

ENTRADA© - Environmental Traffic Data Abstract

Presented at the TRB Ninth Conference on the Application of Transportation Planning Methods, April 6 – 10, 2003, Baton Rouge, LA

The Environmental Traffic Data, ENTRADA, Program standardizes the production of environmental traffic data – Speeds, VMT (VKT), VHT, and VHD — needed as input for air quality and noise analyses. ENTRADA utilizes look-up tables based upon the Highway Capacity Manual (HCM), Special Report 209; NCHRP Reports 365 (187), 387 and 504; and other nationally and internationally recognized sources to adjust free-flow speeds for different facility types (Freeways, Multi-Lane and Two-Lane Highways, and Urban Streets). It incorporates factors recommended by these documents in order to adjust free-flow speeds based upon number of lanes, access points, lateral clearances, median types, and lane widths. The application of the methods has been developed into a spreadsheet, Excel programs.

Highway projects using Federal funds are required to undergo air and noise studies. Typically, these studies analyze Base year, Interim year (Build & No-build), and Design year (Build & No-build) air quality and noise impacts of proposed improvements. Environmental traffic input typically includes diurnal data for traffic volumes, operating speeds, Vehicle Miles (Kilometer) of Travel (VMT), Vehicle Hours of Travel (VHT), and Vehicle Hours of Delay (VHD.)

As this program is based upon nationally recognized adjustment factors, the output is processed by a selection of **BPR** and **19** researched available **Modified BPR** Models in addition to **two** (2) nationally known **Non-BPR** Models. Therefore, the output from **ENTRADA** Program is less likely to be legally challenged. Use of the program should result in staff time efficiencies, as production of environmental traffic data will become standardized and routine. Additionally, **Calibration** process is available and makes the forecasted traffic data less subjective.

Input data required to run **ENTRADA** includes Base, Interim, and Design year ADT volumes, percent hourly traffic variation (K), percent directional distribution factor (D), and percent trucks ADT. Other inputs are capacity, directional number of lanes, Route Type, Median Type, Lateral Clearance, Lane Width, Access Point Density, Terrain, and Posted Speed. The program allows for the use of either Metric or US-English System of measurements.

The **ENTRADA** program is write protected and worksheet files open as **Read Only**. Therefore, files should be saved under different names.

My thanks to Mr. William "Bill" Mann, P.E. and Mr. Bahram Jamei, Ph.D., P.E. at Transportation Planning Section, Northern Virginia District Office of the Virginia Department of Transportation.

Please forward your comments, suggestions, and or questions to:

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703-383-2213

Virginia Department of Transportation , 14685 Avion Parkway, Chantilly, VA 20151.



ENTRADA© - Environmental Traffic Data Input Sheet

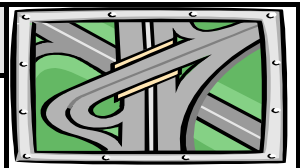


Table 1 - Sample

Widening alternative analysis

Facility	US Route 50	Direction	e/w	Present Year	2005	Analyst
From	VA Route 28	Reference Map #	ADC4	Interim Year	2015	Techman
To	Loudoun County Line	County	Fairfax	Design Year	2030	Ver. 805

Traffic and Geometric Data						<<< Input Description >>>	
Sys. Unit	e	Facility Length (Mi)	5.50	Terrain	1	- White cells are input.	
Itemized Input	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	- Hyper-linked cells are Underlined in BLUE.	
Two-way ADT	80,000	120,000	100,000	150,000	130,000	- Cells with RED upper right corner indicate input help, tips, or references.	
% Truck ADT	0%	0%	0%	0%	0%		
Adjusted ADT	Hourly	Truck	Percent	Is	Available	<<< Facility Type >>>	<<< Median Type >>>
<u>LOS 'C' Capacity, phpl</u>	1,400	1,400	1,400	1,400	1,400	Present= Minor Art.	Present= Undivided
Facility Type	2	2	2	2	2	2015 Build= Minor Art.	2015 Build= Undivided
Median Type	1	1	1	1	1	2015 No-bld= Minor Art.	2015 No-bld= Undivided
EB # of lanes	2	3	2	3	3	2030 Build= Minor Art.	2030 Build= Undivided
WB # of lanes	2	3	2	3	3	2030 No-bld= Minor Art.	2030 No-bld= Undivided
Outside shldr. width (ft)	6	6	6	6	6	<<< F-F Calc. Method >>>	<<< Terrain >>>
Inside shldr. width (ft)	6	6	6	6	6	Estimated 85th Percentile	Rolling
Lane Width (ft)	12	12	12	12	12	<<< Note >>>	
# Access/mi	0	0	0	0	0	additional text here.....	
Posted Speed (mph)	45	45	45	45	45		
Free-flow Calc. Method	0	0	0	0	0	Link to:	K-factors D-factors LOS"E"Cap
Est. FF Speed (mph)	52	52	52	52	52	NCHRP	PFC MwCOG COG-NBPR

Processing Models Selection					
Processing Model #	3	#1: BPR Model = 1 + 0.15 (v/c) ⁴	#2: Modified BPR Models = A + B (C + D * v/c) ^E		MBPR List
#3: Combination of #1 & #2, input v/c upper limit for BPR use=	2.00	A	B	C	D
#4: MwCOG V2.x Model (DC Region)	#5: Akcelick/Davidson Model	1.00	0.15	1.60	0.20
					4

