APPENDICES

C-663A Pre-Construction Traffic Study for the Scudder Falls Bridge Replacement Project

APPENDIX L

CAPACITY ANALYSIS WORKSHEETS

(2-LANE ROADWAYS)



DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Route 532 NB S.R. 2081 to S.R. 2075 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2015
Input Data		
+		
Shoulder width ft		
Lane width		highway 🔛 Class II
Shoulder widthft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fai No-passing z	Level Rolling n mi Up/down ctor, PHF 0.91 one 100%
Analysis direction vol., V _d 193veh/h	Show North Arrow % Trucks and	l Buses , P _T 2 %
Opposing direction vol., V _o 241veh/h Shoulder width ft 3.0 Lane Width ft 10.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 15</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.5	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.990	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	214	267
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
N	Adj. for lane and shoulder width, ²	f _{LS} (Exhibit 15-7) 3.7 mi/h
Mean speed of sample ^v , S _{FM}	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.8 mi/h
Free-flow speed FES=S ₋₁ +0.00776(ν / fractions)	Free-flow speed, FFS (FSS=BFI	-S-f _{LS} -f _Δ) 47.5 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)3.6 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 40.3 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	84.7 %
Percent Time-Spent-Following	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	0.998	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	213	265
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	25.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	58.6	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 51.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures		D
Level of service, LOS (EXRIDIC 15-3)	/	D 13
	l	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	84.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	212.1
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.11
Bicycle level of service (Exhibit 15-4)	D
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	f the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only Exhibit 15-20 provides coefficients a and b for Equation 15-10. 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Route 532 SB S.R. 2081 to S.R. 2075 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft		
Lane width	Class I I	nighway 🔲 Class II
Lane width It	highway 🗹	Class III highway
Segment length, L ₁ mi	Terrain Grade Length Peak-hour fa	Level Rolling mi Up/down ctor, PHF 0.94
Analysis direction vol., V _d 271veh/h	Show North Arrow % Trucks and	one 100% I Buses , P _T 3 %
Opposing direction vol., V _o 142veh/h Shoulder width ft 3.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 15/mi
Lane Width ft 10.0 Seament Length mi 1.8		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.7
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.988	0.979
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	292	154
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Moon around of complete S	Adj. for lane and shoulder width,	f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.8 <i>mi/h</i>
Free-flow speed FES=S ₋₁ +0.00776(ν /f	Free-flow speed, FFS (FSS=BFI	-S-f _{1 S} -f ₄) 47.5 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)3.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 40.8 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	85.8 %
Percent Time-Spent-Following	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.997	0.997
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	289	152
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	29.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	51.7	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 63.2	
V _{o,PTSF})		
Level of Service and Other Performance Measures		D
Level of Service, LOS (EXRIDIC 15-3)	/	D) 17
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Capacity, C Large (Equation 15-12) yeh/h	1664
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1695
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	85.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	288.3
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.52
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Route 532 NB S.R. 2081 to S.R. 2075 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft	_	_
Lane width ft	Class I I	nighway 📃 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling n mi Up/down ctor, PHF 0.83 one 100%
Analysis direction vol., V _d 318veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %
Opposing direction vol., V _o 210veh/h Shoulder width ft 3.0 Lane Width ft 10.0 Segment Length mi 1.8	% Recreation Access points	nal vehicles, P _R 0% s <i>mi 15</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	384	254
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Moon around of complete S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.8 mi/h
Free-flow speed, FFS=S _{EM} +0.00776(v / f _{LV ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 47.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.6 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 39.0 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	81.9 %
Percent Time-Spent-Following		Operation Direction (c)
		Opposing Direction (0)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-venicie adjustment factor, $T_{HV} = 1/(1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.999	0.999
Grade adjustment factor, $I_{g,PTSF}$ (Exhibit 15-16 of EX 15-17)	7.00	7.00
Base percent time spent following ⁴ RDTSE (%)=100(1 $a^{2V_a}^{b})$	384 253	
Addi for no-passing zone f (Evbibit 15-21)	38.4	
Percent time-spent-following PTSF (%)=RPTSF +f *(v /v +		
V. proc)	69.7	
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)		С
Volume to capacity ratio, v/c	C	0.23
	1	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	383.1
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.50
Bicycle level of service score, BLOS (Eq. 15-31)	4.11
Bicycle level of service (Exhibit 15-4)	D
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction	Route 532 SB S.R. 2081 to S.R. 2075 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015
Input Data		
Lane width		
Lane width ft.		
Shoulder width ft	nigriway 💌	
• Segment length, L _t mi	Terrain ✓ Level Rolli Grade Length mi Up/down Peak-hour factor, PHF 0.85 No-passing zone 100%	Level Colling Mi Up/down tor, PHF 0.85 one 100%
Analysis direction vol., V _d 235veh/h	Show North Arrow % Trucks and	l Buses , P _T 1 %
Opposing direction vol., V _o 173veh/h Shoulder width ft 3.0 Lane Width ft 10.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 15</i> /mi
Segment Length min 1.8		
Average Traver Speeu	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E ₊ (Exhibit 15-11 or 15-12)	1.4	1.5
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.995
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	278	205
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mana and afferraria 3.0	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Mean speed of sample ^o , S _{FM}	Adj. for access points ⁴ , f _A (Exhibit	it 15-8) 3.8 <i>mi/h</i>
Free-flow speed FES=S+0.00776(v /f)	Free-flow speed, FFS (FSS=BFF	-S-f _{1 S} -f ₄) 47.5 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)4.0 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 39.8 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	83.8 %
Percent Time-Spent-Following		- · -·
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	277	204
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	28.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	57.2	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 61.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures		D
Level of service, LOS (EXHIBIT 15-3) Volume to canacity ratio v/c	ſ	0 16

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1692
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	83.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	276.5
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.01
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Route 532 NB S.R. 2075 to S.R. 2069 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft Lane width ft Lane width ft Lane width ft ft	☐ Class I I highway ☑	nighway 🗌 Class II Class III highway
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	mi Up/down ctor, PHF 0.94 one 100%
Analysis direction vol., V _d 395veh/h	% Trucks and	d Buses , P _T 2 %
Opposing direction vol., Vo403veh/hShoulder width ft3.0Lane Width ft10.0Segment Length mi0.2	% Recreation Access point	ial vehicles, P _R 0% s <i>mi 40</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	2.0	1.9
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.980	0.982
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.91	0.91
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	471	480
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 10.0 mi/h
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{LV/ATS}$)	Free-flow speed, FFS (FSS=BFI	=S-f _{LS} -f _A) 31.3 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 21.6 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	68.9 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.4	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.992
Grade adjustment factor', f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.91	0.92
Directional flow rate ⁺ , v _i (pc/n) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	465	4/0
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ⁻)	48.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	4	12.3
Percent time-spent-following, $PTSF_d$ (%)=BPTSF_d+f_np,PTSF *($v_{d,PTSF} / v_{d,PTSF}$ +	+ 69.9	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Level of Service, LOS (EXRIDIC 15-3)	/	ט 28
	l	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1569
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1585
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	68.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	420.2
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.46
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Route 532 SB S.R. 2075 to S.R. 2069 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ftLane width ftLane width ftLane width fttttttttt	☐ Class I h highway ☑ Terrain Grade Length	nighway Class II Class III highway Level Rolling
Analysis direction vol., V _d 784veh/h Opposing direction vol., V _o 343veh/h Shoulder width ft 3.0 Lane Width ft 10.0 Segment Length mi 0.2	Show North Arrow Show North Arrow % Recreation Access points	tor, PHF 0.93 one 100% d Buses , P _T 2 % al vehicles, P _R 0% s <i>mi</i> 40/mi
Average Travel Speed	Analysis Direction (d)	Opposing Direction (a)
Dessences and an inclusion for trucks E (Euclidia 15, 14 or 15, 12)		
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	2.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.980
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.99	0.88
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	858	428
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Moon speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit	it 15-8) 10.0 mi/h
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{HV/ATS}$)	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 31.3 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.6 mi/h	Average travel speed, ATS _d =FFS	6-0.00776(v _{d,ATS} + 18.7 mi/h
Present Time Operat 5- Hamilton	^v o,ATS ^{7 -} 'np,ATS Percent free flow speed, PFFS	59.9 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.6
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.988
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	0.88
Directional flow rate ² , $v_i(\text{pc/h}) v_i = V_i/(\text{PHF}^* f_{\text{HV,PTSF}} + f_{g,\text{PTSF}})$	843	424
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	67.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	25.5	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+$	+ 84.0	
V _{O,PTSF})		
Level of Service and Other Performance Measures	1	_
Level of service, LOS (Exhibit 15-3)		E
	<u> </u>	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1516
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1535
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	59.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	843.0
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.81
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Timo Boriod BM Pools	Highway / Direction of Travel F From/To S Jurisdiction F Analysis Yoar	Route 532 NB S.R. 2075 to S.R. 2069 PennDOT	
Project Description: Pre-Construction Traffic Study	Analysis real 2	015	
Input Data			
Shoulder width	 		
Lane width	t Class I hig	ghway 🔲 Class II	
Lane width	highway 🗸 C	lass III highway	
Shoulder width			
Segment length, L _t mi	Grade Length Peak-hour factur No-passing zor	mi Up/down or, PHF 0.96 ne 100%	
Analysis direction vol., V _d 746veh/h	% Trucks and E	Buses , P _T 1 %	
Opposing direction vol., V _o 350veh/h Shoulder width ft 3.0 Lane Width ft 10.0	% Recreational Access points <i>i</i>	l vehicles, P _R 0% <i>mi 40</i> /mi	
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks. E ₊ (Exhibit 15-11 or 15-12)	1.4	2.0	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, $f_{HV,ATS}$ =1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.996	0.990	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.99	0.88	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	788	418	
Free-Flow Speed from Field Measurement	Estimated Free	-Flow Speed	
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
	Adj. for lane and shoulder width, ⁴ f	LS(Exhibit 15-7) 3.7 mi/h	
Mean speed of sample ^o , S _{FM}	Adj. for access points ⁴ , f _A (Exhibit	15-8) 10.0 mi/h	
Free-flow speed EES=S +0.00776(v/f	Free-flow speed, FFS (FSS=BFFS	S-f _{LS} -f _A) 31.3 mi/h	
Adj. for no-passing zones, f np,ATS (Exhibit 15-15)2.6	ni/h Average travel speed, ATS _d =FFS-	0.00776(v _{d,ATS} + 19.3 mi/h	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	61.7 %	
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.6	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000	0.994	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	0.88	
Directional flow rate ² , $v_i(pc/h) v_i = V_i/(PHF^*f_{HV,PTSF}^* f_{g,PTSF})$	777	417	
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av_d}^b)$	64.	64.5	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	27.	27.9	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d})$	(PTSF ⁺	+ 82.7	
V _{o,PTSF})			
Level of Service and Other Performance Measures		-	
Volume to capacity ratio v/c		16	
	0.4	· ·	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1532
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1541
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	61.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	777.1
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.54
Bicycle level of service (Exhibit 15-4)	E
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Route 532 SB S.R. 2075 to S.R. 2069 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft		
Lane width ft	Class I	highway 📃 Class II
Lane width It	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtl Peak-hour fa	Level Rolling n mi Up/down ctor, PHF 0.89
Analysis direction vol., V _d 462veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %
Opposing direction vol., V _o 680veh/h Shoulder width ft 3.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 40/mi
Lane Width ft 10.0 Segment Length mi 0.2		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.8	1.5
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.995
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.95	0.99
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	551	776
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 10.0 mi/h
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{LV/ATS}$)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 31.3 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 19.7 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	63.0 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.2	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.96	1.00
Directional flow rate ⁴ , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	542	764
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} dັ)	57.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	2	29.6
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 69.6	
V _{o,PTSF})		
Level of Service and Other Performance Measures	I	-
Level of service, LOS (EXNIDIT 15-3)		
	ļ	1.52

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	63.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	519.1
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.33
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain. 	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Explicit 15 20 provides coefficients a and h for Equation 15 10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Timo Boriod AM Book	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) SB Route 532 to I-95 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2015
Input Data		
Shoulder width ft Lane width ft Lane width ft Lane width ft Lane width ft	☐ Class I highway ☑	highway 🔲 Class II Class III highway
Segment length, L _t mi	Terrain Grade Lengt Peak-hour fa No-passing z	Level Rolling h mi Up/down lotor, PHF 0.91 zone 100%
Analysis direction vol., V _d 612veh/h Opposing direction vol., V 290veh/h	Show North Arrow % Trucks and % Recreation	d Buses , P _T 3 % nal vehicles, P _P 0%
Shoulder width ft 2.0 Lane Width ft 12.0 Segment Length mi 2.8	Access point	rs <i>mi</i> 18/mi
Average Travel Speed	Analysis Direction (d)	Opposing Direction (c)
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.6	2.1
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-venicle adjustment factor, $t_{HV,ATS} = 1/(1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.982	0.968
Grade adjustment factor', t _{g,ATS} (Exhibit 15-9)	0.98	0.84
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $t_{g,ATS}$ * $t_{HV,ATS}$)	699	392
Free-Flow Speed from Field Measurement	Estimated Fr	ree-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/n
Mean speed of sample ³ , S _{EM}	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 2.6 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	bit 15-8) 4.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 47.9 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.8 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 36.7 mi/h
	Percent free flow speed, PFFS	76.6 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.6
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.982
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.98	0.86
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	686	377
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	59.6	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	30.9	
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 79.5	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	C
Volume to capacity ratio v/c	<u> </u>	0 41
	+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1453
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1486
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	672.5
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.81
Bicycle level of service (Exhibit 15-4)	E
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Explicit 15.20 provides coofficients a and b for Equation 15.10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) WB Route 532 to I-95 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Andiysis Teal	2015
Input Data		
The should arwidth the state of		
Lane width		
Lane widthft		
Letter Shoulder widthft		
Segment length, L _t mi	Grade Length mi Up/down Peak-hour factor, PHF 0.85 No-passing zone 100%	tor, PHF 0.85 0 0 000000000000000000000000000000000
Analysis direction vol., V _d 520veh/h	Show North Arrow % Trucks and	l Buses , P _T 2 %
Opposing direction vol., V _o 404veh/h Shoulder width ft 2.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 18/mi
Segment Length mi 2.8		
Average Travel Speed	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.7	1.8
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.986	0.984
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.97	0.94
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	640 514	
Free-Flow Speed from Field Measurement	Estimated Fre	e-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ , S _{E4}	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 2.6 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit	t 15-8) 4.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BFF	FS-f _{LS} -f _A) 47.9 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.2 mi/h	Average travel speed, ATS _d =FFS	6-0.00776(v _{d,ATS} + 36.7 mi/h
	^v o,ATS ^{7 - I} np,ATS Percent free flow speed, PFFS	76.7 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E ₊ (Exhibit 15-18 or 15-19)	1.0	1.4
Passenger-car equivalents for RVs, E _P (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.992
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.97	0.94
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	631	510
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	59.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	34.5	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 78.1	
v _{o,PTSF})	1	0.1
Level of Service and Other Performance Measures	1	
Level of service, LOS (Exhibit 15-3)		C
	L	.30

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1589
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1625
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	611.8
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.51
Bicycle level of service (Exhibit 15-4)	E
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period BM Paak	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) NB Route 532 to I-95 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
Lane width		
Lane width ft	highway 🖌	
ft_ft	Terrain	
Segment length, L _t mi	Grade Length mi Up/down Peak-hour factor, PHF 0.94 No-passing zone 100%	mi Up/down ctor, PHF 0.94 one 100%
Analysis direction vol., V _d 506veh/h	Show North Arrow % Trucks and	l Buses , P _T 1 %
Opposing direction vol., V _o 434veh/h	% Recreation	al vehicles, P _R 0% s <i>mi</i> 18/mi
Lane Width ft 12.0		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.8	1.9
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.991
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.96	0.93
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	565	501
Free-Flow Speed from Field Measurement	Estimated Fro	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Moon speed of sample ³ S	Adj. for lane and shoulder width, ²	f _{LS} (Exhibit 15-7) 2.6 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 4.5 mi/h
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{HV/\Delta TS}$)	Free-flow speed, FFS (FSS=BFI	-S-f _{LS} -f _A) 47.9 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 37.4 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	78.0 %
Percent Time-Spent-Following	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.2	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.998	0.996
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.96	0.94
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	562	493
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	54.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	3	7.6
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 74.9	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	
Level of service, LOS (Exhibit 15-3)	/	ر ۱۹۹
	l	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1602	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1625	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.0	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	538.3	
Effective width, Wv (Eq. 15-29) ft	14.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	4.22	
Bicycle level of service (Exhibit 15-4)	D	
Notes		
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific	
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only		

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) SB Route 532 to I-95 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
Shoulder width ft Lane width ft		highway
Lane width ft		Class III biobway
ft ft fft fft fft fft fft fft		
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	mi Up/down ctor, PHF 0.95 one 100%
Analysis direction vol., V _d 632veh/h	Show North Arrow % Trucks and	I Buses , P _T 1 %
Opposing direction vol., V _o 406veh/h Shoulder width ft 2.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 18/mi
Segment Length mi 2.8		
Average Travel Speed	1	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,ATS} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	0.997
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	666 429	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 2.6 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibi	t 15-8) 4.5 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV ATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 47.9 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.6 <i>mi/h</i>	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 36.8 mi/h
	v _{o,ATS}) - † _{np,ATS} Percent free flow speed, PFFS	76.9 %
Percent Time-Spent-Following	Apply to Directly (1)	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	665	427
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	58.8	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	3	4.0
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 79.5	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Volume to canacity ratio v/c	n n	39

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v</i> _{OL} (Eq. 15-24) veh/h	665.3
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.32
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Taylorsville Rd EB Dolington Rd to I-95 PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width It Lane width It Lane width It Shoulder width It Segment length, L _t mi	Class I highway Class I highway Terrain Grade Length Peak-hour far No-passing z	nighway Class II Class III highway Level Rolling n mi Up/down ctor, PHF 0.97 one 100%	
Analysis direction vol., V _d 320veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %	
Opposing direction vol., V381veh/hShoulder width ft3.0Lane Width ft11.0Segment Length mi0.4	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 27/mi	
Average Travel Speed	Analysis Direction (d)	Opposing Direction (c)	
	Analysis Direction (d)		
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.3	
Heavy-vehicle adjustment factor $f_{max} = 1/(1 + P_{-}(F_{-}-1) + P_{-}(F_{-}-1))$			
Grade adjustment factor ¹ , $f_{r,ATS}$ (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , v; (pc/h) v=V; / (PHF* $f_{p,ATS}$ * $f_{p,V,ATS}$)	331 394		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
·	Base free-flow speed ⁴ , BFFS 45.0 m		
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	⁴ f _{LS} (Exhibit 15-7) 3.0 <i>mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit	it 15-8) 6.8 mi/h	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV ATS})	Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 35.3 m		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 26.9 m		
Personé Timo Coorté Following	Percent free flow speed, PFFS	76.3 %	
rercent inne-spent-ronowing	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	0.999	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	330	393	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	37.5		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	48.7		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	59.7		
v _{o,PTSF})			
Level of Service and Other Performance Measures	1	<u>^</u>	
Level of service, LOS (EXHIBIT 15-3) Volume to canacity ratio v/c	C 0.10		
	ł – – – °		

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Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	329.9
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	3.97
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Taylorsville Rd WB Dolington Rd to I-95 PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width ft			
Lane width	Class I h	ighway 📃 Class II	
Lane width It	highway ♥ Class III highway Terrain ♥ Level ■ Ro Grade Length mi Up/down Peak-hour factor, PHF 0.95		
Segment length, L _t mi			
Analysis direction vol., V _d 1040veh/h	Show North Arrow % Trucks and	Buses , P _T 1 %	
Opposing direction vol., V _o 238veh/h Shoulder width ft 3.0 Lane Width ft 11.0 Segment Length mi 0.4	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 27/mi	
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	1.4	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.996	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	1095 252		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 3.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 6.8 r		
Free-flow speed, FFS=S _{EM} +0.00776(<i>v</i> / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFFS- $f_{I,S}$ - f_{Δ}) 35.3		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 21.5		
	v _{o,ATS}) ^{- 1} np,ATS Percent free flow speed, PFFS	60.0 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)	
Passenner-car equivalents for trucks E (Evhibit 15.18 or 15.10)	1 0		
Passenger-car equivalents for RVs. E_{T} (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{H_V}=1/(1+P_T(E_T-1)+P_D(E_D-1))$	1.000	0.999	
Grade adjustment factor ¹ , f _{a.PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	1095	251	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	73.4		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	29.3		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+$	97.2		
V _{o,PTSF})			
		F	
Volume to capacity ratio, v/c	E		
	•		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	60.0	
Bicycle Level of Service		
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	1094.7	
Effective width, Wv (Eq. 15-29) ft	14.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	4.58	
Bicycle level of service (Exhibit 15-4)	E	
Notes		
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.		
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.		

