

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - WB - Mitig.
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	Year 2030 With Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Segment length, L_1 _____ mi

Class I highway
 Class II highway

Terrain
 Level
 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 993veh/h
 Opposing direction vol., V_o 347veh/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	7.5
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	0.885
Grade adjustment factor ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	0.94
Directional flow rate ² , $v_i(\text{pc/h})$ $v_i=V_i/(\text{PHF} \cdot f_{HV} \cdot f_G)$	1131	474
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, $\text{FFS}_d = S_{FM} + 0.00776(V_i / f_{HV})$ 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) 2.5 mi/h	Free-flow speed, FFS_d ($\text{FFS} = \text{BFFS} \cdot f_{LS} \cdot f_A$) 59.5 mi/h	
	Average travel speed, $\text{ATS} = \text{FFS} \cdot 0.00776 v_p \cdot f_{np}$ 44.6 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)	1.00	1.00
Directional flow rate ² , $v_i(\text{pc/h})=V_i/(\text{PHF} \cdot f_{HV} \cdot f_G)$	1128	394
Base percent time-spent-following ⁴ , $\text{BPTSF}(\%)=100(1-e^{-a v_d^b})$	76.4	
Adj. for no-passing zone, f_{np} (Exhibit 20-20)	20.4	
Percent time-spent-following, $\text{PTSF}(\%)=\text{BPTSF}+f_{np}$	91.5	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c=V_p/1,700$	0.67
Peak 15-min veh-miles of travel, $\text{VMT}_{15}(\text{veh} \cdot \text{mi})=0.25L_1(V/\text{PHF})$	3047
Peak-hour vehicle-miles of travel, $\text{VMT}_{60}(\text{veh} \cdot \text{mi})=V \cdot L_1$	10724
Peak 15-min total travel time, $\text{TT}_{15}(\text{veh} \cdot \text{h})=\text{VMT}_{15}/\text{ATS}$	68.3

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If $v_i(v_d \text{ or } v_o) \geq 1,700 \text{ pc/h}$, 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.

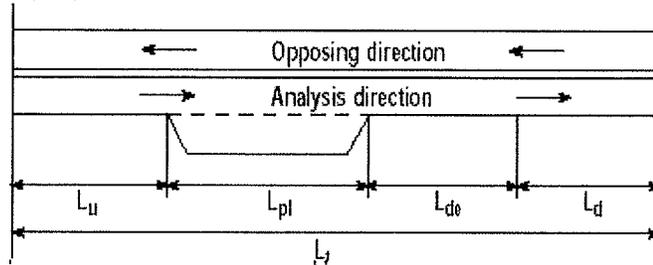
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - WB - Mitig.
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	Year 2030 With 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)	1.8
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	44.6
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	91.5
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) $L_d = L_t - (L_u + L_{pl} + L_{de})$	2.50
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 , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	45.7

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) $L_d = L_t - (L_u + L_{pl} + L_{de})$	0.60
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 , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	79.9

Level of Service and Other Performance Measures⁴

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) $TT_{15} = VMT_{15}/ATS_{pl}$	66.7

Notes

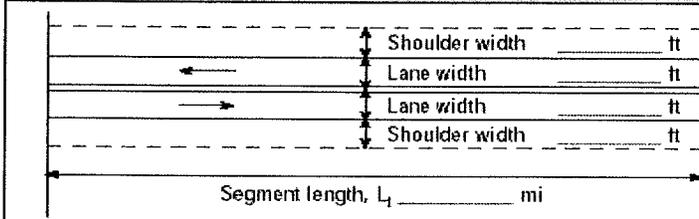
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - WB - Mitig.
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	Year 2030 With 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 684veh/h
 Opposing direction vol., V_o 405veh/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	0.915
Grade adjustment factor ¹ , f _G (Exhibit 20-7 or 20-13)	1.00	0.98
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV} *f _G)	779	512
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) 1.3 mi/h	
Adjustment for no-passing zones, f _{np} (Exhibit 20-19) 2.4 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} 46.4 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)	1.00	0.94
Directional flow rate ² , v _i (pc/h)=V _i /(PHF*f _{HV} *f _G)	777	488
Base percent time-spent-following ⁴ , BPTSF(%)=100(1-e ^{-av_d})	65.7	
Adj. for no-passing zone, f _{np} (Exhibit. 20-20)	29.9	
Percent time-spent-following, PTSF(%)=BPTSF+f _{np}	84.1	

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	0.46
Peak 15-min veh-miles of travel, VMT ₁₅ (veh- mi)=0.25L ₁ (V/PHF)	330
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh- mi)=V*L ₁	1163
Peak 15-min total travel time, TT ₁₅ (veh-h)=VMT ₁₅ /ATS	7.1

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) >=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.