Past, Present & Future Traffic Statistics										
Starting Time	Time Span	0	Hourly Traffic Input (Known as K-factor)				Natl. Urban	Natl. Rural	COG Region	If Hourly Volume or Hourly Rates are not available, a selection is provided. If considered, please use copy and paste procedure. Click for more Tables from NCHRP
	HV or HR	Present HR	2015 Build	2015 No-bld	2030 Build	2030 No-bld				
0:00	0.005	0.55%	0.55%	0.55%	0.55%	0.55%	1.00%	1.00%	1.00%	
1:00	0.003	0.28%	0.28%	0.28%	0.28%	0.28%	1.00%	1.00%	0.50%	
2:00	0.003	0.28%	0.28%	0.28%	0.28%	0.28%	1.00%	0.50%	0.50%	
3:00	0.003	0.29%	0.29%	0.29%	0.29%	0.29%	0.50%	1.00%	0.50%	
4:00	0.006	0.62%	0.62%	0.62%	0.62%	0.62%	1.00%	1.50%	1.00%	
5:00	0.023	2.27%	2.27%	2.27%	2.27%	2.27%	1.50%	2.00%	2.00%	
6:00	0.044	4.39%	4.39%	4.39%	4.39%	4.39%	3.00%	2.00%	2.98%	
7:00	0.057	5.71%	5.71%	5.71%	5.71%	5.71%	6.00%	7.00%	7.08%	
8:00	0.060	6.01%	6.01%	6.01%	6.01%	6.01%	5.00%	7.00%	5.87%	
9:00	0.057	5.73%	5.73%	5.73%	5.73%	5.73%	5.00%	6.00%	3.62%	
10:00	0.053	5.31%	5.31%	5.31%	5.31%	5.31%	5.00%	6.00%	4.57%	
11:00	0.058	5.84%	5.84%	5.84%	5.84%	5.84%	6.00%	5.00%	5.11%	
12:00	0.068	6.79%	6.79%	6.79%	6.79%	6.79%	6.00%	5.00%	5.35%	
13:00	0.065	6.51%	6.51%	6.51%	6.51%	6.51%	6.00%	6.00%	4.95%	
14:00	0.063	6.27%	6.27%	6.27%	6.27%	6.27%	7.00%	5.00%	5.30%	
15:00	0.068	6.81%	6.81%	6.81%	6.81%	6.81%	7.00%	5.00%	6.15%	
16:00	0.085	8.50%	8.50%	8.50%	8.50%	8.50%	7.00%	6.00%	5.17%	
17:00	0.089	8.90%	8.90%	8.90%	8.90%	8.90%	7.00%	7.00%	9.43%	
18:00	0.090	9.00%	9.00%	9.00%	9.00%	9.00%	6.00%	7.00%	6.93%	
19:00	0.052	5.24%	5.24%	5.24%	5.24%	5.24%	4.00%	6.00%	7.54%	
20:00	0.037	3.70%	3.70%	3.70%	3.70%	3.70%	4.00%	4.00%	5.45%	
21:00	0.031	3.09%	3.09%	3.09%	3.09%	3.09%	5.00%	4.00%	5.00%	
22:00	0.019	1.89%	1.89%	1.89%	1.89%	1.89%	3.00%	3.00%	3.00%	
23:00	0.010	1.01%	1.01%	1.01%	1.01%	1.01%	2.00%	2.00%	1.00%	



ENTRADA© - Environmental Traffic Data Input Sheet



Table 1 - Sample

Widening alternative analysis

Starting Time	#2 - Hourly Truck Traffic (Percent of hourly volume)									Two-way Weighted %T= EB(V*%T) + WB(V*%T) / Vtotal ----- where: V=Volume T=Truck
	EB			WB			TWO-WAY			
	2X-6T	3X +	Total Truck	2X-6T	3X +	Total Truck	2X-6T	3X +	Total Truck	
0:00	0.9%	0.6%	1.5%	0.0%	0.0%	0.0%	0.4%	0.2%	0.6%	
1:00	0.0%	1.2%	1.2%	1.7%	0.0%	1.7%	1.0%	0.5%	1.5%	
2:00	3.3%	2.4%	5.7%	4.9%	0.0%	4.9%	4.2%	1.0%	5.2%	
3:00	1.4%	1.3%	2.7%	4.1%	0.0%	4.1%	2.7%	0.7%	3.4%	
4:00	0.0%	0.7%	0.7%	1.6%	3.0%	4.6%	0.7%	1.7%	2.4%	
5:00	1.0%	2.5%	3.6%	1.2%	0.4%	1.6%	1.1%	1.6%	2.7%	
6:00	0.3%	2.4%	2.7%	1.3%	1.8%	3.2%	0.8%	2.1%	2.9%	
7:00	0.8%	4.0%	4.7%	1.3%	2.0%	3.3%	1.0%	3.1%	4.1%	
8:00	1.2%	2.0%	3.2%	1.3%	2.1%	3.4%	1.2%	2.0%	3.3%	
9:00	1.4%	2.0%	3.3%	1.5%	1.5%	2.9%	1.4%	1.7%	3.1%	
10:00	1.3%	2.5%	3.8%	2.1%	1.4%	3.5%	1.7%	2.0%	3.7%	
11:00	1.2%	2.3%	3.5%	1.3%	1.4%	2.6%	1.2%	1.8%	3.1%	
12:00	1.1%	1.2%	2.3%	1.6%	0.8%	2.4%	1.4%	1.0%	2.4%	
13:00	0.9%	1.9%	2.8%	1.2%	0.8%	2.0%	1.1%	1.3%	2.4%	
14:00	1.5%	1.7%	3.2%	1.4%	1.4%	2.8%	1.5%	1.5%	3.0%	
15:00	0.8%	1.5%	2.3%	1.6%	1.2%	2.8%	1.2%	1.4%	2.6%	
16:00	0.7%	1.6%	2.3%	1.5%	0.9%	2.4%	1.2%	1.2%	2.3%	
17:00	0.4%	1.0%	1.4%	0.7%	1.2%	1.8%	0.5%	1.1%	1.6%	
18:00	0.4%	1.0%	1.5%	0.6%	0.5%	1.1%	0.5%	0.7%	1.3%	
19:00	0.3%	1.1%	1.4%	2.2%	0.8%	3.0%	1.3%	0.9%	2.2%	
20:00	0.7%	1.2%	1.9%	0.4%	0.5%	0.9%	0.5%	0.8%	1.3%	
21:00	0.7%	1.0%	1.7%	0.3%	0.6%	0.8%	0.5%	0.8%	1.2%	
22:00	0.2%	0.9%	1.1%	0.9%	0.9%	1.8%	0.6%	0.9%	1.5%	
23:00	0.4%	2.0%	2.5%	0.4%	1.0%	1.4%	0.4%	1.5%	1.9%	