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Taylorsville Rd EB Dolington Rd to I-95 PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width ft Lane width ft Lane width ft Lane width ft Shoulder width ft	☐ Class I highway ☑ Terrain	nighway 🔲 Class II Class III highway 🗹 Level 🔲 Rolling	
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	n mi Up/down ctor, PHF 0.89 one 100%	
Analysis direction vol., V _d 675veh/h	% Trucks and	Buses, P _T 7%	
Opposing direction vol., V294veh/hShoulder width ft3.0Lane Width ft11.0Segment Length mi0.4	% Recreation Access points	ial vehicles, P _R 0% s <i>mi</i> 27/mi	
Average Travel Speed	-	1	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.4	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.999	0.996	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	759 332		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Moon speed of sample ³ S	Adj. for lane and shoulder width, ²	f _{LS} (Exhibit 15-7) 3.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 6.8 m		
Free-flow speed, FFS=S _{EM} +0.00776(v / f _{LN/ATE})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 35.3 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.1 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 23.6		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	67.1 %	
Percent Time-Spent-Following	Analysis Disset (1)		
	Analysis Direction (d)	Opposing Direction (0)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-venicie adjustment factor, I_{HV} =1/ (1+ $P_T(E_T-1)$ + $P_R(E_R-1)$)	1.000	0.999	
Grade adjustment factor', $r_{g,PTSF}$ (Exhibit 15-16 or EX 15-17)	759	221	
Base percent time spent following ⁴ RDTSE (0)-100(1 2 V ^b)			
Addi for no-passing zone f (Evplibit 15-21)	62.0		
Percent time-spent-following PTSE (%)=RPTSE +f */v /v +	29.3		
V. proc)	82.4		
1 evel of Service and Other Performance Measures	l		
Level of service, LOS (Exhibit 15-3)		D	
Volume to capacity ratio, v/c	0.45		
	ł		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	67.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	758.4
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.39
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15 20 provides coefficients a and b for Equation 15 10.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Taylorsville Rd WB Dolington Rd to I-95 PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Analysis direction vol., V _d 345veh/h	Class I highway Class II highway ✓ Class II highway Terrain ✓ Level ⊂ Rolling Grade Length mi Up/down Peak-hour factor, PHF 0.97 No-passing zone 100% % Trucks and Buses , P _T 1 %		
Opposing direction vol., V _o 331veh/h Shoulder width ft 3.0 Lane Width ft 11.0 Segment Length mi 0.4	% Recreation Access points	s <i>mi</i> 27/mi	
Average Travel Speed	Analysis Direction (d)	Opposing Direction (a)	
Passanger ear equivalents for trucks E (Exhibit 15 11 or 15 12)	4 0		
Passenger-car equivalents for RVs, $E_{\rm P}$ (Exhibit 15-11 or 15-12) Passenger-car equivalents for RVs, $E_{\rm P}$ (Exhibit 15-11 or 15-13)	1.0	1.4	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.996	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	357	343	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, <i>v</i> Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.1 mi/h	Base free-flow speed ⁴ , BFFS45.0Adj. for lane and shoulder width, ${}^4 f_{LS}$ (Exhibit 15-7)3.0 rAdj. for access points ⁴ , f_A (Exhibit 15-8)6.8 rFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)35.3Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + v _{o,ATS}) - $f_{np,ATS}$ 26.7Percent free flow speed, PEFS75.9		
Percent Time-Spent-Following	•		
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	0.999	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ⁴ , v_i (pc/h) v_i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	356	342	
Base percent time-spent-following*, BPTSF _d (%)=100(1-e ^{av} d)	39.0		
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} + $v_{d,PTSF}$)	65.2		
Level of Service and Other Performance Measures	.		
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio, v/c		C 0.21	
	+		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	355.7
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.01
Bicycle level of service (Exhibit 15-4)	D
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	f the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Taylorsville Rd EB Dolington Rd to Afton Avenue PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2013	
Input Data			
Shoulder width tt			
Lane width tt		nignway 🔲 Class II	
Shoulder width ft	highway ✓ Class III highway Terrain ✓ Level ⊂ Rolling Grade Length mi Up/down Peak-hour factor, PHF 0.95 No-passing zone 100%		
Segment length, L _t mi			
Analysis direction vol., V _d 395veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %	
Opposing direction vol., V _o 386veh/h Shoulder width ft 2.0 Lane Width ft 11.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 40</i> /mi	
Segment Length mi 0.6			
Average maver Speed	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	1.3	1.3	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}$ =1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.997 0.997		
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	417	408	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS mi/h		
Maan analod of complete S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) <i>mi/h</i>	
Total demand flow rate, both directions v	Adj. for access points ⁴ , f _A (Exhibit 15-8) <i>mi/h</i>		
Free-flow speed, FFS=S _{FM} +0.00776($v/f_{HV/ATS}$)	Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 36.1 r		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.7 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 27.0 mi/h	
	v _{o,ATS}) - † _{np,ATS} Percent free flow speed, PFFS	74.9 %	
Percent Time-Spent-Following	Apolyois Direction (d)	Opposing Direction (c)	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, $E_{T}(Exhibit 15-16 \text{ or } 15-19)$	1.0	1.0	
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 of 15-19)	1.00	1.00	
Grade adjustment factor ¹ f (1+ $r_T(E_T^{-1}) r_R(E_R^{-1})$)	1.000	1.000	
Directional flow rate ² . v(pc/h) v=V/(PHF*f_w_proc* f_proc)	416	406	
Base percent time-spent-following ⁴ , BPTSF ₄ (%)=100(1- $e^{av_d}^b$)	43.4		
Adj. for no-passing zone, f _{nn PTSF} (Exhibit 15-21)	45.6		
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{no.PTSF} *(v _{d.PTSF} / v _{d.PTSF}	+		
V _{o,PTSF})		55.5	
Level of Service and Other Performance Measures			
Level of service, LOS (Exhibit 15-3)	D		
Volume to capacity ratio, v/c	0.25		

•		
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.9	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	415.8	
Effective width, Wv (Eq. 15-29) ft	13.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	4.22	
Bicycle level of service (Exhibit 15-4)	D	
Notes	•	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific	
2. If v _i (v _d or v _o) >=1,700 pc/h, terminate analysisthe LOS is F.		
3. For the analysis direction only and for v>200 ven/n.		

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

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Beriod PM Peak	Highway / Direction of Travel From/To Jurisdiction Applycis Year	Taylorsville Rd EB Dolington Rd to Afton Avenue PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width ft		_	
Lane width tt		nighway 📃 Class II	
Shoulder width ft	highway ♥ Class III highway Terrain ♥ Level ■ Rolling Grade Length mi Up/down Peak-hour factor, PHF 0.90 No-passing zone 100%		
Segment length, L _t mi			
Analysis direction vol., V _d 621veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %	
Opposing direction vol., V _o 372veh/h Shoulder width ft 2.0 Lane Width ft 11.0	Access points	s <i>mi</i> 40/mi	
Segment Length mi 0.6			
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.3	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.994	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	691	416	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	mi/h	
Mean speed of sample ³ S 30	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) <i>mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) <i>mi/h</i>		
Free-flow speed, FFS=S _{EM} +0.00776(v /f _{LV (ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 37.7 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.6 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 26.5 mi/h	
	v _{o,ATS}) - † _{np,ATS} Percent free flow speed, PFFS	70.3 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000	1.000	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , <i>v</i> _i (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	690	413	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av_db})	61.0		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	32.9		
Percent time-spent-following, $PTSF_d$ (%)=BPTSF_d+f_np,PTSF *($v_{d,PTSF} / v_{d,PTSF}$. 81.6		
v _{o,PTSF})			
Level of Service and Other Performance Measures	1		
Level of service, LOS (EXNIDIT 15-3)	D 0.44		
		י.דו	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690		
---	---		
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700		
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	70.3		
Bicycle Level of Service			
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	690.0		
Effective width, Wv (Eq. 15-29) ft	13.00		
Effective speed factor, S_t (Eq. 15-30)	4.79		
Bicycle level of service score, BLOS (Eq. 15-31)	4.71		
Bicycle level of service (Exhibit 15-4)	E		
Notes			
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the ba downgrade segments are treated as level terrain. 	ase conditions. For the purpose of grade adjustment, specific		
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h.			

For the analysis direction only
 Exhibit 15-20 provides coefficients a and b for Equation 15-10.
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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Taylorsville Rd WB Dolington Rd to Afton Avenue PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width ft			
Lane width tttttttt	highway ☑ Terrain Grade Length	Class III highway	
Analysis direction vol., V _d 712veh/h	Show North Arrow % Trucks and	ctor, PHF 0.86 one 100% I Buses , P _T 2 %	
Opposing direction vol., Vo282veh/hShoulder width ft2.0Lane Width ft11.0Segment Length mi0.6	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 40/mi	
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.4	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.992	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	830 331		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	mi/h	
Mean speed of sample ³ S 30	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) <i>mi/l</i>		
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV.ATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 37.7 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.1 mi/h	Average travel speed, ATS _d =FFS	6-0.00776(v _{d,ATS} + 25.6 mi/h	
	v _{o,ATS}) - I _{np,ATS} Percent free flow speed, PFFS	67.8 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.998	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	828	329	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1- $e^{av_d}^b$)	65.3		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	28.2		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+$	+ 85.5		
V _{o,PTSF})			
	1	D	
Volume to capacity ratio, v/c	0.49		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	67.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	827.9
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.80
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700$ pc/h, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst ACB Agency or Company Pennoni Date Performed 11/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd WB Dolington Rd to Afton Avenue PennDOT 2015	
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015	
Input Data			
Shoulder width ft			
Lane Width It	Class I h	nighway 📃 Class II	
Shoulder width tt	highway 🗹	Class III highway	
Segment length, L, mi	Terrain Vevel Rollin Grade Length mi Up/down		
Applying dispeties well V 20 4 wh/h	Show North Arrow % Trucks and	ctor, PHF 0.86 one 100%	
Analysis direction vol., v _d 394ven/n	% Decreation	$T_{\rm T}$ $Z_{\rm T}$	
Opposing direction vol., V _o 533veh/h Shoulder width ft 2.0 Lane Width ft 11.0	% Recreation Access points	s <i>mi</i> 40/mi	
Segment Length mi 0.6			
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.998	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	460 621		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS mi/h		
Moon around of complete S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	t 15-8) <i>mi/h</i>	
Free-flow speed, FFS=S _{EM} +0.00776(v/f_{HVATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 37.2 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 72.8 %		
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0	
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.0	1.00	
Heavy-venicie adjustment factor ¹ f (Evenibit 15 16 or Ex 15 17)	1.000	1.000	
Grade adjustment factor, $I_{g,PTSF}$ (Exhibit 15-16 of EX 15-17)	458	620	
Base percent time-spent-following ⁴ RPTSF $(%)=100(1-e^{av_d^b})$	400 020		
Adi for no-passing zone f $_{}$ (Explicit 15-21)	49.0		
Percent time-spent-following PTSE (%)=RPTSE +f*(v /v +	33.7		
Vapres)	64.8		
Level of Service and Other Performance Measures			
Level of service. LOS (Exhibit 15-3)		D	
Volume to capacity ratio, v/c	0.27		
}	1		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1697
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	72.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	458.1
Effective width, Wv (Eq. 15-29) ft	13.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.50
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015	Highway / Direction of Travel From/To Jurisdiction	Pine Grove Rd (S.R. 2071) NB S.R. 2026 to U.S. Route 1 PennDOT	
Analysis Time Period AM Peak	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data			
Shoulder width It			
Lane width		nighway 🔛 Class II	
Shoulder width ft	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Length Peak-hour fai	Level Rolling mi Up/down ctor, PHF 0.86	
Analysis direction vol., V _d 532veh/h	Show North Arrow % Trucks and	Buses , P _T 4 %	
Opposing direction vol., V _o 533veh/h	% Recreation	al vehicles, P _R 0%	
Shoulder width ft 6.0 Lane Width ft 12.0	Access points	s <i>mi 4</i> /mi	
Segment Length mi 0.8			
Average Travel Speed	-		
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV,ATS} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.996	0.996	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	621 622		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	50.0 mi/h	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 1.0		
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV.ATS})	Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 49.0		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.8 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 37.5		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	76.6 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)	
Passenger-car equivalents for trucks E (Evhibit 15-18 or 15-10)			
Passenger-car equivalents for RVs E (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor $f_{ex} = 1/(1 + P_{ex}(E_{ex}(1) + P_{ex}(E_{ex}(1))))$	1 000	1 000	
Grade adjustment factor ¹ f $_{-\pi\sigma\sigma}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , $v(pc/h) v = V/(PHE^*f_{rational} + f_{rational} + f_{rational})$	619	620	
Base percent time-spent-following ⁴ , BPTSF, (%)=100(1- $e^{av_d^b}$)	58.9		
Adj. for no-passing zone, f _{an proc} (Exhibit 15-21)	33.4		
Percent time-spent-following, PTSF (%)=BPTSF .+f DTGE *(V_d DTGE / V_d DTGE +	+		
	75.6		
Level of Service and Other Performance Measures	I		
Level of service, LOS (Exhibit 15-3)		С	
Volume to capacity ratio, v/c	0.37		
and the second	+ Č		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	618.6
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	3.14
Bicycle level of service (Exhibit 15-4)	С
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Pine Grove Rd (S.R. 2071) SB S.R. 2026 to U.S. Route 1 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft	Class	
Lane width It	highway ☑ Terrain Grade Lengti	Class III highway
Segment length, L ₁ mi	Peak-hour fa No-passing z	ctor, PHF 0.87 cone 100%
Analysis direction vol., v _d 533ven/m	% Procession	$T = \frac{1}{2} $
Opposing direction vol., V _o 532veh/h Shoulder width ft 6.0 Lane Width ft 12.0 Segment Length mi 0.8	% Recreation Access point	s <i>mi</i> 4/mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.997
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	614	613
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Mana analafaamala ³ O	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Mean speed of sample", S _{FM}	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 1.0 mi/h
Free-flow speed $FES=S_{-1}+0.00776(y/f_{-1})$	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 49.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)1.8 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 37.6 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	76.8 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Upposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.00	1.0
$\frac{1}{1000} = \frac{1}{1000} = 1$	1.000	1.000
Directional flow rate ² μ (pc/h) μ =V/(PHE*f, μ =====* f, ====)	613	611
Base percent time-spent-following ⁴ . BPTSF_(%)=100(1- $e^{av_d}^b$)	59.1	
Adi, for no-passing zone, f	33.9	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$. 76.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u> </u>
Volume to canacity ratio v/c		
	+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	612.6
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.86
Bicycle level of service (Exhibit 15-4)	С
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Pine Grove Rd (S.R. 2071) NB S.R. 2026 to U.S. Route 1 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2013
Input Data		
Shoulder width ft Lane width ft Lane width ft Shoulder width ft Segment length, L, mi	Class I highway V Terrain Grade Lengt	highway
Analysis direction vol., V _d 721veh/h Opposing direction vol., V _o 600veh/h Shoulder width ft 6.0 Lane Width ft 12.0 Segment Length mi 0.8	Show North Arrow Show North Arrow % Trucks an % Recreation Access point	ictor, PHF 0.83 zone 100% d Buses , P _T 2 % nal vehicles, P _R 0% s <i>mi 4</i> /mi
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E ₋ (Exhibit 15-11 or 15-12)	1 0	1 1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.998
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	869	724
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, <i>v</i> Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.5 mi/h	Base free-flow speed4, BFFS50.0 mAdj. for lane and shoulder width, ${}^4 f_{LS}$ (Exhibit 15-7)0.0 mAdj. for access points4, f_A (Exhibit 15-8)1.0 mFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)49.0 mAverage travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +35.1 m	
	^v o,ATS ^{7 - Inp,ATS Percent free flow speed, PFFS}	71.7 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	869	723
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	70.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	24.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	84.4	
V _{o,PTSF})		
Level of Service and Other Performance Measures		D
Level of service, LOS (EXTIDIT 15-3) Volume to capacity ratio, v/c	D	
	+ ``	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1697
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	71.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	868.7
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.79
Bicycle level of service (Exhibit 15-4)	С
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
neral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015	Highway / Direction of Travel From/To Jurisdiction	Pine Grove Rd (S.R. 2071) SB S.R. 2026 to U.S. Route 1 PennDOT
Analysis Time Period PM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Shoulder widthtt		_
	Class I h	ighway 📃 Class II
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fac	Level Rolling mi Up/down ctor, PHF 0.95
Analysis direction vol., V _d 600veh/h	Show North Arrow % Trucks and	Buses , P _T 3 %
Opposing direction vol., V _o 721veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 6.0 Lane Width ft 12.0	Access points	s <i>mi 4</i> /mi
Segment Length mi 0.8		
Average Travel Speed	· · · · · · · · · · · · · · · · · · ·	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.997
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	633 761	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Moon speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 1.0	
Free-flow speed, FFS=S _{EM} +0.00776(ν / f _{LV ATS})	Free-flow speed, FFS (FSS=BFF	S-f _{LS} -f _A) 49.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.4 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	75.1 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	632	759
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	62.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	28.2	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 75.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures	Level of Service and Other Performance Measures	
Level of service, LOS (EXNIDIT 15-3)	<u> </u>	
	0	.31

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	631.6
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.88
Bicycle level of service (Exhibit 15-4)	С
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) NB Route 532 to Route 32 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2015
Input Data		
+		
Shoulder width It		
Lane width		nighway
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling mi Up/down ctor, PHF 0.84 one 91%
Analysis direction vol., V _d 428veh/h	Show North Arrow % Trucks and	l Buses , P _T 2 %
Opposing direction vol., V _o 248veh/h Shoulder width ft 1.0 Lane Width ft 10.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 21</i> /mi
Segment Length mi 2.2		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (c)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	512 298	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 55.0	
Mean speed of sample ³ S	Adj. for lane and shoulder width, 4 f _{LS} (Exhibit 15-7) 5.	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 5.3	
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV.ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 44.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 34.	
	v _{o,ATS}) - † _{np,ATS} Percent free flow speed, PFFS	78.5 %
Percent Time-Spent-Following	Analysis Disection (4)	Orana in a Direction (c)
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	510	296
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	48.7	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	38.7	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 73.2	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Volume to capacity ratio v/c		
	+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	509.5
Effective width, Wv (Eq. 15-29) ft	11.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.79
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) SB Route 532 to Route 32 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Andiysis Teal	2015
Input Data		
Shoulder width ft		
Lane widthtt	Class I h	nighway 🔲 Class II
Lane width tt	highway 🗸	Class III highway
T Shoulder width ft		
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	tevel Coning mi Up/down ctor, PHF 0.80 one 91%
Analysis direction vol., V _d 286veh/h	Show North Arrow % Trucks and	l Buses , P _T 3 %
Opposing direction vol., Vo215veh/hShoulder width ft1.0Lane Width ft10.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 21/mi
Segment Length mi 2.2		
Average maver speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.991	0.988
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	361 272	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 mi/	
	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 5.3	
Mean speed of sample ^o , S _{FM}	Adj. for access points ⁴ , f _A (Exhibit	t 15-8) 5.3 mi/h
Free flow speed EFS=S $\pm 0.00776(y/f)$	Free-flow speed, FFS (FSS=BFF	-S-f _{Lo} -f _A) 44.5 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15) 3.4 mi/h	Average travel speed, ATS _d =FFS	G-0.00776(v _{d,ATS} +
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	81.2 %
Percent Time-Spent-Following		-
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.997
Grade adjustment factor ¹ , f _{g.PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	359	270
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	37.6	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	52.7	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	67.7	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Level of service, LOS (EXRIDIT 15-3)	<u> </u>	
		. 2 1

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1680
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1695
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.2
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	357.5
Effective width, Wv (Eq. 15-29) ft	11.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.87
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) NB Route 532 to Route 32 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft Lane width ft Lane width ft Shoulder width ft Segment length, L _t mi	Class I highway □ Class II highway ☑ Class II highway Terrain ☑ Level □ Rollin Grade Length mi Up/down Grade Length mi Up/down	
Analysis direction vol., V _d 440veh/h Opposing direction vol., V _o 252veh/h Shoulder width ft 1.0 Lane Width ft 10.0 Segment Length mi 2.2	Show North Arrow % Trucks and % Recreation Access points	tone 91% d Buses , P _T 1% nal vehicles, P _R 0% s <i>mi</i> $21/mi$
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. E ₊ (Exhibit 15-11 or 15-12)	1.2	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	507	291
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, v Free-flow speed, FFS=S _{FM} +0.00776(v / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 mi/h	Base free-flow speed ⁴ , BFFS55.0Adj. for lane and shoulder width, ${}^4 f_{LS}$ (Exhibit 15-7)5.3 rAdj. for access points ⁴ , f_A (Exhibit 15-8)5.3 rFree-flow speed, FFS (FSS=BFFS-f_LS-f_A)44.5Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 34.934.9V_a ATS) = f_{ap ATS}34.9	
Persont Time Spont Following	Percent free flow speed, PFFS	78.6 %
r ercent rime-opent-ronowilly	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	506	290
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	48.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	38.9	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	73.6	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u>^</u>
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio, V/c		
	+	

Capacity, C.,, (Equation 15-12) yeb/b	1693
d,ATS (Equation 10 12) torisin	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	505.7
Effective width, Wv (Eq. 15-29) ft	11.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.56
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Deried PM Realy	Highway / Direction of Travel From/To Jurisdiction	Taylorsville Rd (S.R. 2071) SB Route 532 to Route 32 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder widthft	_	
Lane width		nighway 🔛 Class II
Shoulder widthft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fac No-passing z	Level Rolling mi Up/down ctor, PHF 0.89 one 91%
Analysis direction vol., V _d 374veh/h	Show North Arrow % Trucks and	l Buses , P _T 1 %
Opposing direction vol., V _o 279veh/h Shoulder width ft 1.0 Lane Width ft 10.0 Segment Length mi 2.2	% Recreation Access points	al vehicles, P _R 0% s <i>mi 21/</i> mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	421	315
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 55.0 min	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 5.3 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibi	t 15-8) 5.3 <i>mi/h</i>
Free-flow speed, FFS=S _{EM} +0.00776(<i>v</i> / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 44.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.2 mi/h	Average travel speed, ATS _d =FFS	6-0.00776(v _{d,ATS} + 35.6 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 80.0 %	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	420	314
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d [°])	43.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	46.1	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	69.8	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Volume to capacity ratio v/c	C	
		.20