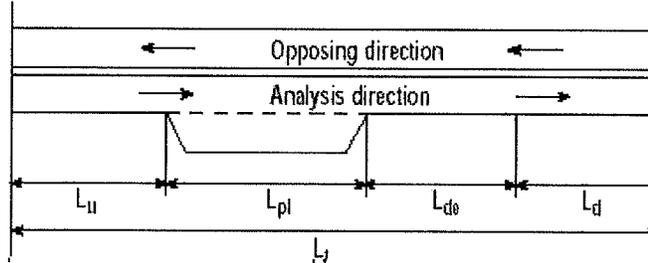
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - WB - Mitig.
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	Year 2030 With 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)	1.0
Length of passing lane including tapers, L_{pl} (mi)	0.2
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	46.4
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	84.1
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) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.20
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 , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	48.1

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)	5.16
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-4.66
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 , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	71.4

Level of Service and Other Performance Measures⁴

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) $TT_{15} = VMT_{15}/ATS_{pl}$	6.9

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 - WB - Mitig.
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	Year 2030 With Forest Ranch

Project Description: *Foresthill Divide Community Plan*

Input Data

Segment length, L_1 _____ mi

Show North Arrow

Class I highway Class II highway
 Terrain Level 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 405veh/h

Opposing direction vol., V_o 1009veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.2	5.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	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) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	537	1660
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 ($FSS=BFFS-f_{LS}-f_A$) 59.5 mi/h	
	Average travel speed, $ATS=FFS-0.00776V_p \cdot f_{np}$ 41.8 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)	1.1	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	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) $=V_i/(PHF \cdot f_{HV} \cdot f_G)$	535	1369
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-a \cdot v_d^b})$	63.2	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	18.6	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	68.5	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	D
Volume to capacity ratio, $v/c=V_p/1,700$	0.32
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $=0.25L_1(V/PHF)$	1439
Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $=V \cdot L_1$	4374
Peak 15-min total travel time, TT_{15} (veh-h) $=VMT_{15}/ATS$	34.5

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.

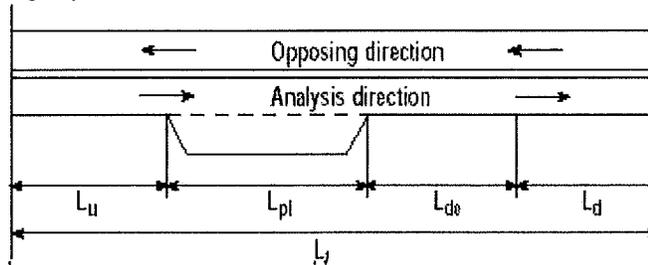
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - WB - Mitig.
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	Year 2030 With 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)	1.8
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	41.8
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	68.5
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	D

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) $L_d = L_t - (L_u + L_{pl} + L_{de})$	2.50
Adj. factor for the effect of passing lane on average speed, f_{pl} (Exhibit 20-24)	1.10
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	42.7

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)	7.02
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-2.82
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.61
Percent time-spent-following including passing lane ³ , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	56.7

Level of Service and Other Performance Measures⁴

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) $TT_{15} = VMT_{15} / ATS_{pl}$	33.7

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 Agency or Company Date Performed Analysis Time Period	MKL MRO Engineers, Inc. 2/27/07 PM Peak Hour	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Foresthill Road - WB - Mitig. Spring Garden to Todd Valley W Placer County Year 2030 With Forest Ranch

Project Description: Foresthill Divide Community Plan

Input Data

Segment length, L_1 _____ mi

Show North Arrow

Class I highway Class II highway
 Terrain Level 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	455veh/h
Opposing direction vol., V_o	676veh/h