Starting Time	#3 - Directional Split									
	EB					WB				
	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	2005	2015 Build	Interim Nbld	2030 Build	2030 No-bld
0:00	41%	41%	41%	41%	41%	59%	59%	59%	59%	59%
1:00	41%	41%	41%	41%	41%	59%	59%	59%	59%	59%
2:00	42%	42%	42%	42%	42%	58%	58%	58%	58%	58%
3:00	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
4:00	58%	58%	58%	58%	58%	42%	42%	42%	42%	42%
5:00	57%	57%	57%	57%	57%	43%	43%	43%	43%	43%
6:00	52%	52%	52%	52%	52%	48%	48%	48%	48%	48%
7:00	54%	54%	54%	54%	54%	46%	46%	46%	46%	46%
8:00	58%	58%	58%	58%	58%	42%	42%	42%	42%	42%
9:00	54%	54%	54%	54%	54%	46%	46%	46%	46%	46%
10:00	52%	52%	52%	52%	52%	48%	48%	48%	48%	48%
11:00	52%	52%	52%	52%	52%	48%	48%	48%	48%	48%
12:00	48%	48%	48%	48%	48%	52%	52%	52%	52%	52%
13:00	48%	48%	48%	48%	48%	52%	52%	52%	52%	52%
14:00	48%	48%	48%	48%	48%	52%	52%	52%	52%	52%
15:00	43%	43%	43%	43%	43%	57%	57%	57%	57%	57%
16:00	42%	42%	42%	42%	42%	58%	58%	58%	58%	58%
17:00	44%	44%	44%	44%	44%	56%	56%	56%	56%	56%
18:00	47%	47%	47%	47%	47%	53%	53%	53%	53%	53%
19:00	48%	48%	48%	48%	48%	52%	52%	52%	52%	52%
20:00	43%	43%	43%	43%	43%	57%	57%	57%	57%	57%
21:00	46%	46%	46%	46%	46%	54%	54%	54%	54%	54%
22:00	44%	44%	44%	44%	44%	56%	56%	56%	56%	56%
23:00	45%	45%	45%	45%	45%	55%	55%	55%	55%	55%

ENTRADA program is developed by Ed Azimi @VDOT-NOVA/TP

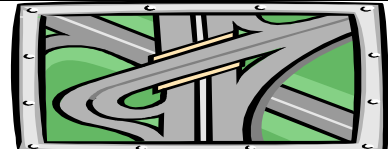
Question, Problem & Comments, Please e-mail @ ed.azimi@vdot.virginia.gov



ENTRADA® - Environmental Traffic Data Speed Output

Table 1 - Sample

Widening alternative analysis

Route	US Route 50				Reference Map #	ADC4	
From	VA Route 28				US-English, BPR + MBPR Models are used		
To	Loudoun County Line				Present Year 2005 ADT	80,000	No-build
City/County	Fairfax				Interim Year 2015 ADT	120,000	100,000
Date	9/9/2005	Time Span	24 Hours		Design Year 2030 ADT	150,000	130,000

Eastbound

Starting Time	Hourly Volume					Present		Present hourly % truck		
	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	% ADT	Dir. Dist.			
								2A-6T	3A+	Total
0:00	178	267	222	333	289	0.55%	41%	0.9%	0.6%	1.5%
1:00	90	136	113	170	147	0.28%	41%	0.0%	1.2%	1.2%
2:00	94	140	117	175	152	0.28%	42%	3.3%	2.4%	5.7%
3:00	113	170	142	213	184	0.29%	50%	1.4%	1.3%	2.7%
4:00	287	430	358	538	466	0.62%	58%	0.0%	0.7%	0.7%
5:00	1,030	1,545	1,288	1,932	1,674	2.27%	57%	1.0%	2.5%	3.6%
6:00	1,823	2,734	2,279	3,418	2,962	4.39%	52%	0.3%	2.4%	2.7%
7:00	2,451	3,677	3,064	4,596	3,983	5.71%	54%	0.8%	4.0%	4.7%
8:00	2,770	4,155	3,463	5,194	4,502	6.01%	58%	1.2%	2.0%	3.2%
9:00	2,471	3,707	3,089	4,634	4,016	5.73%	54%	1.4%	2.0%	3.3%
10:00	2,231	3,346	2,788	4,182	3,625	5.31%	52%	1.3%	2.5%	3.8%
11:00	2,428	3,643	3,035	4,553	3,946	5.84%	52%	1.2%	2.3%	3.5%
12:00	2,602	3,902	3,252	4,878	4,228	6.79%	48%	1.1%	1.2%	2.3%
13:00	2,477	3,716	3,097	4,645	4,026	6.51%	48%	0.9%	1.9%	2.8%
14:00	2,433	3,649	3,041	4,562	3,954	6.27%	48%	1.5%	1.7%	3.2%
15:00	2,367	3,551	2,959	4,438	3,846	6.81%	43%	0.8%	1.5%	2.3%
16:00	2,829	4,244	3,537	5,305	4,598	8.50%	42%	0.7%	1.6%	2.3%
17:00	3,157	4,735	3,946 *	5,919 *	5,129	8.90%	44%	0.4%	1.0%	1.4%
18:00	3,419	5,129	4,274 *	6,411 *	5,556	9.00%	47%	0.4%	1.0%	1.5%
19:00	2,031	3,047	2,539	3,809	3,301	5.24%	48%	0.3%	1.1%	1.4%
20:00	1,282	1,922	1,602	2,403	2,083	3.70%	43%	0.7%	1.2%	1.9%
21:00	1,136	1,704	1,420	2,130	1,846	3.09%	46%	0.7%	1.0%	1.7%
22:00	661	991	826	1,239	1,074	1.89%	44%	0.2%	0.9%	1.1%
23:00	360	540	450	676	585	1.01%	45%	0.4%	2.0%	2.5%