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	80.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	420.2
Effective width, Wv (Eq. 15-29) ft	11.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.47
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
neral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Lindenhurst Rd (S.R. 2069) NB Route 532 to Route 332 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder width tt		
Lane width		nighway 🔛 Class II
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level V Rolling m mi Up/down ctor, PHF 0.78 one 100%
Analysis direction vol., V _d 370veh/h	Show North Arrow % Trucks and	l Buses , P _T 16 %
Opposing direction vol., V _o 439veh/h Shoulder width ft 4.0 Lane Width ft 11.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 15</i> /mi
Segment Length mi 2.3		
Average Traver Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.9	1.7
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.874	0.899
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.94	0.96
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{q,ATS} * f _{HV,ATS})	577 652	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
N	Adj. for lane and shoulder width, ²	f _{LS} (Exhibit 15-7) <i>1.7 mi/h</i>
Mean speed of sample ^o , S _{FM}	Adj. for access points ⁴ , f_{A} (Exhibit 15-8) 3.8	
Free-flow speed FES=S ₋₁ +0.00776(ν / fractions)	Free-flow speed, FFS (FSS=BFI	-S-f _{LS} -f _Δ) 44.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)1.6 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 33.4 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	74.9 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.4	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.940	0.969
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.94	0.97
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	537	599
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	54.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	35.2	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *($v_{d,PTSF}$ / $v_{d,PTSF}$ +	70.9	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Volume to capacity ratio v/c		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1482
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1598
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	474.4
Effective width, Wv (Eq. 15-29) ft	15.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	9.62
Bicycle level of service (Exhibit 15-4)	F
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	eral Information Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Lindenhurst Rd (S.R. 2069) SB Route 532 to Route 332 PennDOT
Project Description: Pre-Construction Traffic Study	Analysis rear	2015
Input Data		
+		
Shoulder width tt		—
Lane width		nighway
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtt Peak-hour fa No-passing z	Level Rolling n mi Up/down ctor, PHF 0.88 one 100%
Analysis direction vol., V _d 534veh/h	Show North Arrow % Trucks and	d Buses , P _T 9 %
Opposing direction vol., V _o 167veh/h Shoulder width ft 4.0 Lane Width ft 11.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 15</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.7	2.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.941	0.895
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.97	0.74
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	665 287	
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 50.0	
Maan anaad of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 1.7 mi/h
Total demand flow rate both directions v	Adj. for access points ⁴ , f _A (Exhibit 15-8)	
Free-flow speed, FFS=S _{EM} +0.00776(v / f _{LV/ATS})	Free-flow speed, FFS (FSS=BFI	=S-f _{LS} -f _A) 44.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.4 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 33.7 <i>mi/h</i>
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	75.7 %
Percent Time-Spent-Following	Anglusia Dispetien (d)	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.8
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.933
Grade adjustment factor', t _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.97	0.79
Directional flow rate ⁺ , v _i (pc/h) v _i =v _i (PHF*t _{HV,PTSF} * t _{g,PTSF})	626	258
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ⁻)	53.4	
Adj. tor no-passing zone, t _{np,PTSF} (Exhibit 15-21)	31.5	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + $	75.7	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Level of service, LOS (EXNIDIT 15-3)	<u> </u>	
	ļ	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1228
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1327
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	606.8
Effective width, Wv (Eq. 15-29) ft	15.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	6.55
Bicycle level of service (Exhibit 15-4)	F
Notes	
 Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysia Timo Datiod	Highway / Direction of Travel From/To Jurisdiction	Lindenhurst Rd (S.R. 2069) NB Route 532 to Route 332 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis rear	2015
Input Data		
Shoulder width tt		
Lane width		nighway 🔛 Class II
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour far No-passing z	Level VROlling m mi Up/down ctor, PHF 0.91 one 100%
Analysis direction vol., V _d 467veh/h	Show North Arrow % Trucks and	Buses , P _T 2 %
Opposing direction vol., V _o 366veh/h Shoulder width ft 4.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 15/mi
Segment Length mi 2.3		
Average Travel Speed	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.8	2.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, f _{HV,ATS} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.984	0.980
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.95	0.90
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	549 456	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>1.7 mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibi	it 15-8) 3.8 <i>mi/h</i>
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV ATS})	Free-flow speed, FFS (FSS=BFF	⁻ S-f _{LS} -f _A) 44.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.4 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 34.3 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	77.0 %
Percent Time-Spent-Following	I .	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.2	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.996	0.992
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.96	0.90
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	537	450
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	53.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	38.5	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + $	+ 74.2	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Level of service, LOS (EXNIDIT 15-3)	<u> </u>	
	<u> </u>	9.02

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1536
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1568
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	77.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	513.2
Effective width, Wv (Eq. 15-29) ft	15.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.28
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period PM Paak	Highway / Direction of Travel From/To Jurisdiction	Lindenhurst Rd (S.R. 2069) SB Route 532 to Route 332 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder width tt		
Lane width		nighway 🔛 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling n mi Up/down ctor, PHF 0.89 one 100%
Analysis direction vol., V _d 400veh/h	Show North Arrow % Trucks and	d Buses , P _T 7 %
Opposing direction vol., V _o 358veh/h Shoulder width ft 4.0 Lane Width ft 11.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 15/mi
Segment Length mi 2.3		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.9	2.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.941	0.935
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.92	0.90
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	519 478	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) <i>1.7 mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.8 mi/h
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{LV/ATS}$)	Free-flow speed, FFS (FSS=BFI	⁻ S-f _{LS} -f _A) 44.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 34.5 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	77.4 %
Percent Time-Spent-Following	I .	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.4	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.973	0.973
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.93	0.90
Directional flow rate ² , v _i (pc/h) v _i =V _i ((PHF*f _{HV,PTSF} * f _{g,PTSF})	497	459
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	50.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	40.7	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *($v_{d,PTSF}$ / $v_{d,PTSF}$ +	+ 71.4	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Volume to capacity ratio v/c	C 031	
	+`	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1488
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1554
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	77.4
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	449.4
Effective width, Wv (Eq. 15-29) ft	15.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	5.67
Bicycle level of service (Exhibit 15-4)	F
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Route 32 NB Route 532 to Route 179 PennDOT 2015
Project Description: Pre-Constructin Traffic Study	Analysis real	2015
Input Data		
Shoulder width		
Lane width tt	Class I I	nighway 🔲 Class II
Lane width tt	highway 🗸	Class III highway
Shoulder widthft		
Segment length, L _t mi	Grade Length Peak-hour far No-passing z	mi Up/down ctor, PHF 0.90 one 100%
Analysis direction vol., V _d 437veh/h	Show North Arrow % Trucks and	d Buses , P _T 0 %
Opposing direction vol., V _o 278veh/h Shoulder width ft 2.0 Lane Width ft 10.0	% Recreation Access points	nal vehicles, P _R 0% s <i>mi</i> 19/mi
Segment Length mi 7.3		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i / (PHF^* f_{g,ATS}^* f_{HV,ATS})$	486 309	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 45.0 m	
Mean speed of sample ³ . S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 4.8 mi/h
Free-flow speed, FFS=S _{EM} +0.00776(<i>v</i> / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFI	⁻ S-f _{LS} -f _A) 36.5 <i>mi/h</i>
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 27.1 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	74.1 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	486	309
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	46.5	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	41.0	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 71.6	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	D	
	0.29	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	485.6
Effective width, Wv (Eq. 15-29) ft	12.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.22
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
neral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Timo Boriad AM Boak	Highway / Direction of Travel From/To Jurisdiction	Route 32 SB Route 532 to Route 179 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis fear	2015
Input Data		
Lane width		nighway
Lane width ft		Class III highway
tt		
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	mi Up/down ctor, PHF 0.87 one 100%
Analysis direction vol., V _d 349veh/h	Show North Arrow % Trucks and	d Buses , P _T 3 %
Opposing direction vol., V _o 273veh/h Shoulder width ft 2.0 Lane Width ft 10.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 19/mi
Segment Length mi 7.3		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.991	0.988
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	405 318	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 4.8	
Free-flow speed, FFS=S _{EM} +0.00776(v/ f _{HV ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 36.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.2 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 27.7 <i>mi/h</i>
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	75.8 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.997
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	401	315
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	42.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	48.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 69.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Volume to capacity ratio v/c	C 0 24	
		··= ·

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1680
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1695
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	401.1
Effective width, Wv (Eq. 15-29) ft	12.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.81
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain. 	the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only For the analysis are direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period BM Paak	Highway / Direction of Travel From/To Jurisdiction	Route 32 NB Route 532 to Route 179 PennDOT 2015
Project Description: Pre-Constructin Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder width tt		
Lane width tt		nighway 📃 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling mi Up/down ctor, PHF 0.95 one 100%
Analysis direction vol., V _d 463veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %
Opposing direction vol., V _o 314veh/h Shoulder width ft 2.0	% Recreation Access points	nal vehicles, P _R 0% s <i>mi</i> 19/mi
Segment Length mi 7.3		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	488 332	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 45.0 m	
Maan aroad of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 4.8 mi/h
Free-flow speed, FFS=S _{FM} +0.00776($v/f_{\rm INVATE}$)	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 36.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.1 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 27.0	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	74.0 %
Percent Time-Spent-Following	· · · · · · · · · · · ·	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	487	331
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	47.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	41.1	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 71.7	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Volume to capacity ratio v/c	U	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	487.4
Effective width, Wv (Eq. 15-29) ft	12.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.43
Bicycle level of service (Exhibit 15-4)	D
Notes	·
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 8/24/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Route 32 SB Route 532 to Route 179 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft Lane width ft	Class I I	nighway 🔲 Class II
Lane width ft Shoulder widthft Segment length, L _t mi	highway Terrain Grade Length Peak-hour fa No-passing z	Class III highway Level Rolling mi Up/down ctor, PHF 0.84 one 100%
Analysis direction vol., V d500veh/hOpposing direction vol., V o276veh/hShoulder width ft2.0Lane Width ft10.0Segment Length mi7.3	Show North Arrow % Trucks and % Recreation Access points	d Buses , P _T 0 % val vehicles, P _R 0% s <i>mi</i> 19/mi
Average Travel Speed	1	1
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	595 329	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 45.0	
Maan append of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points4, fA (Exhibit 15-8)4.Free-flow speed, FFS (FSS=BFFS-fLS-fA)36	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV.ATS})		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.2 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 26.2 mi/h
	vo,ATS) ^{- I} np,ATS Percent free flow speed, PFFS	71.7 %
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	595	329
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	54.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	35.9	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 77.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	<u>D</u>	
	0.35	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700	
--	--	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	71.7	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	595.2	
Effective width, Wv (Eq. 15-29) ft	12.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	4.32	
Bicycle level of service (Exhibit 15-4)	D	
Notes		
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific	
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only		

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
AnalystMTDAgency or CompanyPennoniDate Performed9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Pike EB East 95/West Edgewood Rd PennDOT
Analysis Time Period AM Peak	Analysis Year	2015
Shoulder width tttttt		
Lane width ft	highway 🖌	
t Shoulder widthtt		
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	Level Colling mi Up/down ctor, PHF 0.83 one 100%
Analysis direction vol., V _d 316veh/h	Show North Arrow % Trucks and	l Buses , P _T 3 %
Opposing direction vol., V _o 249veh/h Shoulder width ft 2.0 Lane Width ft 12.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 35/mi
Segment Length mi 0.4		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks E (Exhibit 15-11 or 15-12)	1 3	1 4
Passenger-car equivalents for RVs, $E_{\rm P}$ (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HVATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.991 0.988	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , V_{i} (pc/h) $v_{i}=V_{i}$ / (PHF* f_{i} and * f_{i} v_{i} (and)	384 304	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Sneed	
	Base free-flow speed ⁴ . BFFS 45.0 mi/l	
	Adi, for lane and shoulder width.4	f. (Exhibit 15-7) 2.6 mi/h
Mean speed of sample ³ , S _{FM}	Adi for access points ⁴ f. (Exhibi	it 15-8) 8.8 mi/h
Total demand flow rate, both directions, v	Auj. 101 access points ', 1 _A (Exhibit 13-8) 8.8 7	
Free-flow speed, FFS=S _{FM} +0.00776(V /f _{HV,ATS})	Average travel speed ATS -EES	$(1 - 1_{LS} - 1_{A})$ $(1 - 1_{LS} - 1_{A})$
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 mi/h	$v_{o ATS}$) - $f_{no ATS}$	25.0 mi/h
	Percent free flow speed, PFFS	74.3 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. E_(Exhibit 15-18 or 15-19)		1.1
Passenger-car equivalents for RVs. E _D (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{\mu\nu}=1/(1+P_{T}(E_{T}-1)+P_{D}(E_{D}-1))$	0.997	0.997
Grade adjustment factor ¹ , $f_{a, PTSF}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	382	301
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	39.6	
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	50.5	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 67.0	
V _{o,PTSF})	c	
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	D	
volume to capacity ratio, V/c	0.23	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1680
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1695
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	380.7
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.52
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
eneral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Reformed 9///2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Pike WB East 95/West Edgewood Rd PanaDOT
Analysis Time Period AM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study	-	
Input Data		
Shoulder width It	_	_
Lane width ft	Class I h	nighway 📃 Class II
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fac	Level Rolling mi Up/down ctor, PHF 0.89
Analysis direction vol., V _d 263veh/h	Show North Arrow % Trucks and	one 100% I Buses , P _T 2 %
Opposing direction vol., V 273veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 2.0	Access points	s <i>mi</i> 35/mi
Lane Width ft 12.0 Seament Length mi 0.4		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0 1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	298 309	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Moon around of complete S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 2.6 <i>mi/h</i>
Total demand flow rate, both directions v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.8 n	
Free-flow speed, FFS=S _{EM} +0.00776(ν / f _{LV ATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 33.7 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 25.6 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 76.2 %	
Percent Time-Spent-Following	1	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	296	307
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ⁵)	32.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	56.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 60.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Volume to capacity ratio. v/c	0.18	
	i	· · ·

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.2
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	295.5
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.14
Bicycle level of service (Exhibit 15-4)	D
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Pike EB East 95/West Edgewood Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
Shoulder width ft Lane width ft	Class I I	nighway 🗌 Class II
Lane widthtt	highway 🗹 Class III highway	
	Terrain	Level Rolling
Segment length, L _t mi	Grade Length Peak-hour far No-passing z	n mi Up/down ctor, PHF 0.90 one 100%
Analysis direction vol., V _d 403veh/h	Show North Arrow % Trucks and	Buses , P _T 2 %
Opposing direction vol., V _o 341veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 2.0 Lane Width ft 12.0	Access points	s <i>mi 35</i> /mi
Segment Length mi 0.4		
Average Travel Speed		1
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994	0.994
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	450 381	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Moon speed of sample ³ S	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 2.6 <i>mi</i> /	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 8.8 <i>mi/h</i>
Free-flow speed, FFS=S _{FM} +0.00776(v/f_{INVATE})	Free-flow speed, FFS (FSS=BFI	-S-f _{LS} -f _A) 33.7 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.8 mi/h	Average travel speed, ATS _d =FFS	G-0.00776(v _{d,ATS} + 24.4 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 72.4 %	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	448	380
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	45.5	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	43.6	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 69.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures	or Service and Other Performance Measures	
Volume to capacity ratio. v/c	U	

•	-
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	72.4
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	447.8
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.35
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is of downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Pike WB East 95/West Edgewood Rd PennDOT
Analysis Time Period PM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Shoulder width ft		
		highway 🔛 Class II
Shoulder width It	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fai No-passing z	Level Rolling mi Up/down ctor, PHF 0.89
Analysis direction vol., V _d 357veh/h	Show North Arrow % Trucks and	Buses , P _T 0 %
Opposing direction vol., V _o 387veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 2.0 Lane Width ft 12.0 Segment Length mi 0.4	Access points	s <i>mi 35</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0 1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000 1.000	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	401 435	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	45.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 2.6 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.8 r	
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV ATS})	Free-flow speed, FFS (FSS=BFFS- f_{LS} - f_A) 33.7	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.5 <i>mi/h</i>	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 24.6 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 73.2 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (c)
Passenger-car equivalents for trucks. E. (Exhibit 15-18 or 15-19)		
Passenger-car equivalents for RVs. E_{-} (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor. $f_{\rm inv}=1/(1+P_{\rm T}(E_{\rm T}-1)+P_{\rm D}(E_{\rm D}-1))$	1.000	1.000
Grade adjustment factor ¹ , $f_{a, BTSE}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV PTSF} * f _{a PTSF})	401	435
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1- $e^{av_d}^b$)	43.7	
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	44.5	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+	
V _{o,PTSF})	6	o.u
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	D	
Volume to capacity ratio, v/c	0.24	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	73.2
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	401.1
Effective width, Wv (Eq. 15-29) ft	14.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	3.86
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Yardley Langhorne Rd EB East Edgewood Rd/West Rt. 332 PennDOT 2015
Project Description: Pre-Construction Traffic Study		2013
Input Data		
Shoulder width It Lane width It Lane width It Shoulder width It Segment length, L _t mi	Class I highway Class II highway Class III highway Terrain Class III highway Terrain Up/down Crade Length Mi Up/down	
Analysis direction vol., V _d 189veh/h Opposing direction vol., V _o 155veh/h Shoulder width ft 12.0 Lane Width ft 12.0 Segment Length mi 1.6	Show North Arrow % Recreation Access point	iciti, Frin 10.30 cone 94% d Buses , P _T 1 % nal vehicles, P _R 0% s <i>mi</i> 14/mi
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. E ₊ (Exhibit 15-11 or 15-12)	1.5	1.6
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.995	0.994
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	216 177	
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, v Free-flow speed, FFS=S _{FM} +0.00776(v / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.7 mi/h	Base free-flow speed4, BFFS55.0 mAdj. for lane and shoulder width, ${}^4 f_{LS}$ (Exhibit 15-7)0.0 mAdj. for access points4, f_A (Exhibit 15-8)3.5 mFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)51.5 mAverage travel speed, ATS_d=FFS-0.00776(v_{d,ATS} + v_{o,ATS}) - f_{np,ATS}44.8 mVo,ATS) - f_{np,ATS}0.7 0 f	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	215	176
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	2	22.9
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	60.2	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	56.0	
V _{o,PTSF})		
Level of Service and Other Performance Measures		P
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio v/c	B	
	+	

•	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	87.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	214.8
Effective width, Wv (Eq. 15-29) ft	36.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-1.75
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Rd WB East Edgewood Rd/West Rt. 332 PennDOT	
Analysis Time Period AM Peak	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data			
Shoulder widthft			
Lane width		highway	
Shoulder width ft	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling mi Up/down ctor, PHF 0.80 one 94%	
Analysis direction vol., V _d 167veh/h	Show North Arrow % Trucks and	Buses , P _T 1 %	
Opposing direction vol., V _o 181veh/h	% Recreation	al vehicles, P _R 0%	
Lane Width ft 12.0	Access points	5////	
Segment Length mi 1.6			
Average Travel Speed	Analysis Direction (d)	Opposing Direction (a)	
Passenger-car equivalents for trucks. E_ (Exhibit 15-11 or 15-12)	1.5		
Passenger-car equivalents for RVs. $E_{\rm p}$ (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{LV/ATC} = 1/(1 + P_T(E_T - 1) + P_D(E_D - 1))$	0.995 0.995		
Grade adjustment factor ¹ , f _{a ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v_i (pc/h) $v_i=V_i/(PHF^* f_{0.0TE}^* f_{LV/0TE})$	210 227		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
·	Base free-flow speed ⁴ , BFFS 55.0 mi/h		
	Adj. for lane and shoulder width, ²	f _{Le} (Exhibit 15-7) 0.0 mi/h	
Mean speed of sample ³ , S _{FM}	Adi, for access points ⁴ , f, (Exhib	it 15-8) 3.5 mi/h	
Total demand flow rate, both directions, v	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		
Free-flow speed, FFS=S _{FM} +0.00776(V/T _{HV,ATS}) Addition to passing zones f (Exhibit 15.15) 3.8 mi/h	Average travel speed, ATS_=FFS	$6 - 0.00776(v_{1ATO} + 0.00776$	
Auj. 101 http://www.automatical.com/automatical	v _{o,ATS}) - f _{np,ATS}	44.3 mi/h	
Descent Time On and Tallanting	Percent free flow speed, PFFS	86.0 %	
rercent Time-spent-ronowing	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	0.999	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v_i (pc/h) $v_i = V_i$ /(PHF*f _{HV,PTSF} * f _{g,PTSF})	209	226	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	23.0		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	62.0		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 52.8		
V _{o,PTSF})			
Level of Service and Other Performance Measures			
Level of service, LOS (EXNIDIT 15-3)	B		
		.12	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1692
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	86.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	208.8
Effective width, Wv (Eq. 15-29) ft	36.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-1.76
Bicycle level of service (Exhibit 15-4)	A
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	f the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Information Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Rd EB East Edgewood Rd/West Rt. 332 PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015
Input Data		
Shoulder width ft		
Lane width	Class I	highway
Lane width tt	highway 🗸	Class III highway
Segment length 1 mi	Terrain Grade Lengt	Level Rolling
	Peak-hour fa No-passing z	actor, PHF 0.83 zone 94%
Analysis direction vol., V _d 189veh/h	% Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 199veh/h Shoulder width ft 12.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 14/mi
Segment Length mi 1.6		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.5	1.5
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.990	0.990
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	230 242	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 min	
Maan speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 3.5	
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{LV/ATS}$)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A)
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 44.1 n	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	85.7 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*t _{HV,PTSF} * f _{g,PTSF})	228	240
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ⁻)	25.8	
Adj. tor no-passing zone, f _{np,PTSF} (Exhibit 15-21)	61.3	
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 55.7	
V _{o,PTSF})		
Level of Service and Other Performance Measures		D
Level of service, LOS (EXTIDIT 15-3)	<u> </u>	
		2.17