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 20-9 or 20-15)	1.2	4.3
Passenger-car equivalents for RVs, E_R (Exhibit 20-9 or 20-17)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994	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) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	520	845
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) 1.3 mi/h	Free-flow speed, FFS_d ($FSS=BFFS \cdot f_{LS} \cdot f_A$) 58.8 mi/h	
	Average travel speed, $ATS=FFS_d \cdot 0.00776 v_p \cdot f_{np}$ 46.8 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)	1.1	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10 or 20-16)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	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)= $V_i/(PHF \cdot f_{HV} \cdot f_G)$	519	814
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-av_d^b})$	56.2	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	28.9	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	67.4	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	D
Volume to capacity ratio, $v/c=V_p/1,700$	0.31
Peak 15-min veh-miles of travel, $VMT_{15}(\text{veh-mi})=0.25L_1(V/PHF)$	220
Peak-hour vehicle-miles of travel, $VMT_{60}(\text{veh-mi})=V \cdot L_1$	774
Peak 15-min total travel time, $TT_{15}(\text{veh-h})=VMT_{15}/ATS$	4.7

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.

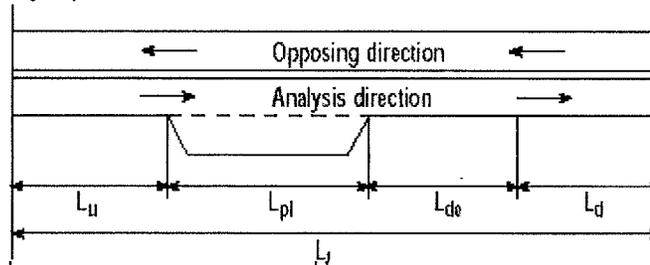
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - WB - Mitig.
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	Year 2030 With 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)	1.0
Length of passing lane including tapers, L_{pl} (mi)	0.2
Average travel speed, ATS_d (from Directional Two-Lane Highway Segment Worksheet)	46.8
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	67.4
Level of service ¹ , LOS_d (from Directional Two-Lane Highway Segment Worksheet)	D

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)	1.10
Average travel speed including passing lane ² , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	48.4

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)	7.15
Length of two-lane highway downstream of effective length of the passing lane for percent-time-following, L_d (mi) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-6.65
Adj. factor for the effect of passing lane on percent time-spent-following, f_{pl} (Exhibit 20-24)	0.61
Percent time-spent-following including passing lane ³ , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	56.9

Level of Service and Other Performance Measures⁴

Level of service including passing lane LOS_{pl} (Exhibit 20-3 or 20-4)	C
Peak 15-min total travel time, TT_{15} (veh-h) $TT_{15} = VMT_{15} / ATS_{pl}$	4.5

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.

APPENDIX H

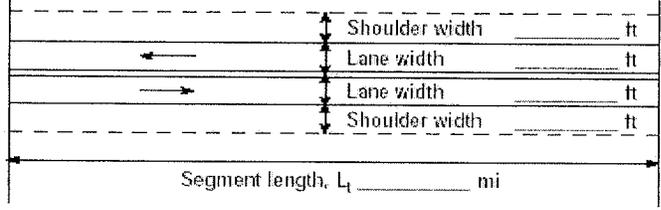
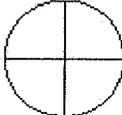
**CUMULATIVE + PROJECT CONDITIONS
BUILDOUT "WITHOUT FOREST RANCH" SCENARIO
LEVEL OF SERVICE CALCULATION WORKSHEETS**

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

 <p style="text-align: center;">Segment length, L_1 _____ mi</p>	<table style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> Class I highway</td> <td><input type="checkbox"/> Class II highway</td> </tr> <tr> <td>Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling</td> <td></td> </tr> <tr> <td>Grade Length 4.00 mi</td> <td>Up/down 3.0</td> </tr> <tr> <td>Peak-hour factor, PHF 0.88</td> <td></td> </tr> <tr> <td>No-passing zone 55%</td> <td></td> </tr> <tr> <td>% Trucks and Buses, P_T 6%</td> <td></td> </tr> <tr> <td>% Recreational vehicles, P_R 2%</td> <td></td> </tr> <tr> <td>Access points/ mi 2</td> <td></td> </tr> </table> <div style="text-align: center;">  <p>Show North Arrow</p> </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 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	
<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 $FFS=S_{FM}+0.00776(V_f \cdot f_{HV})$ 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 ($FSS=BFFS \cdot f_{LS} \cdot f_A$) 59.5 mi/h	
	Average travel speed, $ATS=FFS-0.00776V_p \cdot f_{np}$ 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 , $BPTSF(\%)=100(1-e^{-av_d^b})$	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, $v/c=V_p/1,700$	0.94
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi)= $0.25L_1(V/PHF)$	3191
Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi)= $V \cdot L_1$	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.