Calibrated Hourly Speed (MPH)

Starting Time	Calibrated Hourly Speed (MPH)									
	Present		2015 Build		2015 No-bld		2030 Build		2030 No-bld	
	Interrupted	Uninterrupt.	Interrupted	Uninterrupt.	Interrupted	Uninterrupt.	Interrupted	Uninterrupt.	Interrupted	Uninterrupt.
0:00	29	44	29	44	29	44	29	44	29	44
1:00	29	44	29	44	29	44	29	44	29	44
2:00	29	44	29	44	29	44	29	44	29	44
3:00	29	44	29	44	29	44	29	44	29	44
4:00	29	44	29	44	29	44	29	44	29	44
5:00	28	44	28	44	28	44	28	44	28	44
6:00	27	43	27	43	25	43	25	43	26	43
7:00	23	42	23	42	17	40	17	40	21	42
8:00	21	41	21	41	<u>13</u>	39	<u>13</u>	39	18	41
9:00	23	42	23	42	17	40	17	40	21	42
10:00	25	43	25	43	20	41	20	41	23	42
11:00	23	42	23	42	18	40	18	40	22	42
12:00	23	42	23	42	16	40	16	40	21	41
13:00	23	42	23	42	17	40	17	40	22	42
14:00	24	42	24	42	18	40	18	40	22	42
15:00	24	43	24	43	19	41	19	41	23	42
16:00	21	41	21	41	<u>13</u>	39	<u>13</u>	39	18	41
17:00	18	40	18	40	<u>8</u>	37	<u>8</u>	37	<u>15</u>	39
18:00	<u>15</u>	39	<u>15</u>	39	<u>5</u>	36	<u>5</u>	36	<u>11</u>	38
19:00	26	43	26	43	23	42	23	42	26	43
20:00	28	44	28	44	28	44	28	44	28	44
21:00	28	44	28	44	28	44	28	44	28	44
22:00	29	44	29	44	29	44	29	44	29	44
23:00	29	44	29	44	29	44	29	44	29	44

* Shown when volume exceeds Max. Service Flow

Underlined values indicate STOP&GO condition

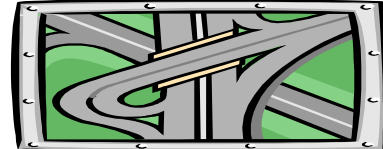
ENTRADA Ver. 805 VDOT-NOVA



ENTRADA® - Environmental Traffic Data Speed Output

Table 1 - Sample

Widening alternative analysis

Route	US Route 50				Reference Map #		ADC4		
From	VA Route 28				US-English, BPR + MBPR Models are used				
To	Loudoun County Line				Present Year 2005 ADT	80,000	No-build		
City/County	Fairfax				Interim Year 2015 ADT	120,000	100,000		
Date	9/9/2005	Time Span	24 Hours		Design Year 2030 ADT	150,000	130,000		

Westbound

Starting Time	Hourly Volume					Present		Present % Truck		
	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	% ADT	Dir. Dist.	2A-6T	3A+	Total
	0:00	259	389	324	486	421	0.55%	59%	0.0%	0.0%
1:00	132	198	165	247	214	0.28%	59%	1.7%	0.0%	1.7%
2:00	129	193	161	241	209	0.28%	58%	4.9%	0.0%	4.9%
3:00	115	172	144	216	187	0.29%	50%	4.1%	0.0%	4.1%
4:00	205	308	257	385	334	0.62%	42%	1.6%	3.0%	4.6%
5:00	790	1,184	987	1,480	1,283	2.27%	43%	1.2%	0.4%	1.6%
6:00	1,693	2,539	2,116	3,173	2,750	4.39%	48%	1.3%	1.8%	3.2%
7:00	2,114	3,171	2,643	3,964	3,435	5.71%	46%	1.3%	2.0%	3.3%
8:00	2,041	3,061	2,551	3,826	3,316	6.01%	42%	1.3%	2.1%	3.4%
9:00	2,111	3,167	2,639	3,958	3,430	5.73%	46%	1.5%	1.5%	2.9%
10:00	2,021	3,031	2,526	3,789	3,283	5.31%	48%	2.1%	1.4%	3.5%
11:00	2,244	3,367	2,806	4,208	3,647	5.84%	48%	1.3%	1.4%	2.6%
12:00	2,833	4,250	3,541	5,312	4,604	6.79%	52%	1.6%	0.8%	2.4%
13:00	2,730	4,096	3,413	5,119	4,437	6.51%	52%	1.2%	0.8%	2.0%
14:00	2,585	3,877	3,231	4,846	4,200	6.27%	52%	1.4%	1.4%	2.8%
15:00	3,085	4,627	3,856	5,783	5,012	6.81%	57%	1.6%	1.2%	2.8%
16:00	3,971 *	5,956 *	4,963 *	7,445 *	6,452 *	8.50%	58%	1.5%	0.9%	2.4%
17:00	3,963 *	5,945 *	4,954 *	7,431 *	6,441 *	8.90%	56%	0.7%	1.2%	1.8%
18:00	3,781	5,671	4,726 *	7,089 *	6,144 *	9.00%	53%	0.6%	0.5%	1.1%
19:00	2,159	3,238	2,698	4,047	3,508	5.24%	52%	2.2%	0.8%	3.0%
20:00	1,676	2,513	2,095	3,142	2,723	3.70%	57%	0.4%	0.5%	0.9%
21:00	1,334	2,001	1,667	2,501	2,167	3.09%	54%	0.3%	0.6%	0.8%
22:00	852	1,279	1,065	1,598	1,385	1.89%	56%	0.9%	0.9%	1.8%
23:00	449	674	561	842	730	1.01%	55%	0.4%	1.0%	1.4%