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1683
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	85.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	227.7
Effective width, Wv (Eq. 15-29) ft	36.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-1.49
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysis—the LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
AnalystMTDAgency or CompanyPennoniDate Performed9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Langhorne Rd WB East Edgewood Rd/West Rt. 332 PennDOT	
Analysis Time Period PM Peak	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data			
Shoulder widthft		sistema Dolara II	
Lane width tt		nighway 🔄 Class II	
Shoulder width ft	highway 🗹	Class III highway	
Segment length, L _t mi	Grade Length Peak-hour far No-passing z	Level Rolling m mi Up/down ctor, PHF 0.85 one 94%	
Analysis direction vol., V _d 213veh/h	Show North Arrow % Trucks and	Buses , P _T 1 %	
Opposing direction vol., V _o 158veh/h	% Recreation	al vehicles, P _R 0%	
Shoulder width ft 12.0 Lane Width ft 12.0	Access points	<i>s mi 14/</i> mi	
Segment Length mi 1.6			
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.6	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.994	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	252 187		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ²	f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 3.5		
Free-flow speed, FFS=S _{EM} +0.00776(ν / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFFS- f_{LS} - f_{Δ}) 41.		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 82.8 \$		
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (0)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.999	0.999	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	251	186	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^v)	26.1		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	57.6		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 59.2		
V _{o,PTSF})			
Level of Service and Other Performance Measures		<u>^</u>	
Volume to canacity ratio v/c	C		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	82.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	250.6
Effective width, Wv (Eq. 15-29) ft	36.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-1.67
Bicycle level of service (Exhibit 15-4)	А
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain. 	the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only For the analysis are direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Big Oak Rd (S.R. 2024) EB Pine Grove Rd/Stony Hill Rd PennDOT	
Analysis Time Period AM Peak	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data	1		
Shoulder width ft	_	_	
	Class I h	nighway 📃 Class II	
Shoulder width tt	highway 🗹	Class III highway	
Segment length, L _t mi	Grade Length	Level Rolling mi Up/down	
Analysis direction vol V, 410veh/h	Show North Arrow % Trucks and	loo, FHP 0.75 one 100% I Buses , P _T 4 %	
Opposing direction vol. V 147veh/b	% Recreation	al vehicles. P _D 0%	
Shoulder width ft 8.0	Access points	s <i>mi</i> 35/mi	
Lane Width ft 10.0			
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.5	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.980	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	551 200		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 45.0 mi		
Maan anood of complete S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>1.1 mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_{Δ} (Exhibit 15-8) 8.8		
Free-flow speed. FFS=S _{Fx} +0.00776(y / f _{initiation})	Free-flow speed, FFS (FSS=BFFS-f _{1, 2} -f ₄) 35.		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)4.0 mi/h	Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} + 25.2)$		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	72.0 %	
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.996	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	547	197	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	47.6		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	36.5		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 74.4		
V _{o,PTSF})			
Level of Service and Other Performance Measures	1	0	
Level of service, LOS (EXRIDIT 15-3)	D		
		.32	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1666
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1693
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	72.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	546.7
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.58
Bicycle level of service (Exhibit 15-4)	С
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Data Deformed 0/4/2015	Highway / Direction of Travel From/To	Big Oak Rd (S.R. 2024) WB Pine Grove Rd/Stony Hill Rd	
Analysis Time Period AM Peak	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data			
Shoulder widthft			
Lane width ft	Class I h	nighway 🗌 Class II	
Lane width tt	highway 🗹	Class III highway	
	Terrain	V Level Rolling	
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	n mi Up/down ctor, PHF 0.69 one 100%	
Analysis direction vol., V _d 189veh/h	Show North Arrow % Trucks and	Buses , P _T 8 %	
Opposing direction vol., V _o 310veh/h	% Recreation	al vehicles, P _R 0%	
Lane Width ft 8.0	Access points	51111 557111	
Segment Length mi 2.0			
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.3	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.969	0.977	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v_i (pc/h) $v_i = V_i / (PHF^* f_{g,ATS} * f_{HV,ATS})$	283 460		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>1.1 mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.8		
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 35.2 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.4 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	76.7 %	
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.0	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.992	1.000	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	276	449	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	34.0		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	44.9		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 51.1		
V _{o,PTSF})			
Level of Service and Other Performance Measures		0	
Level of Service, LOS (EXTIDIT 15-3)	C 0.17		
volume to capacity ratio, we			

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1661
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	273.9
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	3.52
Bicycle level of service (Exhibit 15-4)	D
Notes	•
 Note that the adjustment factor for level terrain is 1.00,as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Big Oak Rd (S.R. 2024) EB Pine Grove Rd/Stony Hill Rd PennDOT	
Analysis Time Period PM Peak	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data			
Shoulder width tt		_	
Lane width tt	Class I	highway 📃 Class II	
Shoulder width tt	highway 🔽	Class III highway	
Segment length, L _t mi	Grade Length Peak-hour fa	Level Rolling h mi Up/down ctor, PHF 0.94 rone 100%	
Analysis direction vol., V _d 290veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %	
Opposing direction vol., V _o 262veh/h	% Recreation	nal vehicles, P _R 0%	
Shoulder width ft 8.0 Lane Width ft 10.0	Access point	s <i>mi 35</i> /mi	
Segment Length mi 2.0			
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.4	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.996	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	310 280		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Moon speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) <i>1.1 mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.8		
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{\rm LW/ATE}$)	Free-flow speed, FFS (FSS=BFFS-f _{1 s} -f _A) 35		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.5 mi/h	Average travel speed, ATS _d =FF3	S-0.00776(v _{d,ATS} + 27.1 mi/h	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	77.1 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)	
Passanger oor equivalants for trucks E (Exhibit 15.19 or 15.10)			
Passenger car equivalents for PVs. E (Exhibit 15-16 of 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor $f = 1/(1+P(F_{-1})+P(F_{-1}))$	0.999	0.999	
Grade adjustment factor ¹ f $_{\text{rec}}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , $v(pc/h) v = V/(PHF*f_{rev}, proc^* f_{rev})$	309	279	
Base percent time-spent-following ⁴ . BPTSF .(%)=100(1-e ^{av} d ^b)	33.0		
Adj. for no-passing zone, f _{ere proc} (Exhibit 15-21)	56.7		
Percent time-spent-following, PTSF (%)=BPTSF +f an DTSE *(V4 DTSE / V4 DTSE +	+		
	62.8		
Level of Service and Other Performance Measures	1		
Level of service, LOS (Exhibit 15-3)		С	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	77.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v</i> _{OL} (Eq. 15-24) veh/h	308.5
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.54
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Explicit 15 20 provides coefficients a and h for Equation 15 10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Information Site Information		
Analyst MTD Agency or Company Pennoni	Highway / Direction of Travel From/To	Big Oak Rd (S.R. 2024) WB Pine Grove Rd/Stony Hill Rd	
Analysis Time Period 9/4/2015	Analysis Year	2015	
Project Description: Pre-Construction Traffic Study			
Input Data			
Shoulder widthft			
Lane width tt	Class I h	nighway 🔲 Class II	
Lane width tt	highway 🗸	Class III highway	
\downarrow Shoulder width $_$ $_$ $_$ $_$	Terrain	V Level Rolling	
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	mi Up/down ctor, PHF 0.92 one 100%	
Analysis direction vol., V _d 307veh/h	Show North Arrow % Trucks and	Buses , P _T 1 %	
Opposing direction vol., V _o 525veh/h	% Recreation	al vehicles, P _R 0%	
Lane Width ft 8.0	Access points	5777 557711	
Segment Length mi 2.0			
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.999	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	335 571		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	45.0 mi/h	
Moon around of complete S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>1.1 mi/h</i>	
Total demand flow rate both directions v	Adj. for access points ⁴ , f_{A} (Exhibit 15-8) 8.8		
Free-flow speed, FFS=S ₋₁ +0.00776(ν / f _{10.4.4.50})	Free-flow speed, FFS (FSS=BFFS-f,f_) 35		
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)1.9 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	74.5 %	
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.0	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.999	1.000	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	334	571	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	39.9		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	37.1		
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + $	53.6		
V _{o,PTSF})			
Level of Service and Other Performance Measures	1		
Level of Service, LOS (EXRIDIT 15-3)	D		
		.20	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1698
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	333.7
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.58
Bicycle level of service (Exhibit 15-4)	В
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Explicit 15.20 provides coefficients a and b for Equation 15.10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Stony Hill Rd (S.R. 2069) NB Rt. 1 to Big Oak Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft		
Lane width	Class I I	nighway 🔲 Class II
Lane width It	highway 🗹	Class III highway
Segment length, L ₁ mi	Terrain Grade Length Peak-hour fa	Level Rolling mi Up/down ctor, PHF 0.83
Analysis direction vol., V _d 281veh/h	Show North Arrow % Trucks and	one 100% d Buses , P _T 10 %
Opposing direction vol., V _o 363veh/h	% Recreation	nal vehicles, P _R 0%
Shoulder width ft 2.0 Lane Width ft 10.0 Seament Lenath mi 0.9	Access point	s <i>mi 19/</i> mi
Average Travel Speed	<u>.</u>	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.962 0.971	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	352 450	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean around of complete C	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 4.8	
Free-flow speed, FFS=S _{EM} +0.00776(v / f _{LV/ATS})	Free-flow speed, FFS (FSS=BFFS- $f_{1,S}$ - f_{Λ}) 44	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.5 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	81.3 %
Percent Time-Spent-Following	Analysia Direction (d)	Opposing Direction (a)
$\sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{i$		
Passenger-car equivalents for trucks, E_{T} (Exhibit 15-18 or 15-19)	1.1	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 15-16 of 15-19) Heavy-vehicle adjustment factor $f_1 = 1/(1 + P_1(E_1 - 1) + P_2(E_1 - 1))$	0.990	1.00
Grade adjustment factor ¹ f (Explicit 15-16 or Ex 15-17)	1.00	1.000
Directional flow rate ² μ (pc/h) μ =V/(PHF*f, μ ====* f ====)	342	437
Base percent time-spent-following ⁴ , BPTSF .(%)=100(1-e ^{av} d ^b)	30 0	
Adi, for no-passing zone, f_{-proc} (Exhibit 15-21)	44.5	
Percent time-spent-following, PTSF (%)=BPTSF +f == proc *(V_d proc / V_d proc +	+	
	58.5	
Level of Service and Other Performance Measures	<u>I</u>	
Level of service, LOS (Exhibit 15-3)	С	
Volume to capacity ratio, v/c	0.21	
	+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1651		
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700		
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.3		
Bicycle Level of Service			
Directional demand flow rate in outside lane, <i>v</i> _{OL} (Eq. 15-24) veh/h	338.6		
Effective width, Wv (Eq. 15-29) ft	12.00		
Effective speed factor, S_t (Eq. 15-30)	4.79		
Bicycle level of service score, BLOS (Eq. 15-31)	7.05		
Bicycle level of service (Exhibit 15-4)	F		
Notes			
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific		
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 			

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Stony Hill Rd (S.R. 2069) SB Rt. 1 to Big Oak Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft		
Lane width ft	Class I I	nighway 🔲 Class II
Lane width It	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fa	Level Rolling mi Up/down ctor, PHF 0.93
Analysis direction vol., V _d 1002veh/h	Show North Arrow % Trucks and	one 100% d Buses , P _T 4 %
Opposing direction vol., V _o 254veh/h Shoulder width ft 2.0	% Recreation Access points	nal vehicles, P _R 0% s <i>mi</i> 19/mi
Lane Width ft 10.0 Segment Length mi 0.9		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000 0.984	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	1077 278	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 4.	
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 46.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.5 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 32.	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	69.9 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.996
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _/ (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	1077	274
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	73.5	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	31.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	68.0	
v _{o,PTSF})		
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	D 0.62	
		7.05

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1673	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1693	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	69.9	
Bicycle Level of Service		
Directional demand flow rate in outside lane, <i>v</i> _{OL} (Eq. 15-24) veh/h	1077.4	
Effective width, Wv (Eq. 15-29) ft	12.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	5.58	
Bicycle level of service (Exhibit 15-4)	F	
Notes		
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.		
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only Exhibit 15-20 provides coefficients a and b for Equation 15-10. 		

6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Stony Hill Rd (S.R. 2069) NB Rt. 1 to Big Oak Rd PennDOT 2015	
Project Description: Pre-Construction Traffic Study	Analysis real	2015	
Input Data			
Shoulder width ft Lane width ft		nighway	
Lane widthft	highway 🗸	Class III highway	
ft ft			
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	mi Up/down ctor, PHF 0.85 one 100%	
Analysis direction vol., V _d 416veh/h	Show North Arrow % Trucks and	l Buses , P _T 2 %	
Opposing direction vol., V _o 337veh/h Shoulder width ft 2.0 Lane Width ft 10.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 19</i> /mi	
Segment Length mi 0.9			
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.3	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV,ATS} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.996	0.994	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	491 399		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 55.0 mi		
Maan aroad of comple ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>	
Total demand flow rate both directions v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 4.8 m		
Free-flow speed, FFS=S _{EM} +0.00776(ν / f _{LV/ATS})	Free-flow speed, FFS (FSS=BFFS- $f_{I,S}$ - f_{Λ}) 46.5		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 36.9 r		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 79.3 %		
Percent Time-Spent-Following			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.998	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	489	397	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	48.9		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	41.5		
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 71.8		
V _{o,PTSF})			
Level of Service and Other Performance Measures	I of Service and Other Performance Measures		
Volume to canacity ratio v/c			

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	489.4
Effective width, Wv (Eq. 15-29) ft	12.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.66
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Timo Boriad PM Boak	Highway / Direction of Travel From/To Jurisdiction	Stony Hill Rd (S.R. 2069) SB Rt. 1 to Big Oak Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Shoulder width tt		_
Lane width tt	Class I	highway 🔛 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fa	Level Rolling n mi Up/down ctor, PHF 0.96
Analysis direction vol., V _d	Show North Arrow % Trucks and	d Buses , P _T 5 %
Opposing direction vol., V _o 300veh/h Shoulder width ft 2.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 19/mi
Lane Width ft 10.0 Segment Length mi 0.9		
Average Travel Speed	-	-
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.980
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	1028 319	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 3.7 <i>mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 4.8	
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV ATS})	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 46.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.2 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 32.9	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	70.6 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.995
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	1028	314
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	73.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	29.2	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 95.8	
V _{o,PTSF})		
Level of Service and Other Performance Measures		D
Volume to capacity ratio v/c	D 0.60	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1666
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1692
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	70.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	1028.1
Effective width, Wv (Eq. 15-29) ft	12.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	5.85
Bicycle level of service (Exhibit 15-4)	F
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only Exhibit 15-20 provides coefficients a and b for Equation 15-10. 	

6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
AnalystMTDAgency or CompanyPennoniDate Performed9/4/2015Analysis Time PeriodAM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Yardley Newtown Rd EB I-95 to Mirror Lake Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Segment length l mi	Class I highway V Terrain Grade Length	ighway
Analysis direction vol., V _d 550veh/h Opposing direction vol., V _o 464veh/h Shoulder width ft 4.0 Lane Width ft 12.0 Segment Length mi 0.4	Show North Arrow Show North Arrow % Trucks and % Recreation Access points	ctor, PHF 0.91 one 100% Buses , P _T 4 % al vehicles, P _R 0% s <i>mi</i> 8/mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	607	514
Free-Flow Speed from Field Measurement	Estimated Fre	e-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 1.3 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 2.0	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV.ATS})	Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 51.7	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 40.7 m	
	v _{o,ATS}) - 1 _{np,ATS} Percent free flow speed, PFFS	78.8 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 15-16 of 15-19)	1.00	1.00
$\frac{1}{1000} = \frac{1}{1000} = 1$	1.000	1.000
Directional flow rate ² $v(pc/h) v = V/(PHE^*f)$	604	510
Base percent time-spent-following ⁴ BPTSF (%)=100(1_e ^{av} d ^b)	507	7.6
Addi for no-passing zone f (Evhibit 15-21)	25.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	77.0	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Volume to capacity ratio v/c	C 036	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	604.4
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.73
Bicycle level of service (Exhibit 15-4)	E
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
eneral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Yardley Newtown Rd WB I-95 to Mirror Lake Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder width It		
		nighway 📃 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtt Peak-hour fa No-passing z	Level Rolling mi Up/down ctor, PHF 0.93 one 100%
Analysis direction vol., V _d 556veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 313veh/h Shoulder width ft 4.0 Lane Width ft 12.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 8</i> /mi
Segment Length mi 0.4		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_{τ} (Exhibit 15-11 or 15-12)	1.1	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998 0.992	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	599 339	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 m	
Mana and af annula ³ O	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) <i>1.3 mi/h</i>
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_{A} (Exhibit 15-8) 2.0 r	
Free-flow speed. FFS=S _{Fx} +0.00776(y / f _{10.4 ATC})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 51.7 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15) 3.1 mi/h	Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} + 44.2)$	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	79.9 %
Percent Time-Spent-Following	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	598	337
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	53.7	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	35.9	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 76.7	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Level of Service, LOS (EXTIDIT 15-3)	C	
	ļ	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686	
--	---	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.9	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	597.8	
Effective width, Wv (Eq. 15-29) ft	16.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	4.20	
Bicycle level of service (Exhibit 15-4)	D	
Notes		
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific	
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only		

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Newtown Rd EB I-95 to Mirror Lake Rd PennDOT 2015
Analysis Time Period PM Peak Project Description: Pre-Construction Traffic Study	Analysis Year	2015
Input Data		
Shoulder width tt		
Lane width		nighway
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour far No-passing z	Level Rolling mi Up/down ctor, PHF 0.95 one 100%
Analysis direction vol., V _d 836veh/h	Show North Arrow % Trucks and	l Buses , P _T 1 %
Opposing direction vol., V _o 390veh/h Shoulder width ft 4.0 Lane Width ft 12.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 8</i> /mi
Segment Length mi 0.4		
Average Travel Speed	Analysia Direction (d)	Opposing Direction (c)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	1.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.997
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	880 412	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ . S _c ,	Adj. for lane and shoulder width,	f _{LS} (Exhibit 15-7) 1.3 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 2.0	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BFFS-f _{LS} -f _A) 51	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 39.0	
	v _{o,ATS}) - t _{np,ATS} Percent free flow speed, PFFS	75.4 %
Percent Time-Spent-Following	Analysia Direction (d)	Opposing Direction (c)
Passenger-car equivalents for trucks, $E_T(Exhibit 15-18 \text{ or } 15-19)$	1.0	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor', f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ⁴ , v _i (pc/h) v _i =V _i (PHF*t _{HV,PTSF} * t _{g,PTSF})	880	411
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d [˜])	69.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	25.6	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	* 86.7	
v _{o,PTSF})		
Level of Service and Other Performance Measures	1	C
Volume to capacity ratio. v/c	0.52	
	+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.4
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	880.0
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.17
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction	Yardley Newtown Rd WB I-95 to Mirror Lake Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study		2015
Input Data		
Shoulder width ft		
Lane width tt	Class I	nighway
Lane width tt	highway 🗸	Class III highway
Land Shoulder width It		
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	mi Up/down ctor, PHF 0.93 one 100%
Analysis direction vol., V _d 430veh/h	Show North Arrow % Trucks and	d Buses , P _T 3 %
Opposing direction vol., V _o 527veh/h Shoulder width ft 4.0 Lane Width ft 12.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 8</i> /mi
Segment Length mi 0.4		
Average Travel Speed	1	1
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.2	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994	0.997
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	465 568	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Moon around of complete S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 1.3 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 2.0	
Free-flow speed, FFS=S _{Fk} +0.00776(ν / f _{ink ATC})	Free-flow speed, FFS (FSS=BFI	⁻ S-f _{I S} -f _A) 51.7 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.0 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	80.6 %
Percent Time-Spent-Following	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	462	567
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	49.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	37.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 66.4	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Volume to capacity ratio v/c	C 027	
	ł	

Capacity, C _{4 ATC} (Equation 15-12) yeh/h	1695
Constitution (Franction 45.42) with the	1700
Capacity, C _{d,PTSF} (Equation 15-13) ven/n	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	80.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	462.4
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.32
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >= 1,700 \text{ pc/h}$, terminate analysisthe LOS is F.	
 For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Timo Region	Highway / Direction of Travel From/To Jurisdiction	Yardley Newtown Rd EB Mirror Lake/Langhorne Yardley PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
Shoulder width tt		
Lane width tt	Class I	highway 🗌 Class II
Lane width tt	highway 🗸	Class III highway
	Terrain	Level Rolling
Segment length, L _t mi	Grade Lengt Peak-hour fa No-passing :	n mi Up/down actor, PHF 0.91 zone 100%
Analysis direction vol., V _d 319veh/h	Show North Arrow % Trucks an	d Buses , P _T 7 %
Opposing direction vol., V _o 536veh/h Shoulder width ft 15.0	% Recreatio Access point	nal vehicles, P _R 0% ts <i>mi</i> 32/mi
Segment Length mi 1.1		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.979	0.993
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	358 593	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Mean speed of sample ³ . S _{et}	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.0	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 42.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.8 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 32.8	
	v _{o,ATS}) - t _{np,ATS} Percent free flow speed, PFFS	78.1 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, $E_T(Exhibit 15-18 \text{ or } 15-19)$	1.1	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	0.002	1.000
Heavy-venicie adjustment factor, T_{HV} =1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.993	1.000
Grade adjustment factor', r _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	590
	303	289
Base percent time-spent-following*, BPTSF _d (%)=100(1-e ^{av} d)	41.5	
Adj. tor no-passing zone, f _{np,PTSF} (Exhibit 15-21)	36.5	
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF}	+ 55.2	
V _{o,PTSF})		
Level of Service and Other Performance Measures		C
Volume to capacity ratio v/c	C0 21	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1688
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	350.5
Effective width, Wv (Eq. 15-29) ft	42.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-2.15
Bicycle level of service (Exhibit 15-4)	А
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Data Deformed 0/4/2015	Highway / Direction of Travel From/To	Yardley Newtown Rd WB Mirror Lake/Langhorne Yardley
Analysis Time Period AM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Shoulder widthft		
Lane width tt	Class I I	nighway 🔲 Class II
Lane width tt	highway 🗸	Class III highway
\downarrow Shoulder width $_$ $_$ $_$ $_$	Terrain	V Level Rolling
Segment length, L _t mi	Grade Length Peak-hour far No-passing z	mi Up/down ctor, PHF 0.93 one 100%
Analysis direction vol., V _d 601veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %
Opposing direction vol., V _o 278veh/h	% Recreation	nal vehicles, P _R 0%
Shoulder width ft 15.0 Lane Width ft 12.0	Access points	5////
Segment Length mi 1.1		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.999	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	647 300	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Moon speed of sample ³ S	Adj. for lane and shoulder width, ²	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_{A} (Exhibit 15-8) 8.0 r	
Free-flow speed. FFS=S _{Fx} +0.00776(y / f _{initiation})	Free-flow speed, FFS (FSS=BFI	⁻ S-f _{I S} -f _A) 42.0 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)3.3 mi/h	Average travel speed, $ATS_d = FFS \cdot 0.00776(v_{d,ATS} + 21.2)$	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed_PEFS	74.5 %
Percent Time-Spent-Following	· · · · · · · · · · · · · · · · · · ·	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	1.000	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	646	299
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av}d^b)$	56.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	33.2	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	79.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	0
Level of service, LOS (EXNIDIT 15-3)	D	
		1.30