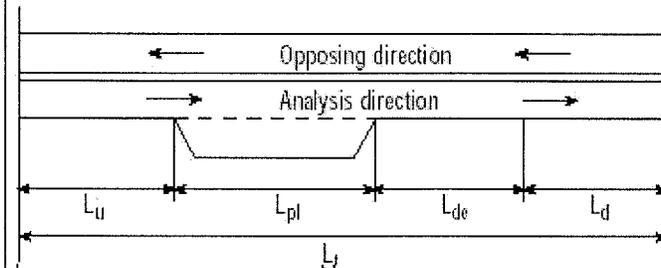
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

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, $TT_{15}(\text{veh-h})$ $TT_{15} = VMT_{15}/ATS_{pl}$	98.2

Notes

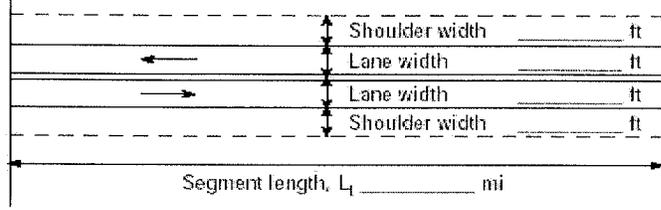
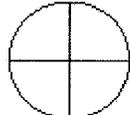
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

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

 <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 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 </div> </div>
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 ¹ , f_G (Exhibit 20-7 or 20-13)	1.00	0.95
Directional flow rate ² , $v_i(\text{pc/h}) v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	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, $FFS_d = FFS = S_{FM} + 0.00776(V_f \cdot f_{HV})$ 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 ($FFS = BFFS - f_{LS} - f_A$) 59.5 mi/h	
	Average travel speed, $ATS = FFS - 0.00776 v_p - f_{np}$ 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 , $v_i(\text{pc/h})=V_i/(PHF \cdot f_{HV} \cdot f_G)$	2009	1218
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-av_d^b})$	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, $v/c=V_f/1,700$	1.18
Peak 15-min veh-miles of travel, $VMT_{15}(\text{veh} \cdot \text{mi})=0.25L_1(V/PHF)$	5425
Peak-hour vehicle-miles of travel, $VMT_{60}(\text{veh} \cdot \text{mi})=V \cdot L_1$	19094
Peak 15-min total travel time, $TT_{15}(\text{veh} \cdot \text{h})=VMT_{15}/ATS$	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

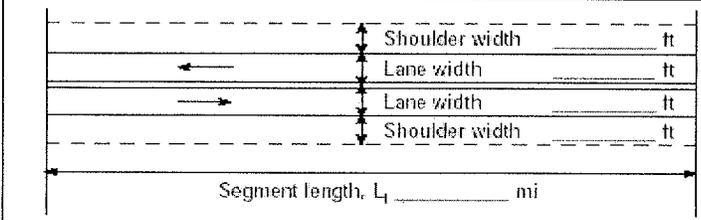
General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	AM Peak Hour	Analysis Year	Buildout Without Forest Ranch
Project Description: <i>Foresthill Divide Community Plan</i>			
Input Data			
<input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> 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 Measures ⁴			
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 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*f _{HV} *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-f _{LS} -f _A) 59.0 mi/h	
	Average travel speed, ATS=FFS-0.00776V _p -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*f _{HV} *f _G)	1638	1620
Base percent time-spent-following ⁴ , BPTSF(%)=100(1-e ^{-av_db})	92.7	
Adj. for no-passing zone, f _{np} (Exhibit 20-20)	4.6	
Percent time-spent-following, PTSF(%)=BPTSF+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 _t (V/PHF)	657
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh- mi)=V*L _t	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) >=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