Calibrated Hourly Speed (MPH)

Starting Time	Present		2015 Build		2015 No-bld		2030 Build		2030 No-bld	
	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.
	0:00	30	44	30	44	30	44	30	44	30
1:00	30	44	30	44	30	44	30	44	30	44
2:00	30	44	30	44	30	44	30	44	30	44
3:00	30	44	30	44	30	44	30	44	30	44
4:00	30	44	30	44	30	44	30	44	30	44
5:00	30	44	30	44	30	44	30	44	30	44
6:00	28	44	28	44	27	43	27	43	28	44
7:00	27	43	27	43	23	42	23	42	26	43
8:00	27	44	27	44	24	42	24	42	26	43
9:00	27	43	27	43	23	42	23	42	26	43
10:00	27	44	27	44	24	42	24	42	26	43
11:00	26	43	26	43	22	42	22	42	25	43
12:00	22	42	22	42	<u>14</u>	39	<u>14</u>	39	19	41
13:00	23	42	23	42	15	40	15	40	21	41
14:00	24	42	24	42	17	40	17	40	22	42
15:00	19	41	19	41	<u>9</u>	38	<u>9</u>	38	16	40
16:00	<u>8</u>	37	<u>8</u>	37	<u>5</u>	36	<u>5</u>	36	<u>5</u>	36
17:00	<u>9</u>	37	<u>9</u>	37	<u>5</u>	36	<u>5</u>	36	<u>5</u>	36
18:00	<u>12</u>	38	<u>12</u>	38	<u>5</u>	36	<u>5</u>	36	<u>8</u>	37
19:00	27	43	27	43	23	42	23	42	25	43
20:00	29	44	29	44	27	44	27	44	28	44
21:00	29	44	29	44	29	44	29	44	29	44
22:00	30	44	30	44	30	44	30	44	30	44
23:00	30	44	30	44	30	44	30	44	30	44

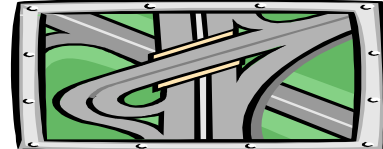
* Shown when volume exceeds Max. Service Flow Underlined values indicate STOP&GO condition ENTRADA Ver. 805 VDOT-NOVA



ENTRADA® - Environmental Traffic Data Speed Output

Table 1 - Sample

Widening alternative analysis

Route	US Route 50				Reference Map #		ADC4		
From	VA Route 28				US-English, BPR + MBPR Models are used				
To	Loudoun County Line				Present Year 2005 ADT	80,000	No-build		
City/County	Fairfax				Interim Year 2015 ADT	120,000	100,000		
Date	9/9/2005	Time Span	24 Hours		Design Year 2030 ADT	150,000	130,000		

Two-way

Starting Time	Hourly Volume					Present		Present % Truck		
	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	% ADT	Dir. Dist.	% Truck		
								2A-6T	3A+	Total
0:00	437	655	546	819	710	0.55%	Two-way	0.4%	0.2%	0.6%
1:00	222	333	278	417	361	0.28%	=	1.0%	0.5%	1.5%
2:00	222	333	278	417	361	0.28%	=	4.2%	1.0%	5.2%
3:00	228	343	286	428	371	0.29%	=	2.7%	0.7%	3.4%
4:00	492	738	615	923	800	0.62%	=	0.7%	1.7%	2.4%
5:00	1,820	2,730	2,275	3,412	2,957	2.27%	=	1.1%	1.6%	2.7%
6:00	3,515	5,273	4,394	6,591	5,712	4.39%	=	0.8%	2.1%	2.9%
7:00	4,565	6,848	5,707	8,560	7,419	5.71%	=	1.0%	3.1%	4.1%
8:00	4,811	7,216	6,013	9,020	7,817	6.01%	=	1.2%	2.0%	3.3%
9:00	4,582	6,874	5,728	8,592	7,446	5.73%	=	1.4%	1.7%	3.1%
10:00	4,251	6,377	5,314	7,971	6,908	5.31%	=	1.7%	2.0%	3.7%
11:00	4,673	7,009	5,841	8,761	7,593	5.84%	=	1.2%	1.8%	3.1%
12:00	5,435	8,152	6,793	10,190	8,831	6.79%	=	1.4%	1.0%	2.4%
13:00	5,208	7,812	6,510	9,765	8,463	6.51%	=	1.1%	1.3%	2.4%
14:00	5,018	7,527	6,272	9,408	8,154	6.27%	=	1.5%	1.5%	3.0%
15:00	5,452	8,177	6,814	10,222	8,859	6.81%	=	1.2%	1.4%	2.6%
16:00	6,800	10,200	8,500 *	12,750 *	11,050	8.50%	=	1.2%	1.2%	2.3%
17:00	7,120	10,680	8,900 *	13,350 *	11,570	8.90%	=	0.5%	1.1%	1.6%
18:00	7,200	10,800	9,000 *	13,500 *	11,700	9.00%	=	0.5%	0.7%	1.3%
19:00	4,190	6,285	5,237	7,856	6,809	5.24%	=	1.3%	0.9%	2.2%
20:00	2,957	4,436	3,697	5,545	4,806	3.70%	=	0.5%	0.8%	1.3%
21:00	2,470	3,705	3,087	4,631	4,013	3.09%	=	0.5%	0.8%	1.2%
22:00	1,513	2,270	1,891	2,837	2,459	1.89%	=	0.6%	0.9%	1.5%
23:00	809	1,214	1,012	1,518	1,315	1.01%	=	0.4%	1.5%	1.9%