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	646.2
Effective width, Wv (Eq. 15-29) ft	42.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-3.53
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Yardley Newtown Rd EB Mirror Lake/Langhorne Yardley PennDOT
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+	1	
Shoulder width ft		
Lane width		highway 🔛 Class II
Shoulder widthft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtl Peak-hour fa No-passing z	Level Rolling n mi Up/down ctor, PHF 0.90 cone 100%
Analysis direction vol., V _d 374veh/h	Show North Arrow % Trucks and	d Buses , P _T 3 %
Opposing direction vol., V _o 212veh/h Shoulder width ft 15.0 Lane Width ft 12.0 Seament Length mi 1.1	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 32</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.5
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.991	0.985
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	419	239
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS 50.0	
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.0	
Free-flow speed, FFS=S _{EM} +0.00776(<i>v</i> / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFFS- $f_{I,S}$ - f_{Δ})	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.7 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 33.1	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	78.9 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (c)
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.997
Grade adjustment factor', f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional tiow rate ⁴ , v _i (pc/h) v _i =V _i (PHF*t _{HV,PTSF} * t _{g,PTSF})	416	236
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d [*])	39.5	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	48.4	
Percent time-spent-following, $PTSF_{d}$ (%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF})	70.4	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u>^</u>
Level of service, LOS (Exhibit 15-3) Volume to capacity ratio v/c	C 0 25	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1695
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	415.6
Effective width, Wv (Eq. 15-29) ft	42.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-3.27
Bicycle level of service (Exhibit 15-4)	А
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Timo Boriad PM Boak	Highway / Direction of Travel From/To Jurisdiction	Yardley Newtown Rd WB Mirror Lake/Langhorne Yardley PennDOT 2015	
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015	
Input Data			
Lane width		nighway	
Lane width tt	highway 🗸	Class III highway	
Shoulder width ft			
Segment length, L _t mi	Grade Lengtl Peak-hour fa No-passing z	n mi Up/down ctor, PHF 0.94 one 100%	
Analysis direction vol., V _d 304veh/h	Show North Arrow % Trucks and	d Buses , P _T 4 %	
Opposing direction vol., V _o 311veh/h Shoulder width ft 15.0 Lane Width ft 12.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 32</i> /mi	
Segment Length mi 1.1			
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E ₊ (Exhibit 15-11 or 15-12)	1.4	1.4	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.984	0.984	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{a,ATS} * f _{HV,ATS})	329 336		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 50.0 n		
Mana and af annula ³ O	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_{A} (Exhibit 15-8) 8.0		
Free-flow speed, FFS=S _{Ex} + $0.00776(y/f_{\rm inv})$	Free-flow speed, FFS (FSS=BFFS- $f_{1,0}$ - f_{A}) 42		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.1 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 80.3		
Percent Time-Spent-Following		I	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.996	0.996	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	325	332	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	35.4		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	53.7		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	62.0		
V _{o,PTSF})			
Level of Service and Other Performance Measures	1	<u>^</u>	
Volume to capacity ratio v/c	C 0.10		
	· · · · · · · · · · · · · · · · · · ·		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1673
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1693
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	80.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	323.4
Effective width, Wv (Eq. 15-29) ft	42.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-3.13
Bicycle level of service (Exhibit 15-4)	А
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the ba downgrade segments are treated as level terrain. 	ase conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Afton Ave EB Langhorne Yardley Rd/Main St PennDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft		
Lane width ft	Class I	highway 🗌 Class II
Lane width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtl Peak-hour fa	Level Rolling h mi Up/down ctor, PHF 0.85
Analysis direction vol., V _d 433veh/h	Show North Arrow % Trucks and	tone 100% d Buses , P _T 4 %
Opposing direction vol., V _o 237veh/h Shoulder width ft 10.0 Lane Width ft 12.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 33/mi
Segment Length mi 0.8		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passanger ear equivalents for trucks E (Exhibit 15.11 or 15.12)	1 2	
Passenger-car equivalents for RVs, E_{T} (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HVATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992 0.984	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{a,ATS}$ * $f_{HV,ATS}$)	514 283	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 50.0	
	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Mean speed of sample ⁹ , S _{FM}	Adj. for access points ⁴ , f ₄ (Exhibit 15-8)	
Free-flow speed EES=S+0.00776(ν / f)	Free-flow speed, FFS (FSS=BFFS-f,f,)	
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15) 3.5 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776($v_{d,ATS}$ +	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 76.9	
Percent Time-Spent-Following		1
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.996
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	509	280
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	47.6	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	39.3	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	73.0	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u>^</u>
Level of Service, LOS (EXTIDIT 15-3)	C 0.20	
	l	

1	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1673
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1693
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	76.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	509.4
Effective width, Wv (Eq. 15-29) ft	32.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.80
Bicycle level of service (Exhibit 15-4)	А
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Afton Ave WB Langhorne Yardley Rd/Main St PennDOT	
Project Description: Pre-Construction Traffic Study		2015	
Input Data			
+			
Shoulder width tt			
Lane width	Class I I	nighway 🔛 Class II	
Shoulder width tt	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling n mi Up/down ctor, PHF 0.85 one 100%	
Analysis direction vol., V _d 362veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %	
Opposing direction vol., V _o 316veh/h Shoulder width ft 10.0 Lane Width ft 12.0 Segment Legath mi 0.8	% Recreation Access point:	nal vehicles, P _R 0% s <i>mi</i> 16/mi	
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.3	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.997	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	427 373		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 50.0		
Moon speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_A (Exhibit 15-8) 4.0		
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{LV/ATS}$)	Free-flow speed, FFS (FSS=BFFS- $f_{1,c}$ - f_{Λ})		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.9 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 80.3 5		
Percent Time-Spent-Following	Anglissia Dispetien (d)	Operation Dispettion (c)	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.999	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	426	372	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d)	44.3		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	44.9		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	68.3		
V _{o,PTSF})			
Level of Service and Other Performance Measures	1	<u>^</u>	
Volume to capacity ratio v/c	C0 25		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695		
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698		
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	80.3		
Bicycle Level of Service			
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	425.9		
Effective width, Wv (Eq. 15-29) ft	32.00		
Effective speed factor, S_t (Eq. 15-30)	4.79		
Bicycle level of service score, BLOS (Eq. 15-31) -0.04			
Bicycle level of service (Exhibit 15-4)	А		
Notes	•		
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific		
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only			

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Afton Ave EB Langhorne Yardley Rd/Main St PennDOT	
Project Description: Pre-Construction Traffic Study	Analysis real	2015	
Input Data			
+			
Shoulder width ft			
Lane width tt	Class I	highway	
Shoulder widthtt	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling h mi Up/down ictor, PHF 0.95 zone 100%	
Analysis direction vol., V _d 389veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %	
Opposing direction vol., V _o 345veh/h Shoulder width ft 10.0 Lane Width ft 12.0 Segment Length mi 0.8	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 33</i> /mi	
Average Travel Speed	- <u>-</u>		
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	1.3	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.997	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	411 364		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 50.0		
Moon speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.3		
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{LV/ATS}$)	Free-flow speed, FFS (FSS=BFFS- $f_{1,c}$ - f_{Λ})		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.9 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 78.6		
Percent Time-Spent-Following		I	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.999	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	409	364	
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av_d^b})$	43.5		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	46.5		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF})$	+ 68.1		
V _{o,PTSF})			
Level of Service and Other Performance Measures		<u>^</u>	
Volume to canacity ratio v/c	C 024		

	_
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	78.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	409.5
Effective width, Wv (Eq. 15-29) ft	32.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	-0.06
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysia Timo Datad	Highway / Direction of Travel From/To Jurisdiction	Afton Ave WB Langhorne Yardley Rd/Main St PennDOT	
Project Description: Pre-Construction Traffic Study	Analysis real	2015	
Shoulder width tt		_	
Lane width tt		nighway 📃 Class II	
Shoulder width tt	highway 🗹	Class III highway	
Segment length, L _t mi	Grade Length Peak-hour fai	Level Rolling mi Up/down ctor, PHF 0.86	
Analysis direction vol., V _d 380veh/h	Show North Arrow % Trucks and	i Buses , P _T 2 %	
Opposing direction vol., V _o 342veh/h Shoulder width ft 10.0 Lane Width ft 12.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 16/mi	
Segment Length mi 0.8			
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)	
Passanger car equivalents for trucks E (Exhibit 15.11 or 15.12)	1 3	1.3	
Passenger-car equivalents for RVs. E_{T} (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV/ATS} = 1/(1 + P_T(E_T - 1) + P_P(E_P - 1))$	0.994	0.994	
Grade adjustment factor ¹ , $f_{g,ATS}$ (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , v_i (pc/h) $v_i = V_i / (PHF^* f_{0ATS}^* f_{HVATS})$	445 400		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 50.0 mi		
	Adj. for lane and shoulder width. ⁴ f. (Exhibit 15-7) 0.0		
Mean speed of sample ³ , S _{FM}	Adi, for access points ⁴ f. (Exhibit 15-8) 40		
Free flow speed EES=S ±0.00776/u/f	Free-flow speed, FFS (FSS=BFI	-S-f ₁₀ -f ₁) 46.0 mi/h	
Adj. for no-passing zones, f _{np.ATS} (Exhibit 15-15) 2.7 mi/h	Average travel speed, ATS _d =FFS-0.00776($v_{d,ATS}$ +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PEES	79.9 %	
Percent Time-Spent-Following	r crocht nee now speed, i'r r o	70.0 70	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.998	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v_i (pc/h) $v_i = V_i$ (PHF*f _{HV,PTSF} * f _{g,PTSF})	442	398	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	45.8		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	44.1		
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *($v_{d,PTSF}$ / $v_{d,PTSF}$ +	69.0		
V _{o,PTSF})			
		C	
Volume to capacity ratio. v/c	0.26		

•	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	441.9
Effective width, Wv (Eq. 15-29) ft	32.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.21
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Oxford Valley Rd NB Big Oak Rd/Stony Hill Rd PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2015	
Input Data			
Lane width			
Lane width ft.	bighway V		
t Shoulder widthtt			
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	a mi Up/down ctor, PHF 0.88 one 40%	
Analysis direction vol., V _d 463veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %	
Opposing direction vol., V _o 456veh/h Shoulder width ft 9.0 Lane Width ft 13.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 20</i> /mi	
Segment Length min 1.5			
Average Traver Speed	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.8	1.8	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.984 0.984		
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.96 0.95		
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	557 554		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 45.0		
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8)		
Free-flow speed, FFS=S _{EM} +0.00776(v / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFFS- $f_{I,S}$ - f_{Δ})		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 0.3 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 31.		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 77.6		
Percent Time-Spent-Following	Applysic Direction (d)		
Dessenger car equivalents for trucks E (Evhibit 15.19 or 15.10)			
Passenger car equivalents for Pl/c E (Exhibit 15.18 or 15.10)	1.2	1.2	
Heavy-vehicle adjustment factor. f. $_{r.r}$ =1/ (1+ P _{-r} (E ₋ -1)+P ₋ (F ₋ -1))	0.996	0.996	
Grade adjustment factor ¹ , $f_{a, DTSE}$ (Exhibit 15-16 or Ex 15-17)	0.96	0.96	
Directional flow rate ² , $v_{i}(pc/h) v_{i} = V_{i}/(PHF^{*}f_{HV PTSF}^{*}f_{a PTSF})$	550	542	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1- $e^{av_d}^b$)	55.0		
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	32.2		
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+		
v _{o,PTSF})	′	1.2	
Level of Service and Other Performance Measures			
Level of service, LOS (Exhibit 15-3)	С		
volume to capacity ratio, v/c	0.33		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1606
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1625
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	77.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	526.1
Effective width, Wv (Eq. 15-29) ft	31.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.61
Bicycle level of service (Exhibit 15-4)	A
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Oxford Valley Rd SB Big Oak Rd/Stony Hill Rd PennDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width ft			
Lane width ft	Class I	highway 📃 Class II	
Lane width It	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Lengt Peak-hour fa	Level Rolling n mi Up/down ctor, PHF 0.96	
Analysis direction vol., V _d 457veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %	
Opposing direction vol., V _o 441veh/h Shoulder width ft 9.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 20/mi	
Lane Width ft 13.0 Seament Length mi 1.5			
Average Travel Speed	<u>.</u>		
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.8	1.9	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.984 0.982		
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.94	0.93	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	515 503		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS 45.0		
Moon speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8)		
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{HV/\Delta TS}$)	Free-flow speed, FFS (FSS=BFFS- $f_{I,S}$ - f_{Δ})		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.2 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 29.		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 74.7		
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)	
Passenger-car equivalents for trucks. E_(Exhibit 15-18 or 15-19)	1.4	1.4	
Passenger-car equivalents for RVs. E_{-} (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{\rm in}$ =1/ (1+ P _T (E _T -1)+P _D (E _D -1))	0.992	0.992	
Grade adjustment factor ¹ , $f_{a, PTSE}$ (Exhibit 15-16 or Ex 15-17)	0.95	0.94	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV PTSF} * f _{o PTSF})	505	493	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1- $e^{av_d}^b$)	51.5		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	40.3		
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	74.0		
V _{o,PTSF})			
Level of Service and Other Performance Measures			
Level of service, LOS (Exhibit 15-3)	D		
volume to capacity ratio, v/c	0.30		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1589
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1619
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	476.0
Effective width, Wv (Eq. 15-29) ft	31.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.56
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Timo Boriod BM Book		Highway / Direction of Travel From/To Jurisdiction	Oxford Valley Rd NB Big Oak Rd/Stony Hill Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study		Andiysis Teal	2015
Input Data			
Shoulder width	ft		
Lane width	t	Class I	nighway 🔲 Class II
Lane width	t	highway 🗸	Class III highway
Shoulder width	<u>t</u>		
Segment length, L _t mi	•	Grade Lengtl Peak-hour fa No-passing z	mi Up/down ctor, PHF 0.91 one 100%
Analysis direction vol., V _d 577veh/h		% Trucks and	d Buses , P _T 1 %
Opposing direction vol., V _o 531veh/h Shoulder width ft 9.0 Lane Width ft 13.0		% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 20/mi
Segment Length mi 1.5			
Average Travel Speed		Analysis Dissetion (d)	Organiza Disection (c)
		Analysis Direction (d)	Opposing Direction (0)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)		1.7	1.7
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)		1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_F))$	₇ -1))	0.993	0.993
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		0.97	0.97
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})		658 606	
Free-Flow Speed from Field Measurement		Estimated Fr	ee-Flow Speed
		Base free-flow speed ⁴ , BFFS 45.0 mi	
Mean speed of sample ³ S		Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions v		Adj. for access points ⁴ , f _A (Exhib	it 15-8) 5.0 mi/h
Free-flow speed. FFS=S _{E4} +0.00776(y / f ₁ / ATC)		Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 40.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)	1.8 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +	
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	71.0 %
Percent Time-Spent-Following		1	•
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)		1.0	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)		1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$		1.000	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)		0.98	0.97
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})		647	603
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)		59.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		32.6	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PT})$	TSF [/] V _{d,PTSF} +	+ 76.8	
V _{o,PTSF})			
evel of Service and Other Performance Measures			
Volume to capacity ratio v/c		<i>D</i>	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1637
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1649
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	71.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	634.1
Effective width, Wv (Eq. 15-29) ft	31.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.48
Bicycle level of service (Exhibit 15-4)	А
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysia Timo Datad	Highway / Direction of Travel From/To Jurisdiction	Oxford Valley Rd SB Big Oak Rd/Stony Hill Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Shoulder width tt		_
Lane width tt		nighway 📃 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fa	Level Rolling mi Up/down ctor, PHF 0.89
Analysis direction vol., V _d 551veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 533veh/h Shoulder width ft 9.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 20/mi
Segment Length mi 1.5		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.7	1.7
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.986	0.986
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.97	0.97
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	647	626
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 45.0 m	
Mean around of complete C	Adj. for lane and shoulder width,	f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 5.0 mi/h
Free-flow speed, FFS=S ₋₁ +0.00776(ν / f _{10.4.4.50})	Free-flow speed, FFS (FSS=BFI	-S-f _{IS} -f _A) 40.0 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)1.7 mi/h	Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} + 28.2)$	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 71.0	
Percent Time-Spent-Following	- -	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.996
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.97	0.97
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	638	620
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	59.9	
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	32.7	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 76.5	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	0
Level of service, LOS (Exhibit 15-3)	D	
	l	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1626
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1649
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	71.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	619.1
Effective width, Wv (Eq. 15-29) ft	31.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.69
Bicycle level of service (Exhibit 15-4)	A
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain.	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
AnalystMTDAgency or CompanyPennoniDate Performed9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Bristol Oxford Valley Rd NB Woodbourne Rd/New Falls Rd PennDOT
Analysis Time Period AM Peak	Analysis Year	2015
Shoulder width tt		_
Lane width tt		nighway 📃 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fa	Level Rolling mi Up/down ctor, PHF 0.87
Analysis direction vol., V _d 532veh/h	Show North Arrow % Trucks and	d Buses , P _T 3 %
Opposing direction vol., V _o 379veh/h	% Recreation	ial vehicles, P _R 0%
Shoulder width ft 10.0 Lane Width ft 12.0	Access points	<i>s mi 20</i> /mi
Segment Length mi 1.7		
Average Travel Speed	Applyoin Direction (d)	Opposing Direction (a)
Passanger ear equivalents for trucks E (Exhibit 15.11 or 15.12)		
Passenger-car equivalents for D/a Γ (Exhibit 15-11 or 15-12)	1.1	1.5
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-venicie adjustment factor, $I_{HV,ATS} = 17 (1 + P_T(E_T - 1) + P_R(E_R - 1))$	0.997	0.991
Grade adjustment factor', f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	613 440	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 50.0	
Mean speed of sample ³ , S _{EM}	Adj. for lane and shoulder width,	f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 6.3 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 43.8 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.5 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 33.1	
	v _{o,ATS}) - t _{np,ATS} Percent free flow speed, PFFS	75.6 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (c)
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	611	436
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	56.8	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	36.1	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 77.9	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u>^</u>
Level of Service, LOS (EXRIDIT 15-3)	<u> </u>	

·	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1685
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	611.5
Effective width, Wv (Eq. 15-29) ft	32.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.62
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Bristol Oxford Valley Rd SB Woodbourne Rd/New Falls Rd PennDOT
Analysis Time Period AM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Shoulder width ft		
		nighway 🔛 Class II
Shoulder width It	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fau No-passing z	Level Rolling mi Up/down ctor, PHF 0.88 one 100%
Analysis direction vol., V _d 523veh/h	Show North Arrow % Trucks and	Buses , P _T 2 %
Opposing direction vol., V _o 466veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 10.0 Lane Width ft 12.0	Access points	<i>5 mi 20</i> /mi
Segment Length mi 1.7		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	596 532	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 50.0 m	
Moon speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_{Δ} (Exhibit 15-8) 6.3	
Free-flow speed, FFS=S _{EM} +0.00776(ν / f _{LV/ATS})	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 43.8 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.1 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 32.9 mi/h
	V _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 75.2 9	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	594	530
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	57.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	36.0	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 76.2	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Level of service, LOS (EXRIDIC 15-3)	<u> </u>	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.2
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	594.3
Effective width, Wv (Eq. 15-29) ft	32.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.36
Bicycle level of service (Exhibit 15-4)	A
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015	Highway / Direction of Travel From/To Jurisdiction	Bristol Oxford Valley Rd NB Woodbourne Rd/New Falls Rd PennDOT
Analysis Time Period PM Peak Project Description: Pre-Construction Traffic Study	Analysis Year	2015
Shoulder width tt		_
Lane width tt		nighway 🔛 Class II
Shoulder width It	highway 🗹	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fac	Level Rolling mi Up/down ctor, PHF 0.93
Analysis direction vol., V _d 576veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 654veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 10.0 Lane Width ft 12.0	Access points	<i>s mi 20</i> /mi
Segment Length mi 1.7		
Average Travel Speed		Oran a sin a Direction (c)
$\sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i$		
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.998
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	621 705	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	50.0 mi/h
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 6.3	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV.ATS})	Free-flow speed, FFS (FSS=BFF	FS-f _{LS} -f _A) 43.8 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.5 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 32.0 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 73.1	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _P (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{\mu\nu}=1/(1+P_{T}(E_{T}-1)+P_{D}(E_{D}-1))$	1.000	1.000
Grade adjustment factor ¹ , $f_{a, PTSF}$ (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV PTSF} * f _{o PTSF})	619	703
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	60.4	
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	30.4	
Percent time-spent-following, $PTSF_d$ (%)=BPTSF_d+f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+	
V _{o,PTSF})	7	4.0
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	D	
Volume to capacity ratio, v/c	C).37

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1697
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	73.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	619.4
Effective width, Wv (Eq. 15-29) ft	32.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.38
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information Site Information			
Analyst MTD Agency or Company Pennoni Date Performed 9/4/2015 Analysis Time Period PM Peak		Highway / Direction of Travel From/To Jurisdiction Analysis Year	Bristol Oxford Valley Rd SB Woodbourne Rd/New Falls Rd PennDOT 2015
Project Description: Pre-Construction Traffic Study		Andiysis Teal	2015
Input Data			
Shoulder width	ft		
Lane width	tt	Class I h	nighway 🗌 Class II
Lane width	tt	highway 🗹	Class III highway
Shoulder width	<u> </u>	Terrain	V Level Rolling
Segment length, L _t mi	•	Grade Length Peak-hour fac No-passing z	mi Up/down ctor, PHF 0.96 one 100%
Analysis direction vol., V _d 661veh/h		% Trucks and	l Buses , P _T 1 %
Opposing direction vol., V _o 544veh/h Shoulder width ft 10.0 Lane Width ft 12.0 Segment Length mi 1.7		% Recreation Access points	al vehicles, P _R 0% s <i>mi 25</i> /mi
Average Travel Speed			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)		1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)		1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1))	0.999	0.999
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)		689	567
Free-Flow Speed from Field Measurement		Estimated Fre	ee-Flow Speed
		Base free-flow speed ⁴ , BFFS	50.0 mi/h
Mean speed of sample ³ S		Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v		Adj. for access points ⁴ , f _A (Exhibi	it 15-8) 6.3 <i>mi/h</i>
Free-flow speed, FFS=S _{EM} +0.00776($v/f_{HV/ATS}$)		Free-flow speed, FFS (FSS=BFF	⁻ S-f _{LS} -f _A) 43.8 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.	.9 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 32.1 mi/h
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	73.3 %
Percent Time-Spent-Following			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)		1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)		1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$		1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)		1.00	1.00
Directional flow rate ⁴ , v _/ (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})		689	567
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d [*])		62.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		31.8	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF})$	F ^{/V} d,PTSF ⁺	+ 79.4	
V _{o,PTSF})			
Level of Service and Other Performance Measures		Ο	
Volume to capacity ratio v/c		D 0.41	
		0	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1698		
---	---		
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700		
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	73.3		
Bicycle Level of Service			
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	688.5		
Effective width, Wv (Eq. 15-29) ft	32.00		
Effective speed factor, S_t (Eq. 15-30)	4.79		
Bicycle level of service score, BLOS (Eq. 15-31)	0.20		
Bicycle level of service (Exhibit 15-4)	A		
Notes			
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific		
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 			