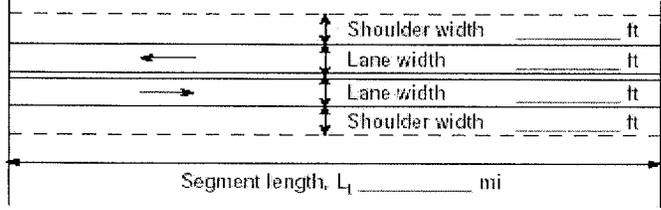
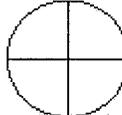
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

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

 <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 1.70 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 </div> </div>
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 (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	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, $FFS_d = FFS = S_{FM} + 0.00776(V_f \cdot f_{HV})$ 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 ($FFS = BFFS \cdot f_{LS} \cdot f_A$) 58.8 mi/h	
	Average travel speed, $ATS = FFS \cdot 0.00776 v_p \cdot f_{np}$ 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 (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1381	1396
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-a v_d^b})$	88.8	
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)	17.0	
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$	97.3	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c = V_f / 1,700$	0.81
Peak 15-min veh-miles of travel, $VMT_{15}(\text{veh} \cdot \text{mi}) = 0.25 L_1 (V / PHF)$	587
Peak-hour vehicle-miles of travel, $VMT_{60}(\text{veh} \cdot \text{mi}) = V \cdot L_1$	2066
Peak 15-min total travel time, $TT_{15}(\text{veh} \cdot \text{h}) = VMT_{15} / ATS$	16.2

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If v_i (V_d 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

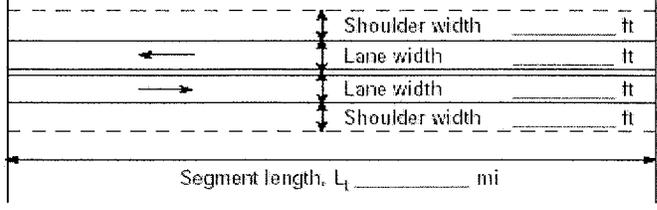
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway / Direction of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct
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

 <p style="text-align: center;">Segment length, L_1 _____ mi</p>	<table style="width: 100%;"> <tr> <td><input checked="" type="checkbox"/> Class I highway</td> <td><input type="checkbox"/> Class II highway</td> </tr> <tr> <td>Terrain <input type="checkbox"/> Level <input type="checkbox"/> Rolling</td> <td></td> </tr> <tr> <td>Grade Length 1.20 mi</td> <td>Up/down 3.0</td> </tr> <tr> <td>Peak-hour factor, PHF 0.59</td> <td>No-passing zone 17%</td> </tr> <tr> <td>% Trucks and Buses, P_T 2%</td> <td></td> </tr> <tr> <td>% Recreational vehicles, P_R 2%</td> <td></td> </tr> <tr> <td>Access points/ mi 3</td> <td></td> </tr> </table>	<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	
<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															
Analysis direction vol., V_d 1049veh/h															
Opposing direction vol., V_o 1060veh/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 (pc/h) $v_i = V_i / (PHF * f_{HV} * f_G)$	1875	1800
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) 0.8 mi/h	
Adjustment for no-passing zones, f_{np} (Exhibit 20-19) 0.5 mi/h	Free-flow speed, FFS_d ($FFS = BFFS - f_{LS} - f_A$) 59.3 mi/h	
	Average travel speed, $ATS = FFS - 0.00776v_p - f_{np}$ 30.2 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)	0.93	1.00
Directional flow rate ² , v_i (pc/h) $v_i = V_i / (PHF * f_{HV} * f_G)$	1904	1797
Base percent time-spent-following ⁴ , $BPTSF(\%) = 100(1 - e^{-av_d^b})$	94.8	
Adj. for no-passing zone, f_{np} (Exhibit 20-20)	4.4	
Percent time-spent-following, $PTSF(\%) = BPTSF + f_{np}$	97.1	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	F
Volume to capacity ratio, $v/c = V_p / 1,700$	1.10
Peak 15-min veh-miles of travel, $VMT_{15} (\text{veh} \cdot \text{mi}) = 0.25L_1(V/PHF)$	533
Peak-hour vehicle-miles of travel, $VMT_{60} (\text{veh} \cdot \text{mi}) = V * L_1$	1259
Peak 15-min total travel time, $TT_{15} (\text{veh} \cdot \text{h}) = VMT_{15} / ATS$	17.6

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.