Average Two-way Calibrated Hourly Speed (MPH)

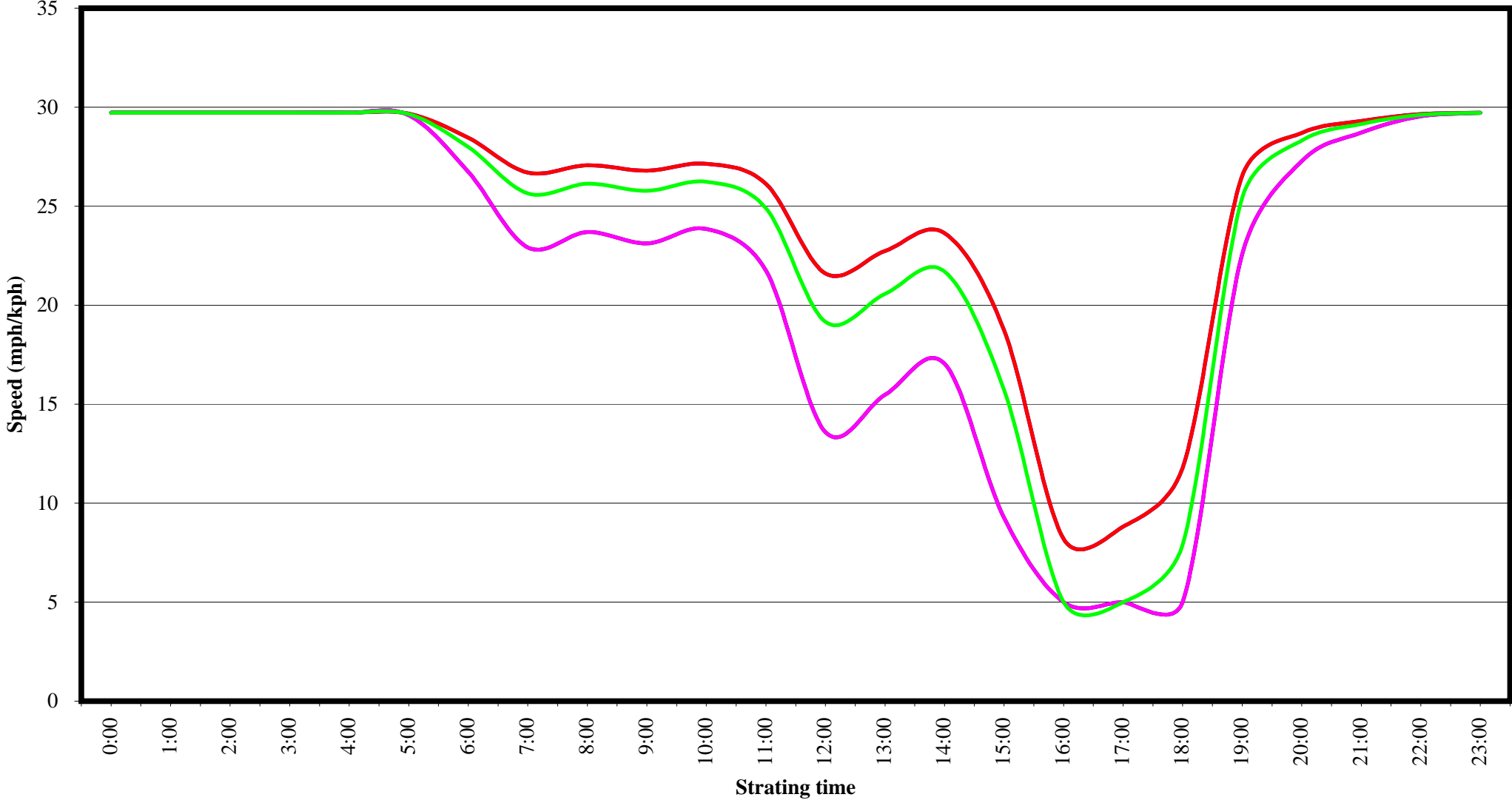
Starting Time	Present		2015 Build		2015 No-bld		2030 Build		2030 No-bld	
	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.	Interrupted #	Uninterrupt.
0:00	29	44	29	44	29	44	29	44	29	44
1:00	29	44	29	44	29	44	29	44	29	44
2:00	29	44	29	44	29	44	29	44	29	44
3:00	29	44	29	44	29	44	29	44	29	44
4:00	29	44	29	44	29	44	29	44	29	44
5:00	29	44	29	44	29	44	29	44	29	44
6:00	28	44	28	44	26	43	26	43	27	44
7:00	25	43	25	43	19	41	19	41	23	42
8:00	23	42	23	42	17	40	17	40	22	42
9:00	25	43	25	43	20	41	20	41	23	42
10:00	26	43	26	43	22	42	22	42	25	43
11:00	25	43	25	43	20	41	20	41	23	42
12:00	22	42	22	42	<u>15</u>	39	<u>15</u>	39	20	41
13:00	23	42	23	42	16	40	16	40	21	42
14:00	24	42	24	42	17	40	17	40	22	42
15:00	21	42	21	42	<u>14</u>	39	<u>14</u>	39	19	41
16:00	<u>13</u>	39	<u>13</u>	39	<u>8</u>	37	<u>8</u>	37	<u>10</u>	38
17:00	<u>13</u>	39	<u>13</u>	39	<u>6</u>	37	<u>6</u>	37	<u>9</u>	38
18:00	<u>13</u>	39	<u>13</u>	39	<u>5</u>	36	<u>5</u>	36	<u>9</u>	38
19:00	26	43	26	43	23	42	23	42	25	43
20:00	28	44	28	44	27	44	27	44	28	44
21:00	29	44	29	44	28	44	28	44	29	44
22:00	29	44	29	44	29	44	29	44	29	44
23:00	29	44	29	44	29	44	29	44	29	44