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
AnalystMTDAgency or CompanyPennoniDate Performed9/8/2015	Highway / Direction of Travel From/To Jurisdiction	Lower Ferry Rd (CR 643) NB CR 546 to CR 636 NJDOT
Analysis Time Period AM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study		
Shoulder widthft		
Lane width		
Shoulder width ft	highway 💌	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fau No-passing z	Level Rolling mi Up/down ctor, PHF 0.77 one 100%
Analysis direction vol., V _d 132veh/h	Show North Arrow % Trucks and	l Buses , P _T 5 %
Opposing direction vol., V _o 77veh/h Shoulder width ft 8.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 35</i> /mi
Lane Width ft 10.0 Segment Length mi 2.3		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.6	1.9
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.971	0.957
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	177 104	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 45.0	
Maan anood of complete C	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 1.	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 8.8 mi/h
Free-flow speed. FFS=S _{Fx} +0.00776(ν / f _{initian})	Free-flow speed, FFS (FSS=BFF	-S-f _{I S} -f _A) 35.2 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.5 mi/h	Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} + 20.5)$	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 86.8 %	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.995	0.995
Grade adjustment factor', r _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ⁻ , $v_i(pc/n) v_i = v_i/(PHF^T_{HV,PTSF}^T_{g,PTSF})$	172 101	
Base percent time-spent-following*, BPISF _d (%)=100(1-e ^{av} d)	18.9	
Adj. for no-passing zone, t _{np,PTSF} (Exhibit 15-21)	52.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 52.2	
V _{o,PTSF})		
evel of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	<u> </u>	
volume to capacity ratio, v/c	0.10	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1627
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1692
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	86.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	171.4
Effective width, Wv (Eq. 15-29) ft	32.12
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.50
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni	Highway / Direction of Travel From/To	Lower Ferry Rd (CR 643) SB CR 546 to CR 636
Analysis Time Period AM Peak	Analysis Year	NJDO1 2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Shoulder widthft		
Lane width tt	Class I h	ighway 📃 Class II
Lane width ft	highway 🗸	Class III highway
\downarrow Shoulder width $_$ $_$ $_$ $_$	Terrain	V Level Rolling
Segment length, L _t mi	Grade Length Peak-hour fac No-passing ze	mi Up/down ctor, PHF 0.89 one 100%
Analysis direction vol., V _d 235veh/h	Show North Arrow % Trucks and	Buses , P _T 5%
Opposing direction vol., V _o 108veh/h	% Recreation	al venicies, P _R 0%
Lane Width ft 8.0	Access points	5//// 30////
Segment Length mi 2.3		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.8
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.980	0.962
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{q.ATS} * f _{HV.ATS})	269 126	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 45.0 mi	
	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>1.1 mi/h</i>
Mean speed of sample ³ , S _{FM}	Adi. for access points ⁴ , f_{A} (Exhibit 15-8) 8.8 r	
Free flow speed EES=S $\pm 0.00776(y/f)$	Free-flow speed, FFS (FSS=BFF	-S-f _{1,0} -f ₄) 35.2 mi/h
Adj. for no-passing zones, $f_{nn ATS}$ (Exhibit 15-15) 2.8 mi/h	Average travel speed, ATS _d =FFS	G-0.00776(v _{d,ATS} + 20.2 mi/h
πρατο	V _{o,ATS}) - f _{np,ATS}	
Percent Time-Spent-Following	Fercent free now speed, FFF3	05.5 /6
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.995	0.995
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	265	122
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	27.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	49.9	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 61.5	
V _{o,PTSF})		
evel of Service and Other Performance Measures		<u>^</u>
Volume to canacity ratio v/c	0.16	

•	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1635
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1692
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	83.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	264.0
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.50
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Lower Ferry Rd (CR 643) NB CR 546 to CR 636 NJDOT 2015
Project Description: Pre-Construction Traffic Study		2070
Input Data		
Analysis direction vol., V _d 241veh/h	Class I H highway ✓ Terrain Grade Length Peak-hour far No-passing z Show North Arrow % Trucks and	nighway
Opposing direction vol., Vo 145veh/h Shoulder width ft 8.0 Lane Width ft 10.0 Segment Length mi 2.3	% Recreation Access points	al vehicles, P _R 4% s <i>mi 35</i> /mi
Average Travel Speed	Analysis Direction (d)	Opposing Direction (c)
	Analysis Direction (d)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.4	1.7
Heavy-vehicle adjustment factor, $f_{HVATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.984	0.973
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	255 155	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed4, BFFS45.0	
Mean speed of sample ³ , S _{FM}	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) <i>1</i> .	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 8.8	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BFF	FS-f _{LS} -f _A) 35.2 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 28.7 n	
	Percent free flow speed, PFFS	81.6 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.996	0.996
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	252	152
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	26.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	54.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 60.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures	ervice and Other Performance Measures	
Level of service, LOS (EXNIDIT 15-3)	<u> </u>	
	0.15	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1654
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1693
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	251.0
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.18
Bicycle level of service (Exhibit 15-4)	В
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni	Highway / Direction of Travel From/To	Lower Ferry Rd (CR 643) SB CR 546 to CR 636
Analysis Time Period PM Peak	Analysis Year	2015
Project Description: Pre-Construction Traffic Study		
Input Data		
Shoulder widthft		
Lane width tt	Class I h	ighway 📃 Class II
Lane width ft	highway 🗸	Class III highway
	Terrain	V Level Rolling
Segment length, L _t mi	Grade Length Peak-hour fac No-passing z	mi Up/down ctor, PHF 0.86 one 100%
Analysis direction vol., V _d 166veh/h	Show North Arrow % Trucks and	Buses , P _T 1 %
Opposing direction vol., V _o 211veh/h	% Recreation	al vehicles, P _R 0%
Shoulder width ft 8.0 Lane Width ft 10.0	Access points	s <i>mi 35</i> /mi
Segment Length mi 2.3		
Average Travel Speed	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.5	1.5
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.995	0.995
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	194	247
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 45.0 m	
Maan anood of complete	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) <i>1.1</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_{Λ} (Exhibit 15-8)	
Free-flow speed $FES=S_{-1}+0.00776(v/f_{1-1.1-20})$	Free-flow speed, FFS (FSS=BFF	S-f _{1 S} -f ₄) 35.2 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)3.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +	
	V _{0,ATS}) - f _{np,ATS} Percent free flow speed PEES 70.9 %	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	0.999	0.999
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	193	246
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	22.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	59.2	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 48.2	
v _{o,PTSF})		
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	<u> </u>	
	0.11	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1692
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1698
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	193.0
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.30
Bicycle level of service (Exhibit 15-4)	А
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain. 	the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only For the analysis are direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Timo Borized AM Book	Highway / Direction of Travel From/To Jurisdiction	CR 546 EB Route 29 to Bear Tavern Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis fear	2015
Input Data		
Lane width ft	Class	highway
> 🗘 Lane width tt	highway 🗸	Class III highway
Letter Shoulder width tt		
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	h mi Up/down ctor, PHF 0.91 cone 100%
Analysis direction vol., V _d 273veh/h	Show North Arrow % Trucks and	d Buses , P _T 0 %
Opposing direction vol., V _o 211veh/h Shoulder width ft 6.0 Lane Width ft 12.0 Segment Longth mi 1.3	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 31/mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	1.4	1.5
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	300 232	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 r	
Mean aread of complete C	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 0.0	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 7.8 mi	
Free-flow speed, FFS=S _{Ex} +0.00776($v/f_{\rm trace}$)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 47.3 mi/h
Adj. for no-passing zones, f np,ATS (Exhibit 15-15)3.8 mi/h	Average travel speed, ATS _d =FF3	S-0.00776(v _{d,ATS} + 39.3 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 83.2 %	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	300	232
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av_d^b})$	30.8	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	56.9	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 62.9	
V _{o,PTSF})		
evel of Service and Other Performance Measures		^
Level of service, LOS (EXTIDIT 15-3)	<u> </u>	
		2.10

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	83.2
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	300.0
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.81
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information Site Information			
Analyst MTD Agency or Company Penn Date Performed 9/8/20 Analysis Timo Pagiad AM B	oni 015	Highway / Direction of Travel From/To Jurisdiction	CR 546 WB Route 29 to Bear Tavern Rd NJDOT 2015
Project Description: Pre-Construction Traffic.	eak Studv	Analysis fear	2015
Input Data			
	bulder width		
🗕 🚽 🕇 Lar	ne width ft	Class I I	nighway
	ne width ft	highway 🗸	Class III highway
<u>_</u>	oulder width ft		
Segment length, L _t	mi 🗧	Grade Length Peak-hour fa No-passing z	n mi Up/down ctor, PHF 0.96 one 100%
Analysis direction vol., V _d 620veh/h		Show North Arrow % Trucks and	d Buses , P _T 0 %
Opposing direction vol., Vo235veh/hShoulder width ft6.0Lane Width ft12.0Segment Langth min1.3		% Recreation Access point	nal vehicles, P _R 0% s <i>mi 31</i> /mi
Average Travel Speed			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. E ₊ (Exhi	bit 15-11 or 15-12)	1.1	1.5
Passenger-car equivalents for RVs, E _R (Exhibit	it 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,ATS} =1/ (1	+ $P_T(E_T-1)+P_R(E_R-1)$)	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,AT}$	s ^{* f} HV,ATS)	646 245	
Free-Flow Speed from Fiel	d Measurement	Estimated Free-Flow Speed	
		Base free-flow speed ⁴ , BFFS 55.0 m	
		Adj. for lane and shoulder width, ⁴ f _{I S} (Exhibit 15-7) 0.0	
Mean speed of sample ^o , S _{FM}	peed of sample ³ , S _{FM} Adi. for access points ⁴ . f _* (Exhibit 15-8)		it 15-8) 7.8 mi/h
Free-flow speed EES=S +0.00776(v/ f		Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 47.3 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-1	s) 15) 3.7 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 36.6 mi/h
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed. PFFS 77.5 %	
Percent Time-Spent-Following		- -	
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhit	bit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E_{R} (Exhibit	it 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P-	_T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-1	l6 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,F}	PTSF ^{* f} g,PTSF)	646	245
Base percent time-spent-following ⁴ , BPTSF _d (%	%)=100(1-e ^{av} d ^b)	55.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-2	21)	32.7	
Percent time-spent-following, PTSF _d (%)=BPT	SF_d +f np,PTSF *(V _d ,PTSF / V _d ,PTSF +	+ 79.1	
V _{o,PTSF})			
Level of Service and Other Performance Me	easures	res	
Volume to capacity ratio v/c		0.38	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	77.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	645.8
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.20
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	eneral Information Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	CR 546 EB Route 29 to Bear Tavern Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		2013
Input Data		
Shoulder width ft		
	Class I	highway
Shoulder width ft	highway 🗹 Terrain	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	h mi Up/down ctor, PHF <i>0.91</i> :one <i>100</i> %
Analysis direction vol., V _d 686veh/h	Show North Arrow % Trucks and	d Buses , P _T 0 %
Opposing direction vol., V _o 248veh/h Shoulder width ft 6.0 Lane Width ft 12.0	% Recreational vehicles, P _R 0% Access points <i>mi</i> 31/r	
Segment Length mi 7.3		
Aronage maren opeed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E ₊ (Exhibit 15-11 or 15-12)	1.1	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	754	273
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mana and af annula ³ O	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 7.8 mi/h
Free-flow speed FES=S ₋₁ +0.00776(ν /f	Free-flow speed, FFS (FSS=BF	FS-f _{1 S} -f ₄) 47.3 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15) 3.5 mi/h	Average travel speed, ATS _d =FF	S-0.00776(v _{d,ATS} + 35.8 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	75.7 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	754	273
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	61.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	30.6	
Percent time-spent-following, $PTSF_d$ (%)=BPTSF_d+f_np,PTSF *($v_{d,PTSF} / v_{d,PTSF}$ +	83.9	
V _{O,PTSF})		
Level of Service and Other Performance Measures	1	•
Level of service, LOS (Exhibit 15-3)	C	
	0.44	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.7
Bicycle Level of Service	•
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	753.8
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.28
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Timo Borized PM Boak	Highway / Direction of Travel From/To Jurisdiction	CR 546 WB Route 29 to Bear Tavern Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
Shoulder width tt		
Lane width ft	Class I	highway 🔲 Class II
Lane width ft	highway 🗸	Class III highway
Shoulder width	Terrain	V Level Rolling
Segment length, L _t mi	Grade Length mi Up/down Peak-hour factor, PHF 0.90 No-passing zone 100	
Analysis direction vol., V _d 269veh/h	% Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 459veh/h Shoulder width ft 6.0 Lane Width ft 12.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 31/mi
Segment Length mi 7.3		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. E ₊ (Exhibit 15-11 or 15-12)	1.4	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	301	512
Free-Flow Speed from Field Measurement	Estimated Fr	ee-Flow Speed
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Mean speed of sample ^o , S _{FM}	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 7.8 mi/h
Free-flow speed, FFS=S _{Ex} +0.00776($v/f_{\rm trace}$)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 47.3 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)2.2 mi/h	Average travel speed, ATS _d =FF3	S-0.00776(v _{d,ATS} + 38.7 mi/h
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	81.9 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.1	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.998	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	299	510
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	36.7	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	39.3	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 51.2	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u>^</u>
Level of service, LOS (EXTIDIT 15-3)	<u> </u>	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.9
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	298.9
Effective width, Wv (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.25
Bicycle level of service (Exhibit 15-4)	В
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
AnalystMTDAgency or CompanyPennoniDate Performed9/8/2015Analysis Time PeriodAM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	CR 546 EB Bear Tavern Rd/Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder widthtt Lane widthtt Lane widthtt Lane widthtt Shoulder widthtt Segment length, Ltmi	□ Class I highway ✓ Terrain Grade Lengt Peak-hour fa No-passing z % Trucks an	highway Class II Class III highway Level Rolling h mi Up/down actor, PHF 0.89 zone 74% d Buses, P _T 2 %
Opposing direction vol., V _o 225veh/h Shoulder width ft 8.0 Lane Width ft 13.0 Segment Length mi 1.2	% Recreation Access point	nal vehicles, P _R 0% ts <i>mi 38</i> /mi
Average Travel Speed	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.3	2.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994	0.977
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	0.79
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	910	328
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, v Free-flow speed, FFS=S _{FM} +0.00776(v / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.8 mi/h	Base free-flow speed ⁴ , BFFS55.0Adj. for lane and shoulder width, ⁴ $f_{LS}(Exhibit 15-7)$ 0.0 mAdj. for access points ⁴ , f_A (Exhibit 15-8)9.5 mFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)45.5Average travel speed, ATS _d =FFS-0.00776($v_{d,ATS}$ +33.1 $v_{o,ATS}$) - $f_{np,ATS}$ Percent free flow speed, PFFS72.7	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E ₊ (Exhibit 15-18 or 15-19)	1.0	1.7
Passenger-car equivalents for RVs E_ (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{\rm IIV}=1/(1+P_{\rm T}(E_{\rm T}-1)+P_{\rm D}(E_{\rm D}-1))$	1.000	0.986
Grade adjustment factor ¹ , f _{a.PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	0.83
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	904	309
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	67.6	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	21.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	83.5	
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)	1	D

Volume to capacity ratio, v/c	0.54	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1397	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1428	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	72.7	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	904.5	
Effective width, Wv (Eq. 15-29) ft	29.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	1.49	
Bicycle level of service (Exhibit 15-4)	А	
Notes		

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

For the analysis direction only and for v>200 veh/h.
 For the analysis direction only
 Exhibit 15-20 provides coefficients a and b for Equation 15-10.
 Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
AnalystMTDAgency or CompanyPennoniDate Performed9/8/2015Analysis Time PeriodAM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	CR 546 WB Bear Tavern Rd/Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Analysis direction vol., V _d 275veh/h Opposing direction vol., V _o 265veh/h	Class I highway Terrain Grade Lengt Peak-hour fa No-passing 3 % Trucks an % Recreatio Access poin	highway Class II Class III highway Level ✓ Rolling th mi Up/down actor, PHF 0.89 zone 74% ad Buses , P _T 2 % nal vehicles, P _R 0% ts mi 38mi
Lane Width ft 13.0		
Segment Length mi 1.2 Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	2.1	2.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.978	0.978
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.84	0.83
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	376	367
Free-Flow Speed from Field Measurement	Estimated F	ree-Flow Speed
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, v Free-flow speed, FFS=S _{FM} +0.00776(v / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.6 mi/h	Base free-flow speed4, BFFS55.0 mAdj. for lane and shoulder width,4 f_{LS} (Exhibit 15-7)0.0 miAdj. for access points4, f_A (Exhibit 15-8)9.5 miFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)45.5 mAverage travel speed, ATS_d=FFS-0.00776(v_{d,ATS} + v_{o,ATS}) - f_{np,ATS}37.2 mPercent free flow speed, PFFS81.7 9	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. F_(Exhibit 15-18 or 15-19)	1.6	1.7
Passenger-car equivalents for RVs, E_{p} (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T-1)+P_R(E_R-1)$)	0.988	0.986
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.85	0.85
Directional flow rate ² , $v_i(\text{pc/h}) v_i = V_i/(\text{PHF}^* f_{\text{HV,PTSF}}^* f_{g,\text{PTSF}})$	368	355
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	39.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	48.1	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	63.7	
Level of Service and Other Performance Measures	·	
Level of service, LOS (Exhibit 15-3)		С

Volume to capacity ratio, <i>v/c</i>	0.22
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1449
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1478
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	309.0
Effective width, Wv (Eq. 15-29) ft	29.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.94
Bicycle level of service (Exhibit 15-4)	А
Notes	

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

For the analysis direction only and for v>200 veh/h.
 For the analysis direction only
 Exhibit 15-20 provides coefficients a and b for Equation 15-10.
 Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
AnalystMTDAgency or CompanyPennoniDate Performed9/8/2015Analysis Time PeriodPM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	CR 546 EB Bear Tavern Rd/Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		2013
Input Data		
Analysis direction vol., V _d 317veh/h Opposing direction vol., V _o 313veh/h Shoulder width ti Shoulder width ti Shoulder width ti Segment length, L _t mi	Class I highway Terrain Grade Leng Peak-hour f No-passing % Trucks ar % Recreatio Access poir	highway Class II Class III highway Level ✓ Rolling th mi Up/down actor, PHF 0.88 zone 74% nd Buses , P _T 0 % onal vehicles, P _R 0% tts mi 38/mi
Lane Width ft 13.0		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	2.0	2.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.87	0.87
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	414	409
Free-Flow Speed from Field Measurement	Estimated F	ree-Flow Speed
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, <i>v</i> Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 mi/h	Base free-flow speed4, BFFS55.0 rAdj. for lane and shoulder width,4 f_{LS} (Exhibit 15-7)0.0 mAdj. for access points4, f_A (Exhibit 15-8)9.5 mFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)45.5 rAverage travel speed, ATS_d=FFS-0.00776(v_{d,ATS} + v_{o,ATS}) - f_{np,ATS}36.8 rPercent free flow speed PEFS80.8 r	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVS, E_R (EXhibit 15-18 of 15-19)	1.00	1.00
Grade adjustment factor ¹ f (Fr F_1(Fr F_1(E_T^-1)) F_R(E_R^-1))	0.88	0.88
Directional flow rate ² , $v_{(pc/h)} v = V_{(PF*f_{nv}, proc^* f_{n-roc})}$	409	404
Base percent time-spent-followind ⁴ . BPTSF .(%)=100(1-e ^{av} d ^b)		43.0
Adj. for no-passing zone, $f_{np, PTSE}$ (Exhibit 15-21)	44.0	
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} + $v_{o,PTSF}$)	65.1	
Level of Service and Other Performance Measures		

Volume to capacity ratio, v/c	0.24
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1530
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1530
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	80.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	360.2
Effective width, Wv (Eq. 15-29) ft	29.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.58
Bicycle level of service (Exhibit 15-4)	Α
Notes	

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

For the analysis direction only and for v>200 veh/h.
 For the analysis direction only
 Exhibit 15-20 provides coefficients a and b for Equation 15-10.
 Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
AnalystMTDAgency or CompanyPennoniDate Performed9/8/2015Analysis Time PeriodPM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	CR 546 WB Bear Tavern Rd/Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		2013
Input Data	-	
Analysis direction vol., V _d 836veh/h Opposing direction vol., V _o 260veh/h	Class I highway Terrain Grade Leng Peak-hour fa No-passing : % Trucks an % Recreatio	highway Class II Class III highway Level Rolling th mi Up/down actor, PHF 0.95 zone 74% id Buses , P _T 1 % nal vehicles, P _R 0%
Shoulder width ft 8.0 Lane Width ft 13.0	Access poin	ts <i>mi 38</i> /mi
Segment Length mi 1.2		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks. E ₊ (Exhibit 15-11 or 15-12)	1.3	2.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.988
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	0.81
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	883	342
Free-Flow Speed from Field Measurement	Estimated F	ree-Flow Speed
Mean speed of sample ³ , S _{FM} Total demand flow rate, both directions, v Free-flow speed, FFS=S _{FM} +0.00776(v / f _{HV,ATS}) Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.7 mi/h	Base free-flow speed4, BFFS55.0rAdj. for lane and shoulder width, ${}^4 f_{LS}$ (Exhibit 15-7)0.0mAdj. for access points4, f_A (Exhibit 15-8)9.5mFree-flow speed, FFS (FSS=BFFS- f_{LS} - f_A)45.5rAverage travel speed, ATS_d=FFS-0.00776(v_{d,ATS} + v_{o,ATS}) - f_{np,ATS}33.3rPortent free flow epood PEES72.16	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.7
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.993
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	0.84
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	880	328
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	67.4	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	22.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	83.7	
Level of Service and Other Performance Measures		
Level of service, LOS (Exhibit 15-3)		D

