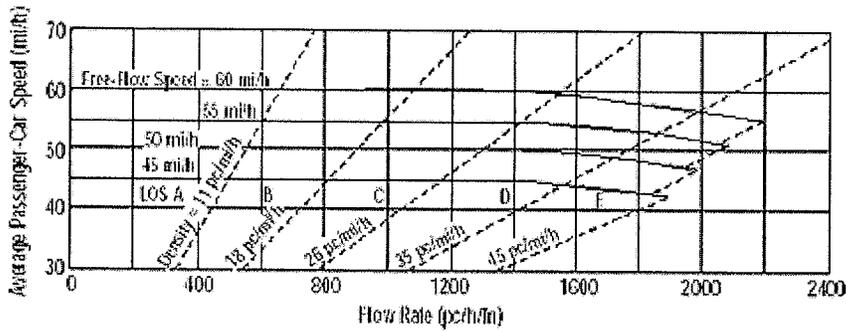
Flow Inputs			
Volume, V (veh/h)	1215	Peak-Hour Factor, PHF	0.88
AADT(veh/h)		%Trucks and Buses, P_T	2
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	2
Peak-Hour Direction Prop, D		General Terrain:	Grade
DDHV (veh/h)		Grade Length (mi)	1.70
Driver Type Adjustment	1.00	Up/Down %	-3.40
		Number of Lanes	2

Calculate Flow Adjustments			
f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	0.986

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	5	f_A (mi/h)	1.3
Median Type, M	Undivided	f_M (mi/h)	1.6
FFS (measured)		FFS (mi/h)	57.2
Base Free-Flow Speed, BFFS	60.0		

Operations		Design	
<u>Operational (LOS)</u>		<u>Design (N)</u>	
Flow Rate, v_p (pc/h/ln)	700	Required Number of Lanes, N	
Speed, S (mi/h)	57.2	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	12.2	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v _p	LOS, S, D
Design (N)	FFS, LOS, v _p	N, S, D
Design (v _p)	FFS, LOS, N	v _p , S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v _p)	FFS, LOS, N	v _p , S, D

General Information

Analyst	MKP
Agency or Company	MRO Engineers, Inc.
Date Performed	10/29/2007
Analysis Time Period	AM Peak Hour

Site Information

Highway/Direction to Travel	Foresthill Road - Mitigated
From/To	Todd Valley W to Owl Hill Ct
Jurisdiction	Placer County
Analysis Year	Buildout Without Forest Ranch

Project Description Foresthill Divide Community Plan

Oper.(LOS)

Des. (N)

Plan. (v_p)

Flow Inputs

Volume, V (veh/h)	1129	Peak-Hour Factor, PHF	0.59
AADT(veh/h)		%Trucks and Buses, P _T	2
Peak-Hour Prop of AADT (veh/d)		%RVs, P _R	2
Peak-Hour Direction Prop, D		General Terrain:	Grade
DDHV (veh/h)		Grade Length (mi)	1.20
Driver Type Adjustment	1.00	Up/Down %	3.00
		Number of Lanes	2

Calculate Flow Adjustments

f _p	1.00	E _R	3.0
E _T	2.5	f _{HV}	0.935

Speed Inputs

Calc Speed Adj and FFS

Lane Width, LW (ft)	12.0	f _{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f _{LC} (mi/h)	0.0
Access Points, A (A/mi)	3	f _A (mi/h)	0.8
Median Type, M	Undivided	f _M (mi/h)	1.6
FFS (measured)		FFS (mi/h)	57.7
Base Free-Flow Speed, BFFS	60.0		

Operations

Design

Operational (LOS)		Design (N)	
Flow Rate, v _p (pc/h/ln)	1023	Required Number of Lanes, N	
Speed, S (mi/h)	57.7	Flow Rate, v _p (pc/h)	
D (pc/mi/ln)	17.7	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	