* Shown when volume exceeds Max. Service Flow

Underlined values indicate STOP&GO condition

ENTRADA Ver. 805 VDOT-NOVA

Conditional Hourly Speed (Outbound)



SB WB

Present 2015 Build 2015 No-bld 2030 Build 2030 No-bld



ENTRADA® - Environmental Traffic Data V's Output

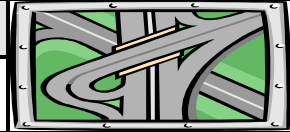


Table 1 - Sample
Widening alternative analysis

Starting Time	Vehicle Mile of Travel - VMT					Vehicle Hour of Travel - VHT					Vehicle Hour of Delay - VHD				
	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld	Present	2015 Build	2015 No-bld	2030 Build	2030 No-bld
Eastbound															
0:00	978	1,467	1,223	1,834	1,589	6	9	8	12	10	0	0	0	0	0
1:00	497	746	622	933	808	3	5	4	6	5	0	0	0	0	0
2:00	514	772	643	964	836	3	5	4	6	5	0	0	0	0	0
3:00	624	936	780	1,170	1,014	4	6	5	7	6	0	0	0	0	0
4:00	1,577	2,365	1,971	2,956	2,562	10	15	13	19	16	0	0	0	0	0
5:00	5,666	8,499	7,083	10,624	9,208	36	54	46	69	59	0	0	0	0	0
6:00	10,025	15,038	12,532	18,798	16,291	68	101	92	138	112	0	0	0	0	0
7:00	13,483	20,224	16,853	25,280	21,909	107	161	185	278	190	0	0	148	222	0
8:00	15,236	22,855	19,045	28,568	24,759	134	201	271	406	246	134	201	167	251	217
9:00	13,592	20,388	16,990	25,485	22,087	106	160	180	269	187	0	0	149	224	0
10:00	12,268	18,403	15,335	23,003	19,936	90	135	138	207	154	0	0	135	202	0
11:00	13,356	20,034	16,695	25,043	21,704	103	155	171	257	181	0	0	147	220	0
12:00	14,309	21,463	17,886	26,829	23,252	115	173	203	304	205	0	0	157	236	204
13:00	13,626	20,439	17,032	25,549	22,142	106	159	178	266	186	0	0	150	224	0
14:00	13,381	20,072	16,727	25,090	21,745	103	155	171	256	181	0	0	147	220	0
15:00	13,019	19,528	16,273	24,410	21,156	97	146	154	231	168	0	0	143	214	0
16:00	15,562	23,343	19,453	29,179	25,289	138	206	280	420	253	137	205	171	256	222
17:00	17,361	26,042	21,702	32,552	28,212	178	267	476	714	348	152	229	191	286	248
18:00	18,805	28,207	23,506	35,259	30,557	233	349	855	1,282	495	165	248	206	310	268
19:00	11,172	16,758	13,965	20,948	18,155	77	116	108	163	129	0	0	0	0	0
20:00	7,049	10,574	8,811	13,217	11,455	45	68	58	87	74	0	0	0	0	0
21:00	6,248	9,372	7,810	11,715	10,153	40	60	51	76	65	0	0	0	0	0
22:00	3,634	5,451	4,543	6,814	5,905	23	35	29	43	38	0	0	0	0	0
23:00	1,981	2,972	2,477	3,715	3,220	13	19	16	24	20	0	0	0	0	0
Daily	223,966	335,949	279,957	419,936	363,944	1,841	2,761	3,694	5,540	3,336	588	882	1,909	2,864	1,159
Westbound															
0:00	1,425	2,137	1,781	2,672	0	9	13	11	16	14	0	0	0	0	0
1:00	725	1,088	906	1,360	0	4	7	6	8	7	0	0	0	0	0
2:00	708	1,062	885	1,328	0	4	6	5	8	7	0	0	0	0	0
3:00	632	949	790	1,186	0	4	6	5	7	6	0	0	0	0	0
4:00	1,130	1,695	1,412	2,119	1,836	7	10	9	13	11	0	0	0	0	0
5:00	4,342	6,514	5,428	8,142	7,056	27	40	33	50	43	0	0	0	0	0
6:00	9,309	13,963	11,636	17,454	15,127	59	89	79	119	98	0	0	0	0	0
7:00	11,628	17,441	14,534	21,802	18,895	79	119	115	173	134	0	0	0	0	0
8:00	11,223	16,834	14,029	21,043	18,237	75	113	108	161	127	0	0	0	0	0
9:00	11,611	17,416	14,513	21,770	18,867	79	118	114	171	133	0	0	0	0	0
10:00	11,113	16,670	13,891	20,837	18,059	74	112	106	159	125	0	0	0	0	0
11:00	12,344	18,516	15,430	23,145	20,059	86	129	129	194	147	0	0	0	0	0
12:00	15,582	23,373	19,478	29,216	25,321	131	197	261	391	240	0	0	171	256	222
13:00	15,017	22,526	18,771	28,157	24,403	120	180	220	331	216	0	0	165	247	214
14:00	14,216	21,324	17,770	26,655	23,101	109	164	190	284	194	0	0	156	234	0
15:00	16,965	25,447	21,206	31,809	27,568	165	247	416	624	319	149	223	186	279	242
16:00	21,838	32,757	27,297	40,946	35,486	485	727	993	1,489	1,290	192	288	240	359	312
17:00	21,799	32,698	27,248	40,873	35,423	449	674	991	1,486	1,288	191	287	239	359	311
18:00	20,795	31,193	25,994	38,991	33,793	321	482	945	1,418	779	183	274	228	342	297
19:00	11,872	17,808	14,840	22,260	19,292	81	122	119	179	138	0	0	0	0	0
20:00	9,216	13,824	11,520	17,280	14,976	58	88	77	115	96	0	0	0	0	0
21:00	7,336	11,004	9,170	13,754	11,921	46	68	58	87	74	0	0	0	0	0
22:00	4,688	7,032	5,860	8,790	7,618	29	43	36	54	47	0	0	0	0	0
23:00	2,471	3,706	3,088	4,632	4,015	15	23	19	28	25	0	0	0	0	0
Daily	237,985	356,977	297,481	446,222	381,053	2,518	3,776	5,044	7,567	5,558	715	1,072	1,385	2,078	1,598