Volume to capacity ratio, v/c	0.52
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1429
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1453
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	73.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	880.0
Effective width, Wv (Eq. 15-29) ft	29.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.24
Bicycle level of service (Exhibit 15-4)	А
Notes	

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

For the analysis direction only and for v>200 veh/h.
 For the analysis direction only
 Exhibit 15-20 provides coefficients a and b for Equation 15-10.
 Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information		Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period AM Peak		Highway / Direction of Travel From/To Jurisdiction	CR 546 EB Jacobs Creek Rd/Scotch Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		Analysis feal	2015
Input Data			
Shoulder width	- <u></u> tt -		
Lane width	tt	Class I	highway
Lane width	tt	highway 🗸	Class III highway
Shoulder width	<u>ft</u>		
Segment length, L _t m	ii •	Grade Length Peak-hour fa No-passing z	h mi Up/down ctor, PHF 0.93 cone 100%
Analysis direction vol., V _d 871veh/h		% Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 257veh/h Shoulder width ft 8.0 Lane Width ft 12.0		% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 14/mi
Segment Length mi 0.7			
Average Travel Speed		Analysis Direction (d)	Opposing Direction (o)
	5.40)		
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 1	5-12)	1.0	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-	-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS} = 1/(1 + P_T(E_T - 1) + C_T)$	P _R (E _R -1))	1.000	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i / (PHF^* f_{g,ATS}^* f_{HV,ATS})$		937	279
Free-Flow Speed from Field Measurem	ent	Estimated Free-Flow Speed	
		Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ S_{-1}		Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 <i>mi/h</i>
Total demand flow rate, both directions, v		Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.5 <i>mi/h</i>
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV ATS})		Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 51.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)	3.5 mi/h	Average travel speed, ATS _d =FF	S-0.00776(v _{d,ATS} + 38.5 mi/h
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	74.8 %
Percent Time-Spent-Following		Analysis Dis (1)	
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15	5-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-	-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_T-1))$	_R -1))	1.000	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17	7)	1.00	1.00
Directional flow rate ² , $v_i(pc/h) v_i = V_i/(PHF^*f_{HV,PTSF}^*f_{g,PTSF})$		937	277
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av}d)$	^b)	68.7	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)		30.0	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}$	*(v _{d,PTSF} / v _{d,PTSF} +	+ 91.9	
v _{o,PTSF})			
evel of Service and Other Performance Measures			
Level of service, LOS (Exhibit 15-3)		D	
		0.55	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v</i> _{OL} (Eq. 15-24) veh/h	936.6
Effective width, Wv (Eq. 15-29) ft	28.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.79
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Further 4.5.20	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information		Site Information	
Analyst MTD Agency or Company Pennon Date Performed 9/8/201 Analysis Time Period AM Pee	i 5	Highway / Direction of Travel From/To Jurisdiction Analysis Year	CR 546 WB Jacobs Creek Rd/Scotch Rd NJDOT 2015
Project Description: Pre-Construction Traffic Stu	udy		2010
Input Data			
	lder width		
- Lane	width ft	Class I I	highway 🔲 Class II
	widthft	highway 🗸	Class III highway
Segment length, L _t	lder_widthft ft	Terrain Grade Length	Level Rolling m mi Up/down
I Analysis direction vol., V _a 309veh/h	b.	Show North Arrow % Trucks and	ctor, PHF 0.97 cone 100% d Buses , P _T 2 %
Opposing direction vol V 321veh/h		% Recreation	nal vehicles, P _P 0%
Shoulder width ft 8.0 Lane Width ft 12.0		Access points	s <i>mi 14</i> /mi
Segment Length mi 0.7			
Average Traver Speed		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks E_ (Exhibit	: 15-11 or 15-12)	14	14
Passenger-car equivalents for RVs, E _R (Exhibit 1	15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,ATS} =1/ (1+	$P_T(E_T-1)+P_R(E_R-1))$	0.992	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)		1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$	* f _{HV,ATS})	321	334
Free-Flow Speed from Field	Measurement	Estimated Free-Flow Speed	
		Base free-flow speed ⁴ , BFFS	55.0 mi/h
		Adj. for lane and shoulder width,	⁴ f _{I S} (Exhibit 15-7) 0.0 mi/h
Mean speed of sample ³ , S _{FM}		Adj. for access points ⁴ , f_{Λ} (Exhibit 15-8) 3.5 <i>mi/h</i>	
Free flow speed EES=S = ±0.00776(y/ f		Free-flow speed, FFS (FSS=BFI	FS-f _{1,0} -f ₁) 51.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)) 3.2 mi/h	Average travel speed, ATS _d =FFS-0.00776($v_{d,ATS}$ +	
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	84.0 %
Percent Time-Spent-Following			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit	15-18 or 15-19)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit ⁻	15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E	E _T -1)+P _R (E _R -1))	0.998	0.998
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16	or Ex 15-17)	1.00	1.00
Directional flow rate ² , v_i (pc/h) $v_i = V_i$ /(PHF*f _{HV,PTS}	GF ^{* f} g,PTSF)	319	332
Base percent time-spent-following ⁴ , BPTSF _d (%)	=100(1-e ^{av} d ^b)	34.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	53.9	
Percent time-spent-following, PTSF _d (%)=BPTSF	d^{+f}_{d} np,PTSF *(V _d ,PTSF / V _d ,PTSF +	61.3	
V _{o,PTSF})			
Level of Service and Other Performance Measures			
Level of service, LOS (Exhibit 15-3)		B	
		0.19	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1697
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	84.0
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	318.6
Effective width, Wv (Eq. 15-29) ft	28.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.24
Bicycle level of service (Exhibit 15-4)	А
Notes	
1. Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information		Site Information	
Analyst Agency or Company Date Performed Analysis Timo Boriod	MTD Pennoni 9/8/2015 BM Book	Highway / Direction of Travel From/To Jurisdiction	CR 546 EB Jacobs Creek Rd/Scotch Rd NJDOT 2015
Project Description: Pre-Construction	Traffic Study	Analysis real	2015
Input Data	inamo otady		
	Shoulder width ft		
-	Lane width tt	Class	highway
	Lane width ft		
	Shoulder width ft _		
Segment lengt	h, L _t mi 🗕 🗕	Grade Length Peak-hour fa No-passing z	n mi Up/down ctor, PHF 0.88 cone 100%
Analysis direction vol., V _d 369	veh/h	% Trucks and	d Buses , P _T 0 %
Opposing direction vol., V _o 370 Shoulder width ft 8.0 Lane Width ft 12.0	veh/h	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 14/mi
Segment Length mi 0.7			
Average Travel Speed		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks	- (Exhibit 15-11 or 15-12)	1.3	1.3
Passenger-car equivalents for RVs, E_{R}	(Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,A}	TS ^{=1/} (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhi	bit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PH	F* f _{g,ATS} * f _{HV,ATS})	419	420
Free-Flow Speed fr	om Field Measurement	Estimated Free-Flow Speed	
		Base free-flow speed ⁴ , BFFS	55.0 mi/h
		Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Mean speed of sample ^o , S _{FM}		Adj. for access points ⁴ , f _A (Exhibit 15-8) 3.5 <i>mi/h</i>	
Free-flow speed FES=S +0.00776(v	, v / f)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 51.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exh	ibit 15-15) 2.6 mi/h	Average travel speed, ATS _d =FF	S-0.00776(v _{d,ATS} + 42.3 mi/h
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	82.2 %
Percent Time-Spent-Following			_
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E	E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R	(Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1	/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exh	ibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _j (pc/h) v _j =V _j /(PF	IF*f _{HV,PTSF} * f _{g,PTSF})	419	420
Base percent time-spent-following ⁴ , BF	PTSF _d (%)=100(1-e ^{av} d ^b)	44.4	
Adj. for no-passing zone, f _{np,PTSF} (Exh	ibit 15-21)	45.4	
Percent time-spent-following, PTSF _d (%	b)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 67.1	
v _{o,PTSF})			
2Vel of Service and Other Performance Measures		<u></u>	
Volume to capacity ratio v/c		C	
		+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	82.2
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	419.3
Effective width, Wv (Eq. 15-29) ft	28.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	0.94
Bicycle level of service (Exhibit 15-4)	А
Notes	•
 Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information		Site Information	
Analyst Agency or Company Date Performed Analysis Timo Boriod	MTD Pennoni 9/8/2015 PM Pook	Highway / Direction of Travel From/To Jurisdiction	CR 546 WB Jacobs Creek Rd/Scotch Rd NJDOT 2015
Project Description: Pre-Construction	Traffic Study	Analysis fear	2015
Input Data	Traine Glady		
·	1 Shoulder width tt		
.	Lane widthft	Class	highway
	Lane width ft	highway 🗸	
	Shoulder_widthft		
Segment lengt	h, L _l mi 🗕 🗕	Grade Lengtl Peak-hour fa No-passing z	n mi Up/down ctor, PHF 0.87 one 100%
Analysis direction vol., V _d 949	veh/h	Show North Arrow % Trucks and	d Buses , P _T 0 %
Opposing direction vol., V _o 328 Shoulder width ft 8.0 Lane Width ft 12.0	veh/h	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 14/mi
Segment Length mi 0.7			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E	: ₋ (Exhibit 15-11 or 15-12)	1.0	1.3
Passenger-car equivalents for RVs, E _R	(Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV,AT}	$F_{S}=1/(1+P_{T}(E_{T}-1)+P_{R}(E_{R}-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{g,ATS} (Exhi	bit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PH	F* f _{g,ATS} * f _{HV,ATS})	1091	377
Free-Flow Speed free	om Field Measurement	Estimated Fr	ee-Flow Speed
		Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ S		Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions	. V	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.5 mi/h
Free-flow speed, FFS=S _{EM} +0.00776(v/	(f _{hvats})	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 51.5 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exh	bit 15-15) 2.9 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 37.2 mi/h
		v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	72.3 %
Percent Time-Spent-Following			
		Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E	: _T (Exhibit 15-18 or 15-19)	1.0	1.1
Passenger-car equivalents for RVs, E _R	(Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1	/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exh	bit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v_i (pc/h) $v_i = V_i/(PH)$	F [*] f _{HV,PTSF} [*] f _{g,PTSF})	1091	377
Base percent time-spent-following ⁴ , BP	TSF _d (%)=100(1-e ^{av} d ^b)	75.2	
Adj. for no-passing zone, f _{np,PTSF} (Exh	ibit 15-21)	25.0	
Percent time-spent-following, $PTSF_{d}(\%)$)=BPTSF _d +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 93.8	
v _{o,PTSF})			
Level of Service and Other Performa	or Service and Other Performance Measures		0
Volume to capacity ratio v/c			
		+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1700
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	72.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	1090.8
Effective width, Wv (Eq. 15-29) ft	28.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.43
Bicycle level of service (Exhibit 15-4)	A
Notes	
 Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain. 	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Explicit 15.20 provides coefficients a and b for Equation 15.10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	River Rd (NJ 29) NB I-95 to Jacobs Creek Rd NJDOT 2015	
Project Description: Pre-Construction Traffic Study		2010	
Input Data			
Shoulder width ft			
Lane width ft	Class I h	nighway 🔲 Class II	
Lane width It	highway 🗹	Class III highway	
Segment length, L _t mi	Grade Length Peak-hour fac No-nassing z	Level Rolling mi Up/down ctor, PHF 0.89 one 100%	
Analysis direction vol., V _d 665veh/h	Show North Arrow % Trucks and	Buses , P _T 4 %	
Opposing direction vol., Vo489veh/hShoulder width ft4.0Lane Width ft12.0Segment Logath minute1.2	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 15/mi	
······································	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.2	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.992	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00	
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	750	554	
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴	f _{LS} (Exhibit 15-7) <i>1.3 mi/h</i>	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibi	it 15-8) 3.8 <i>mi/h</i>	
Free-flow speed, FFS=S _{EM} +0.00776(<i>v</i> / f _{HV/ATS})	Free-flow speed, FFS (FSS=BFF	⁻ S-f _{LS} -f _A) 50.0 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.1 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 37.7		
	v _{o,ATS}) - † _{np,ATS} Percent free flow speed, PFFS	75.6 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)	
Passenner-car equivalents for trucks E (Evhibit 15.18 or 15.10)	1 0		
Passenger-car equivalents for RVs. E_{T} (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_P(E_P-1))$	1.000	1.000	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , $v_i(pc/h) v_i = V_i/(PHF^*f_{HV,PTSF}^*f_{g,PTSF})$	747	549	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	64.7		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	30.2		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 82.1		
V _{o,PTSF})			
If of service and Other Performance Measures		<u>^</u>	
Volume to capacity ratio v/c	C 0 44		
	l		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.6
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	747.2
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.83
Bicycle level of service (Exhibit 15-4)	E
Notes	•
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015	Highway / Direction of Travel From/To Jurisdiction	River Rd (NJ 29) SB I-95 to Jacobs Creek Rd NJDOT
Analysis Time Period AM Peak	Analysis Year	2015
Shoulder width ft	_	_
Lane width		nighway 📃 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fai No-passing z	Level Rolling mi Up/down ctor, PHF 0.93 one 100%
Analysis direction vol., V _d 1036veh/h	Show North Arrow % Trucks and	d Buses , P _T 5 %
Opposing direction vol., V _o 451veh/h Shoulder width ft 4.0	% Recreation Access points	nal vehicles, P _R 0% s <i>mi</i> 15/mi
Segment Length mi 1.3		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.990
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	1114	490
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	55.0 mi/h
Mean speed of sample ³ . Set	Adj. for lane and shoulder width,	¹ f _{LS} (Exhibit 15-7) 1.3 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 3.8 mi/h
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV,ATS})	Free-flow speed, FFS (FSS=BFI	FS-f _{LS} -f _A) 50.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 35.2 mi/h
	v _{o,ATS}) - 1 _{np,ATS} Percent free flow speed, PFFS	70.4 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks E_(Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, $E_{\rm p}$ (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{\mu\nu}=1/(1+P_{\tau}(E_{\tau}-1)+P_{\mu}(E_{\mu}-1))$	1.000	1.000
Grade adjustment factor ¹ , f _{a pres} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v_i (pc/h) v_i =V _i /(PHF*f _{HV PTSE} * f _{o PTSE})	1114	485
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	77.5	
Adj. for no-passing zone, f _{np.PTSF} (Exhibit 15-21)	19.9	
Percent time-spent-following, PTSF _d (%)=BPTSF _d +f _{np.PTSF} *(v _{d.PTSF} / v _{d.PTSF} +	+	
V _{o,PTSF})	91.4	
Level of Service and Other Performance Measures	•	
Level of service, LOS (Exhibit 15-3)	D	
Volume to capacity ratio, v/c	0.66	
Capacity, C _{d,ATS} (Equation 15-12) veh/h	1683	
--	---	
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700	
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	70.4	
Bicycle Level of Service		
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	1114.0	
Effective width, Wv (Eq. 15-29) ft	16.00	
Effective speed factor, S_t (Eq. 15-30)	4.79	
Bicycle level of service score, BLOS (Eq. 15-31)	5.33	
Bicycle level of service (Exhibit 15-4)	E	
Notes		
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific	
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only		

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015	Highway / Direction of Travel From/To Jurisdiction	River Rd (NJ 29) NB I-95 to Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder width It	_	
Lane width		nighway 🔛 Class II
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fau No-passing z	Level Rolling mi Up/down ctor, PHF 0.83 one 100%
Analysis direction vol., V _d 981veh/h	Show North Arrow % Trucks and	l Buses , P _T 2 %
Opposing direction vol., V _o 515veh/h Shoulder width ft 4.0 Lane Width ft 12.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi 15</i> /mi
Segment Length mi 1.3		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks E (Exhibit 15-11 or 15-12)	1 0	1 1
Passenger-car equivalents for RVs, $E_{\rm R}$ (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.998
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{d.ATS} * f _{HV.ATS})	1182 622	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ . BFFS 55.0 mi/	
	Adj. for lane and shoulder width, 4 f _{I c} (Exhibit 15-7) 1.3	
Mean speed of sample ³ , S _{FM}	Adj. for access points ⁴ , f _A (Exhibit	it 15-8) 3.8 mi/h
Free-flow speed EES=S +0.00776(v/ f	Free-flow speed, FFS (FSS=BFF	-S-f _{LS} -f _A) 50.0 mi/h
Adj. for no-passing zones, f np,ATS (Exhibit 15-15)1.8 mi/h	Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} + 24.4)$	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed. PFFS 68.3 9	
Percent Time-Spent-Following	- -	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	1182	620
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	78.9	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	18.6	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$. 91.1	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	0
Level of service, LOS (EXNIDIT 15-3)	D	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1697		
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700		
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	68.3		
Bicycle Level of Service			
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	1181.9		
Effective width, Wv (Eq. 15-29) ft	16.00		
Effective speed factor, S_t (Eq. 15-30)	4.79		
Bicycle level of service score, BLOS (Eq. 15-31)	4.55		
Bicycle level of service (Exhibit 15-4)	E		
Notes			
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific		
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.			

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015	Highway / Direction of Travel From/To Jurisdiction	River Rd (NJ 29) SB I-95 to Jacobs Creek Rd NJDOT
Analysis Time Period PM Peak Project Description: Pre-Construction Traffic Study	Analysis Year	2015
Shoulder width tt		_
Lane width tt	Class I h	nighway 📃 Class II
Shoulder width ft	highway 🗸	Class III highway
Segment length, L _t mi	Grade Length Peak-hour fac	Level Rolling mi Up/down ctor, PHF 0.91
Analysis direction vol., V _d 696veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 489veh/h Shoulder width ft 4.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 15/mi
Segment Length mi 1.3		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	766 540	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 mi/	
Moon around of complete S	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 1.3	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 3.8	
Free-flow speed, FFS=S _{Fx} +0.00776(ν / f _{true tro})	Free-flow speed, FFS (FSS=BFF	-S-f _{I S} -f _A) 50.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15)2.1 mi/h	Average travel speed, $ATS_d = FFS - 0.00776(v_{d,ATS} + 27.7)$	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 75.4 %	
Percent Time-Spent-Following	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	765	537
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	66.2	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	29.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	* 83.7	
V _{o,PTSF})		
Level of Service and Other Performance Measures		<u></u>
Level of service, LOS (Exhibit 15-3)	<u> </u>	
		VT.

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	75.4
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	764.8
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.33
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of the ba downgrade segments are treated as level terrain. 	ase conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h.	