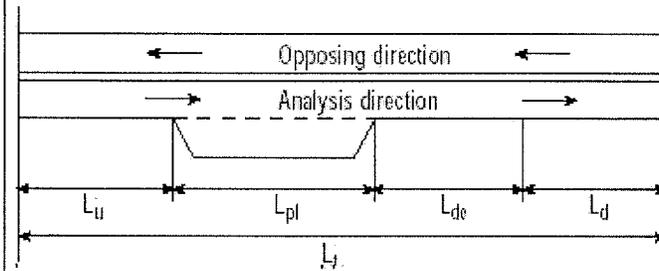
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET WITH PASSING LANE WORKSHEET

General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Eastbound
Agency or Company	MRO Engineers, Inc.	From/To	Todd Valley W to Owl Hill Ct
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)	1.2
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)	30.2
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	97.1
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} (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) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-1.60
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 , $ATS_{pl} = (ATS_d * L_t) / (L_u + L_d + (L_{pl}/f_{pl}) + (2L_{de}/(1+f_{pl})))$	33.2

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) $L_d = L_t - (L_u + L_{pl} + L_{de})$	-3.50
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 , $PTSF_{pl}(\%)$ $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	63.3

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, $TT_{15}(\text{veh-h})$ $TT_{15} = VMT_{15}/ATS_{pl}$	16.0

Notes

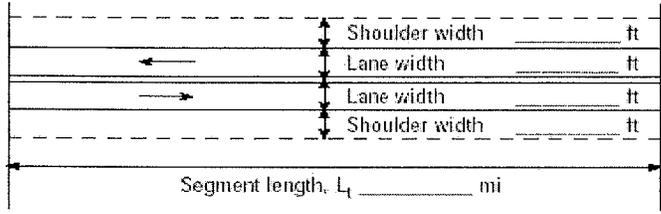
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

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	Todd Valley W to Owl Hill Ct.
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

 <p style="margin-left: 20px;">Shoulder width _____ ft</p> <p style="margin-left: 20px;">Lane width _____ ft</p> <p style="margin-left: 20px;">Lane width _____ ft</p> <p style="margin-left: 20px;">Shoulder width _____ ft</p> <p style="margin-left: 20px;">Segment length, L_1 _____ mi</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 0.79</p> <p>No-passing zone 100%</p> <p>% Trucks and Buses, P_T 2%</p> <p>% Recreational vehicles, P_R 2%</p> <p>Access points/ mi 4</p> </div> </div>
Analysis direction vol., V_d 1060veh/h	
Opposing direction vol., V_o 1049veh/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	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) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1344	1401
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, $FFS_d = FFS = S_{FM} + 0.00776(V_f \cdot f_{HV})$ 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) 0.9 mi/h	Free-flow speed, FFS_d ($FFS = BFFS - f_{LS} - f_A$) 59.0 mi/h	
	Average travel speed, $ATS = FFS - 0.00776v_p \cdot f_{np}$ 36.8 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)	1.00	0.93
Directional flow rate ² , v_i (pc/h) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	1342	1422
Base percent time-spent-following ⁴ , $BPTSF(\%)=100(1-e^{-v_d \cdot b})$		88.4
Adj. for no-passing zone, f_{np} (Exhibit. 20-20)		13.1
Percent time-spent-following, $PTSF(\%)=BPTSF+f_{np}$		94.8

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 or 20-4)	E
Volume to capacity ratio, $v/c=V_p/1,700$	0.79
Peak 15-min veh-miles of travel, $VMT_{15}(\text{veh} \cdot \text{mi})=0.25L_1(V/PHF)$	403
Peak-hour vehicle-miles of travel, $VMT_{60}(\text{veh} \cdot \text{mi})=V \cdot L_1$	1272
Peak 15-min total travel time, $TT_{15}(\text{veh} \cdot \text{h})=VMT_{15}/ATS$	11.0

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	Todd Valley W to Owl Hill Ct.
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)	1.2
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)	36.8
Percent time-spent-following, $PTSF_d$ (from Directional Two-Lane Highway Segment Worksheet)	94.8
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-spent-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 , $PTSF_{pl}$ (%) $PTSF_{pl} = PTSF_d [L_u + L_d + f_{pl}L_{pl} + ((1+f_{pl})/2)L_{de}] / L_t$	94.8