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

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Timo Region	Highway / Direction of Travel From/To Jurisdiction	River Rd (Rt. 29) NB Jacobs Creek Rd/CR 546 NJDOT 2015
Project Description: Pre-Construction Traffic Study		2015
Input Data		
+ + + - +		
Lane width		nighway
Lane width tt	highway 🗸	Class III highway
Land Shoulder width It		
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	mi Up/down ctor, PHF 0.92 one 100%
Analysis direction vol., V _d 665veh/h	Show North Arrow % Trucks and	l Buses , P _T 4 %
Opposing direction vol., V _o 477veh/h Shoulder width ft 4.0 Lane Width ft 12.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 27/mi
Segment Length mi 1.5		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_{τ} (Exhibit 15-11 or 15-12)	1.1	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996	0.992
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	726 523	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 mi	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 1.3	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 6.8	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV,ATS})	Free-flow speed, FFS (FSS=BFI	^E S-f _{LS} -f _A) 47.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.2 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 35.1	
	v _{o,ATS}) - I _{np,ATS} Percent free flow speed, PFFS	74.7 %
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	723	518
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	63.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	31.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 81.3	
V _{o,PTSF})		
Level of Service and Other Performance Measures		
Volume to capacity ratio. v/c		
	+	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1686
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	722.8
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.82
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015	Highway / Direction of Travel From/To Jurisdiction	River Rd (Rt. 29) SB Jacobs Creek Rd/CR 546 NJDOT
Analysis Time Period AM Peak	Analysis Year	2015
Shoulder widthtt		
		nighway 🔛 Class II
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Length Peak-hour fai No-passing z	Level Rolling mi Up/down ctor, PHF 0.93
Analysis direction vol., V _d 1001veh/h	Show North Arrow % Trucks and	Buses , P _T 5 %
Opposing direction vol., V _o 375veh/h Shoulder width ft 4.0	% Recreation Access points	al vehicles, P _R 0% s <i>mi</i> 27/mi
Segment Length mi 1.5		
Average Travel Speed	-	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	1.3
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.985
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS} * f_{HV,ATS}$)	1076 409	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 mi	
Mean speed of sample ³ S	Adj. for lane and shoulder width, 4 f _{LS} (Exhibit 15-7) 1.3	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 6.8	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV ATS})	Free-flow speed, FFS (FSS=BFFS- f_{LS} - f_A) 47.	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 32.8	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 69.8 %	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	1076	403
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	74.7	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	23.5	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 91.8	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Volume to capacity ratio v/c	D	
	°	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1675
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	69.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	1076.3
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	5.31
Bicycle level of service (Exhibit 15-4)	E
Notes	
 Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain. 	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15.20 provides coefficients a and b for Equation 15.10.	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	River Rd (Rt. 29) NB Jacobs Creek Rd/CR 546 NJDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width ft		
Lane widthft	Class I I	nighway 🔲 Class II
Lane width tt	highway 🗹	Class III highway
Segment length, L ₁ mi	Terrain Grade Length Peak bour fa	Level Rolling mi Up/down
Analysis direction vol., V _d 924veh/h	Show North Arrow % Trucks and	one 100% d Buses , P _T 3 %
Opposing direction vol., V 494veh/h	% Recreation	nal vehicles, P _R 0%
Shoulder width ft4.0Lane Width ft12.0	Access points	s <i>mi</i> 27/mi
Segment Length mi 1.5		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)
Passenger car equivalents for trucks E (Exhibit 15.11 or 15.12)	1 0	1 2
Passenger-car equivalents for RVs. E_{T} (Exhibit 15-11 or 15-12)	1.0	1.2
Heavy-vehicle adjustment factor, $f_{HVATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000	0.994
Grade adjustment factor ¹ , f _{q,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{a,ATS} * f_{uv_i ATS}$)	1015 546	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
·	Base free-flow speed ⁴ . BFFS 55.0 m	
	Adi, for lane and shoulder width. ⁴ f. (Exhibit 15-7)	
Mean speed of sample ³ , S _{FM}	Adj for access points ⁴ f (Exhibit 15-8) 6	
I otal demand flow rate, both directions, v	Erea flow speed EES (ESS-DEFS f f)	
Adj. for no-passing zones, $f_{nn ATS}$ (Exhibit 15-15) 2.1 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} +
np) (10	V _{o,ATS}) - f _{np,ATS}	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f_{HV} =1/ (1+ $P_T(E_T$ -1)+ $P_R(E_R$ -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	1015	543
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	74.7	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	22.4	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+)$	89.3	
V _{o,PTSF})		
Level of Service and Other Performance Measures		0
Level of service, LOS (EXRIDIT 15-3)		
	0.00	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	69.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	1015.4
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.72
Bicycle level of service (Exhibit 15-4)	E
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Exhibit 15-20 provides coefficients a and b for Equation 15-10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information	Site Information	
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015	Highway / Direction of Travel From/To Jurisdiction	River Rd (Rt. 29) SB Jacobs Creek Rd/CR 546 NJDOT 2015
Project Description: Pre-Construction Traffic Study		2015
Input Data		
+		
Shoulder width It		
Lane width tt		nighway 🔛 Class II
Shoulder width ft	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtt Peak-hour far No-passing z	Level Rolling mi Up/down ctor, PHF 0.94 one 100%
Analysis direction vol., V _d 693veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 461veh/h Shoulder width ft 4.0 Lane Width ft 12.0	% Recreation Access points	nal vehicles, P _R 0% s <i>mi</i> 27/mi
Segment Length mi 1.5		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (a)
	Analysis Direction (u)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.2
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.996
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	739 492	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 n	
Mean speed of sample ³ . Set	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 1.3	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 6.8	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV.ATS})	Free-flow speed, FFS (FSS=BFI	=S-f _{LS} -f _A) 47.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.3 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 35.1	
	V _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 74.7 <i>°</i>	
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	737	490
Base percent time-spent-following ⁴ , $BPTSF_d(\%)=100(1-e^{av_d^b})$	64.0	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	31.3	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 82.8	
V _{o,PTSF})		-
Level of Service and Other Performance Measures	1	
Level of service, LOS (Exhibit 15-3)	D	
	0.43	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1693
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.7
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	737.2
Effective width, Wv (Eq. 15-29) ft	16.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	4.31
Bicycle level of service (Exhibit 15-4)	D
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
eneral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Timo Poriod MM Pook	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd NB CR 546 to Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis real	2015
Input Data		
+		
Shoulder width ft		
Lane width tt	Class I	highway
Shoulder width tt	highway 🗹	Class III highway
Segment length, L _t mi	Terrain Grade Lengtl Peak-hour fa	Level Rolling h mi Up/down ctor, PHF 0.86 rone 100%
Analysis direction vol., V _d 220veh/h	Show North Arrow % Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 339veh/h Shoulder width ft 6.0 Lane Width ft 14.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 21/mi
Segment Length mi 1.4		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	2.2	2.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.977	0.980
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.79	0.90
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> = <i>V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	331 447	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	60.0 mi/h
Maan anad of aampla ³	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhib	it 15-8) 5.3 mi/h
Free-flow speed, FFS=S _{Ext} +0.00776($v/f_{\rm tructure}$)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 54.8 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 2.6 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 46	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 84.3	
Percent Time-Spent-Following	I -	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.7	1.6
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.986	0.988
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.83	0.90
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v_i</i> =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	313	443
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	;	36.4
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	43.8	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF})$	+ 54.5	
V _{o,PTSF})		
Level of Service and Other Performance Measures		B
Volume to capacity ratio v/c	<u>В</u> 0 19	
	· · · · · · · · · · · · · · · · · · ·	

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1536
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1568
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	84.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	255.8
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.67
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period AM Peak	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd SB CR 546 to Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015
Input Data		
Lane width tt	Class I I	nighway
Lane width tt	highway 🗸	Class III highway
Shoulder widthft		
Segment length, L _t mi	Grade Length Peak-hour far No-passing z	mi Up/down ctor, PHF 0.87 one 100%
Analysis direction vol., V _d 599veh/h	Show North Arrow % Trucks and	d Buses , P _T 1 %
Opposing direction vol., V _o 160veh/h Shoulder width ft 6.0 Lane Width ft 14.0	% Recreational vehicles, P _R 0% Access points <i>mi</i> 21/m	
Segment Length mi 1.4		
Average Travel Speed	Analysis Direction (d)	Opposing Direction (a)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.0	2.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994	0.986
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.98 0.74	
Demand flow rate ² , v_i (pc/h) $v_i = V_i / (PHF^* f_{g,ATS}^* f_{HV,ATS})$	707 252	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS	. 60.0 mi/h
Mean speed of sample ³ . S	Adj. for lane and shoulder width,	f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 5.3	
Free-flow speed, FFS=S _{FM} +0.00776(<i>v</i> / f _{HV.ATS})	Free-flow speed, FFS (FSS=BFI	=S-f _{LS} -f _A) 54.8 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.8 mi/h	Average travel speed, ATS _d =FFS	S-0.00776(v _{d,ATS} + 43.6 mi/h
	v _{o,ATS}) - I _{np,ATS} Percent free flow speed, PFFS	79.5 %
Percent Time-Spent-Following	Applysis Direction (d)	Opposing Direction (c)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.8
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	0.992
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.99	0.79
Directional flow rate ² , v _i (pc/h) v _i =V _i (PHF*f _{HV,PTSF} * f _{g,PTSF})	695	235
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	56.1	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	30.6	
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+$	79.0	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Level of service, LOS (EXNIDIT 15-3)	<u> </u>	
		7.72

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1310
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1384
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	79.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	688.5
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.94
Bicycle level of service (Exhibit 15-4)	В
Notes	
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one downgrade segments are treated as level terrain.	of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	neral Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysia Timo Dated	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd NB CR 546 to Jacobs Creek Rd NJDOT 2015	
Analysis Time Period PM Peak Project Description: Pre-Construction Traffic Study	Analysis Year	2015	
Shoulder width ft		_	
Lane width tt		highway 📃 Class II	
Shoulder width ft	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Lengt Peak-hour fa No-passing z	Level Rolling h mi Up/down ctor, PHF 0.92 cone 100%	
Analysis direction vol., V _d 520veh/h	Show North Arrow % Trucks and	d Buses , P _T 0 %	
Opposing direction vol., V _o 238veh/h Shoulder width ft 6.0 Lane Width ft 14.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 21/mi	
Segment Length mi 1.4			
Average Travel Speed	Applysis Direction (1)		
		Opposing Direction (0)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.7	2.2	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000 1.000		
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.96 0.80		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	589 323		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	60.0 mi/h	
Mean speed of sample ³ S	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 5.3		
Free-flow speed, FFS=S _{FM} +0.00776(v/ f _{HV.ATS})	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 54.8 mi/h	
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 3.3 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 44.		
	v _{o,ATS}) - T _{np,ATS} Percent free flow speed, PFFS	81.1 %	
Percent Time-Spent-Following	Analysis Direction (d)	Opposing Direction (a)	
Descenses on any valente for trucks. E. (Eykikit 45.40 or 45.40)			
Passenger-call equivalents for frucks, E_{T} (Exhibit 15-18 of 15-19)	1.2	1.7	
Passenger-car equivalents for RVs, E_{R} (Exhibit 15-18 of 15-19)	1.00	1.0	
Grade adjustment factor ¹ f (Fybibit 15-16 or Ex 15-17)	0.97	0.83	
Directional flow rate ² $v(nc/h) v = V/(PHE*f = x * f = x)$	583	312	
Base percent time-spent-following ⁴ . BPTSF .(%)=100(1-e ^{av} d ^b)		52.3	
Adi, for no-passing zone, f (Exhibit 15-21)	34.2		
Percent time-spent-following_PTSF (%)=BPTSF +f			
Vo prec)	74.6		
Level of Service and Other Performance Measures			
Level of service, LOS (Exhibit 15-3)		С	
Volume to capacity ratio, v/c	0.35		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1428
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1462
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	81.1
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	565.2
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.63
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain. 	f the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction Analysis Year	Bear Tavern Rd SB CR 546 to Jacobs Creek Rd NJDOT 2015
Project Description: Pre-Construction Traffic Study		2010
Input Data		
Shoulder width It		
Lane width ft	Class I	highway 📃 Class II
Lane width It	highway 🗹	Class III highway
Segment length, L ₁ mi	Terrain Grade Lengtl Peak-hour fa	Level Rolling n mi Up/down ctor, PHF 0.90
Analysis direction vol., V _d 299veh/h	Show North Arrow % Trucks and	one 100% d Buses , P _T 2 %
Opposing direction vol., V _o 447veh/h Shoulder width ft 6.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 21</i> /mi
Segment Length mi 1.4		
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	2.1	1.8
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.1	1.1
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.978 0.984	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	0.85	0.95
Demand flow rate ² , v _i (pc/h) v _i =V _i / (PHF* f _{g,ATS} * f _{HV,ATS})	400 531	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 60.0	
Mean around of complete C	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_A (Exhibit 15-8) 5.	
Free-flow speed, FFS=S _{FM} +0.00776($v/f_{\rm INVATE}$)	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 54.8 mi/h
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15) 2.2 <i>mi/h</i>	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	82.8 %
Percent Time-Spent-Following		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.6	1.4
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	0.988	0.992
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	0.87	0.96
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	386	522
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	44.3	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	38.8	
Percent time-spent-following, $PTSF_{d}$ (%)= $BPTSF_{d}$ +f _{np,PTSF} *(v _{d,PTSF} / v _{d,PTSF} +	+ 60.8	
V _{o,PTSF})		
Level of Service and Other Performance Measures	1	<u>^</u>
Level of Service, LOS (EXTIDIT 15-3)		
	ļ	7.27

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1589
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1625
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	82.8
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	332.2
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.80
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only 5. Explicit 15.20 provides coefficients a and b for Equation 15.10	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET		
General Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Timo Rociod AM Pook	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd NB Jacobs Creek Rd/l-95 NJDOT 2015
Project Description: Pre-Construction Traffic Study	Analysis feal	2015
Input Data		
Shoulder width tt		
Lane width tt		highway
Lane width tt		Class III highway
t <u>Shoulder width</u> tt		
Segment length, L _t mi	Grade Length Peak-hour fa No-passing z	h mi Up/down ctor, PHF 0.88 cone 100%
Analysis direction vol., V _d 585veh/h	% Trucks and	d Buses , P _T 2 %
Opposing direction vol., V _o 600veh/h Shoulder width ft 6.0 Lane Width ft 14.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi 40</i> /mi
Average Travel Speed		
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.1
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.998	0.998
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	666	683
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed	
	Base free-flow speed ⁴ , BFFS 55.0 n	
Mean speed of sample ³ S	Adj. for lane and shoulder width, ⁴ f _{LS} (Exhibit 15-7) 0.0	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 10.0	
Free-flow speed, FFS=S _{EM} +0.00776(v/ f _{HV ATS})	Free-flow speed, FFS (FSS=BF	FS-f _{LS} -f _A) 45.0 mi/h
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.6 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} + 33.0	
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	73.3 %
Percent Time-Spent-Following	Analysia Dia 11 - 41	
	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	665	682
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	62.6	
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	30.1	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d + f_{np,PTSF} *(v_{d,PTSF} / v_{d,PTSF})$	+ 77.5	
V _{o,PTSF})		
Level of Service and Other Performance Measures		Ο
Volume to capacity ratio v/c		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1697
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	73.3
Bicycle Level of Service	
Directional demand flow rate in outside lane, v _{OL} (Eq. 15-24) veh/h	664.8
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.15
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is or downgrade segments are treated as level terrain. 	ne of the base conditions. For the purpose of grade adjustment, specific
2. If $v_i(v_d \text{ or } v_o) >=1,700 \text{ pc/h}$, terminate analysisthe LOS is F. 3. For the analysis direction only and for v>200 veh/h. 4. For the analysis direction only	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET			
General Information	Site Information		
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd SB Jacobs Creek Rd/l-95 NJDOT	
Analysis Time Period AM Peak Project Description: Pre-Construction Traffic Study	Analysis Year	2015	
Shoulder width tt		_	
Lane width tt		nighway 📃 Class II	
Shoulder width ft	highway 🗹	Class III highway	
Segment length, L _t mi	Terrain Grade Length Peak-hour fa No-passing z	Level Rolling n mi Up/down ctor, PHF 0.90 one 100%	
Analysis direction vol., V _d 613veh/h	Show North Arrow % Trucks and	d Buses , P _T 3 %	
Opposing direction vol., V _o 566veh/h Shoulder width ft 6.0 Lane Width ft 14.0	% Recreation Access point	nal vehicles, P _R 0% s <i>mi</i> 40/mi	
Average Travel Speed			
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-11 or 15-12)	1.1	1.1	
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0	
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.997	
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00 1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i = <i>V</i> _i / (PHF* f _{g,ATS} * f _{HV,ATS})	683	631	
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed		
	Base free-flow speed ⁴ , BFFS	55.0 mi/h	
Mean aread of complete C	Adj. for lane and shoulder width,	⁴ f _{LS} (Exhibit 15-7) 0.0 mi/h	
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f_A (Exhibit 15-8) 10.0		
Free-flow speed, FFS=S _{Fk} +0.00776(v / f _{ink etc})	Free-flow speed, FFS (FSS=BFFS-f _{1 o} -f ₄) 45.		
Adj. for no-passing zones, f _{np,ATS} (Exhibit 15-15) 1.7 mi/h	Average travel speed, ATS _d =FFS-0.00776(v _{d,ATS} +		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS 73.5		
Percent Time-Spent-Following	Anglusia Dispetien (d)	Operation Dispettion (c)	
	Analysis Direction (d)	Opposing Direction (o)	
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0	
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0	
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000	
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00	
Directional flow rate ² , v _i (pc/h) v _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	681	629	
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^D)	62.8		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	30.9		
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	+ 78.9		
V _{o,PTSF})			
Level of Service and Other Performance Measures		0	
Volume to capacity ratio. v/c	0 40		
	+		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1695
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	73.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, $v_{\rm OL}$ (Eq. 15-24) veh/h	681.1
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.42
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one downgrade segments are treated as level terrain. 	of the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET				
General Information	Site Information			
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Time Period PM Peak	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd NB Jacobs Creek Rd/I-95 NJDOT 2015		
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015		
Input Data				
Shoulder width tt				
Lane width	Class I	nighway 🔲 Class II		
Lane width tt	highway 🗸	Class III highway		
Shoulder width It				
Segment length, L _t mi	Grade Length mi Up/down Peak-hour factor, PHF 0.96 No-passing zone 100%			
Analysis direction vol., V _d 571veh/h	% Trucks and	d Buses , P _T 1 %		
Opposing direction vol., V _o 661veh/h Shoulder width ft 6.0 Lane Width ft 14.0	% Recreational vehicles, P _R 0% Access points <i>mi</i> 40/mi			
Segment Length min 1.1				
Average Travel Speed	Analysis Direction (d)	Opposing Direction (o)		
Passanger ear equivalents for trucks E (Exhibit 15.11 or 15.12)		1 1		
Passenger-car equivalents for RVs. E_T (Exhibit 15-11 or 15-12)	1.1	1.0		
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.999	0.999		
Grade adjustment factor ¹ , f _{q.ATS} (Exhibit 15-9)	1.00	1.00		
Demand flow rate ² , v_i (pc/h) $v_i = V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	595	689		
Free-Flow Speed from Field Measurement	Estimated Free-Flow Speed			
	Base free-flow speed ⁴ , BFFS	55.0 mi/h		
	Adj. for lane and shoulder width,	⁴ f _{I S} (Exhibit 15-7) 0.0 mi/h		
Mean speed of sample ³ , S _{FM}	Adj. for access points ⁴ , f_{A} (Exhibit 15-8) 10.0 mi/h			
Free flow encode EES=S 10.00776(v/f	Free-flow speed FES (ESS=BEES-f $_{-}$ f) 45.0 mi/h			
Adj. for no-passing zones, $f_{nn ATS}$ (Exhibit 15-15) 1.5 <i>mi/h</i>	Average travel speed, ATS _d =FFS	Average travel speed, ATS _d =FFS-0.00776($v_{d,ATS}$ + 0.0 min)		
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PEES	74.5 %		
Percent Time-Spent-Following		71.0 70		
	Analysis Direction (d)	Opposing Direction (o)		
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0		
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0		
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000		
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00		
Directional flow rate ² , <i>v</i> _i (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	595	689		
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	5	58.9		
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	31.3			
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	73.4			
V _{o,PTSF})				
Volume to capacity ratio, v/c		0.35		
	+			

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1698
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	74.5
Bicycle Level of Service	
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	594.8
Effective width, Wv (Eq. 15-29) ft	26.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	1.87
Bicycle level of service (Exhibit 15-4)	В
Notes	
 Note that the adjustment factor for level terrain is 1.00, as level terrain is one of downgrade segments are treated as level terrain. 	f the base conditions. For the purpose of grade adjustment, specific
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 	

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DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET				
General Information				
Analyst MTD Agency or Company Pennoni Date Performed 9/8/2015 Analysis Timo Region BM Roak	Highway / Direction of Travel From/To Jurisdiction	Bear Tavern Rd SB Jacobs Creek Rd/l-95 NJDOT 2015		
Project Description: Pre-Construction Traffic Study	Analysis Teal	2015		
Input Data				
Shoulder width				
Lane width tt	Class I h	nighway 🔲 Class II		
Lane width tt	highway 🗸	Class III highway		
Shoulder widthft	Terrain			
Segment length, L _t mi	Grade Length mi Up/down Peak-hour factor, PHF 0.83 No-passing zone 100%			
Analysis direction vol., V _d 689veh/h	Show North Arrow % Trucks and	l Buses , P _T 3 %		
Opposing direction vol., Vo431veh/hShoulder width ft6.0Lane Width ft14.0	% Recreational vehicles, P _R 0% Access points <i>mi</i> 40/mi			
Segment Length mi 1.1				
Average Traver Speed	Analysis Direction (d)	Opposing Direction (o)		
Passenger-car equivalents for trucks E ₊ (Exhibit 15-11 or 15-12)	11	12		
Passenger-car equivalents for RVs, E _R (Exhibit 15-11 or 15-13)	1.0	1.0		
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997	0.994		
Grade adjustment factor ¹ , f _{g,ATS} (Exhibit 15-9)	1.00	1.00		
Demand flow rate ² , <i>v_i</i> (pc/h) <i>v_i=V_i</i> / (PHF* f _{g,ATS} * f _{HV,ATS})	833	522		
Free-Flow Speed from Field Measurement	Estimated Fre	ee-Flow Speed		
	Base free-flow speed ⁴ , BFFS	55.0 mi/h		
Mana analaf amala ³ O	Adj. for lane and shoulder width, ⁴	^l f _{LS} (Exhibit 15-7) 0.0 <i>mi/h</i>		
Total demand flow rate, both directions, v	Adj. for access points ⁴ , f _A (Exhibit 15-8) 10.0 mi/h			
Free-flow speed FES=S+0.00776(ν / f	Free-flow speed, FFS (FSS=BFFS- $f_{1,c}$ - f_{a}) 45.0 mi/h			
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15) 2.2 mi/h	Average travel speed, $ATS_d = FFS-0.00776(v_{d,ATS} + 32.3 mi/h)$			
	v _{o,ATS}) - f _{np,ATS} Percent free flow speed, PFFS	71.9 %		
Percent Time-Spent-Following				
	Analysis Direction (d)	Opposing Direction (o)		
Passenger-car equivalents for trucks, E _T (Exhibit 15-18 or 15-19)	1.0	1.0		
Passenger-car equivalents for RVs, E _R (Exhibit 15-18 or 15-19)	1.0	1.0		
Heavy-vehicle adjustment factor, f _{HV} =1/ (1+ P _T (E _T -1)+P _R (E _R -1))	1.000	1.000		
Grade adjustment factor ¹ , f _{g,PTSF} (Exhibit 15-16 or Ex 15-17)	1.00	1.00		
Directional flow rate ² , <i>v_i</i> (pc/h) <i>v</i> _i =V _i /(PHF*f _{HV,PTSF} * f _{g,PTSF})	830	519		
Base percent time-spent-following ⁴ , BPTSF _d (%)=100(1-e ^{av} d ^b)	68.6			
Adj. for no-passing zone, f _{np,PTSF} (Exhibit 15-21)	27.7			
Percent time-spent-following, $PTSF_{d}(\%)=BPTSF_{d}+f_{np,PTSF}*(v_{d,PTSF} / v_{d,PTSF} + v_{d,PTSF})$	85.6			
V _{o,PTSF})				
Level of Service and Other Performance Measures	nd Other Performance Measures			
Level of service, LOS (Exhibit 15-3) Volume to canacity ratio, V/c	ſ	ں 49		
		VTV		

Capacity, C _{d,ATS} (Equation 15-12) veh/h	1690			
Capacity, C _{d,PTSF} (Equation 15-13) veh/h	1700			
Percent Free-Flow Speed PFFS _d (Equation 15-11 - Class III only)	71.9			
Bicycle Level of Service				
Directional demand flow rate in outside lane, <i>v_{OL}</i> (Eq. 15-24) veh/h	830.1			
Effective width, Wv (Eq. 15-29) ft	26.00			
Effective speed factor, S_t (Eq. 15-30)	4.79			
Bicycle level of service score, BLOS (Eq. 15-31)	2.52			
Bicycle level of service (Exhibit 15-4)	С			
Notes				
 Note that the adjustment factor for level terrain is 1.00, as level terrain is on downgrade segments are treated as level terrain. 	e of the base conditions. For the purpose of grade adjustment, specific			
 If v_i(v_d or v_o) >=1,700 pc/h, terminate analysisthe LOS is F. For the analysis direction only and for v>200 veh/h. For the analysis direction only 				

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