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

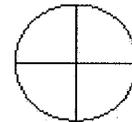
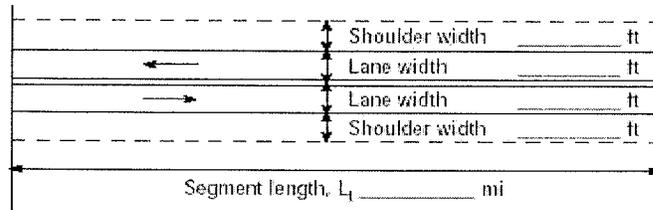
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v.c, VMT_{15} and VMT_{80} are calculated on Directional Two-Lane Highway Segment Worksheet.

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 (FFS=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 ^{-v_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 _f /1,700	1.16
Peak 15-min veh-miles of travel, VMT ₁₅ (veh-m)=0.25L _i (V/PHF)	4829
Peak-hour vehicle-miles of travel, VMT ₆₀ (veh-m)=V*L _i	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

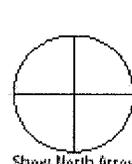
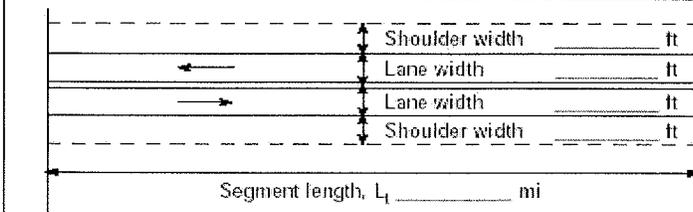
1. If $LOS_d = F$, passing lane analysis cannot be performed.
2. If $L_d < 0$, use alternative Equation 20-22.
3. If $L_d < 0$, use alternative Equation 20-20.
4. v/c, VMT_{15} and VMT_{60} are calculated on Directional Two-Lane Highway Segment Worksheet.

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 _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 (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_db})		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

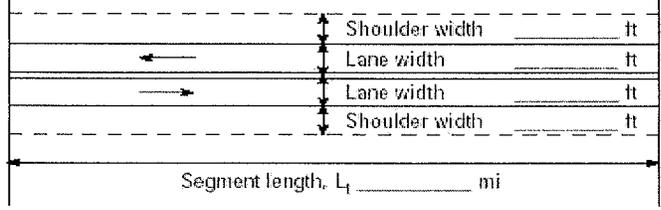
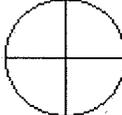
General Information		Site Information	
Analyst	MKL	Highway of Travel	Foresthill Road - Westbound
Agency or Company	MRO Engineers, Inc.	From/To	Bridge to Spring Garden Road
Date Performed	2/27/07	Jurisdiction	Placer County
Analysis Time Period	PM Peak Hour	Analysis Year	Buildout Without Forest Ranch
Project Description: <i>Foresthill Divide Community Plan</i>			
Input Data			
<input checked="" type="checkbox"/> Class I highway <input type="checkbox"/> 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 Measures ⁴			
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 $L_d < 0$, 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	PM 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 1.70 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 </div> </div>
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) $v_i=V_i/(PHF \cdot f_{HV} \cdot f_G)$	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_f veh/h	Adj. for lane width and shoulder width ³ , f_{LS} (Exh 20-5) 0.0 mi/h	
Free-flow speed, $FFS_d = FFS = S_{FM} + 0.00776(V_f \cdot f_{HV})$ 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, $ATS=FFS-0.00776v_p \cdot f_{np}$ 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) $=V_i/(PHF \cdot f_{HV} \cdot f_G)$	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, $VMT_{15}(\text{veh} \cdot \text{mi})=0.25L_1(V/PHF)$	539
Peak-hour vehicle-miles of travel, $VMT_{60}(\text{veh} \cdot \text{mi})=V \cdot L_1$	1899
Peak 15-min total travel time, $TT_{15}(\text{veh} \cdot \text{h})=VMT_{15}/ATS$	14.8

Notes

1. If the highway is extended segment (level) or rolling terrain, $f_G=1.0$.
2. If $v_i(v_d \text{ or } v_o) \geq 1,700$ 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 - 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} (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 (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} (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 (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.