ENTRADA® - Environmental Traffic Data V's Output

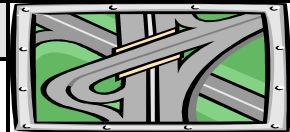


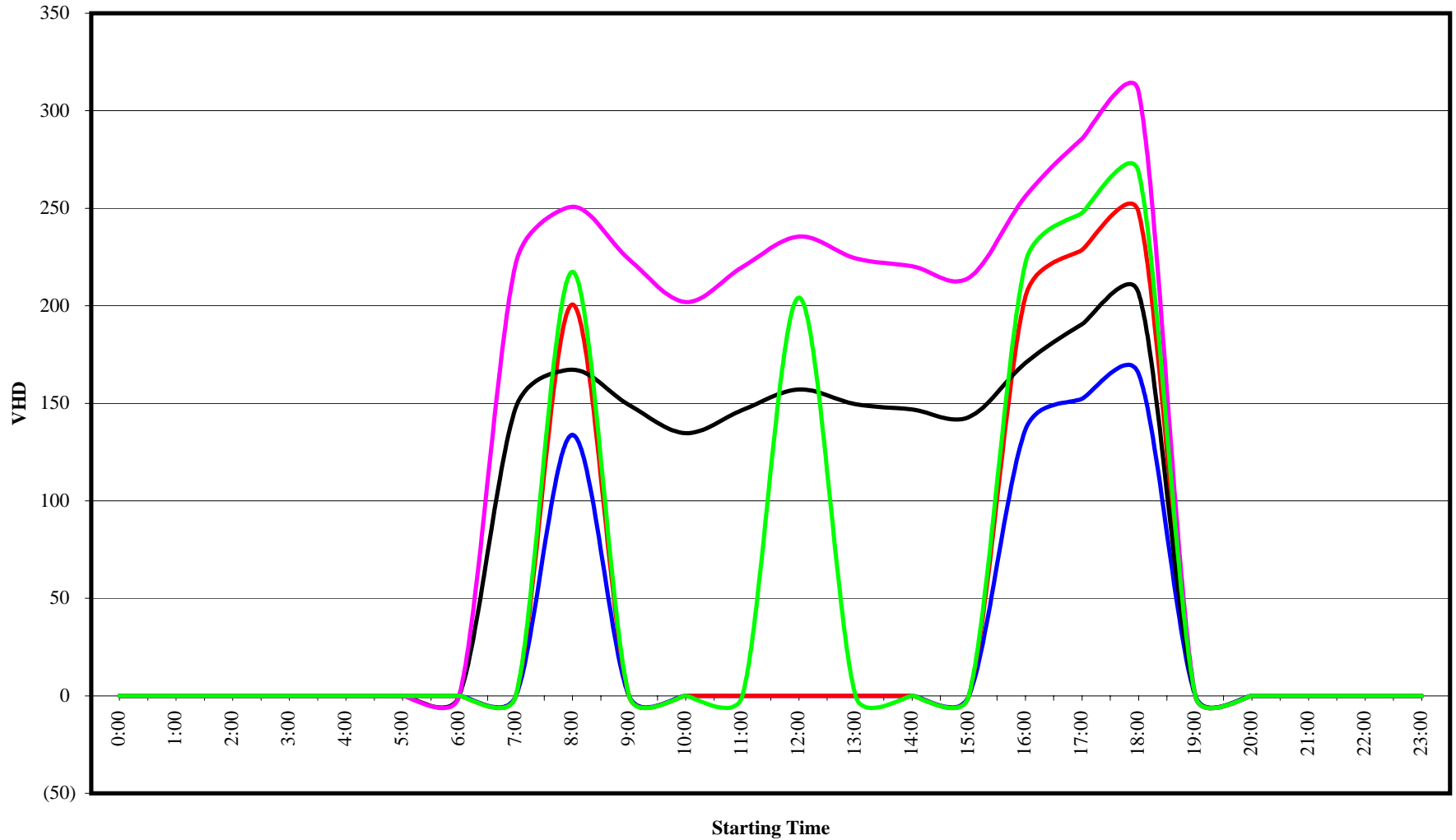
Table 1 - Sample
Widening alternative analysis

Starting Time	Vehicle Mile of Travel - VMT					Vehicle Hour of Travel - VHT					Vehicle Hour of Delay - VHD				
	Present	2015 Build	2015 No-bl'd	2030 Build	2030 No-bl'd	Present	2015 Build	2015 No-bl'd	2030 Build	2030 No-bl'd	Present	2015 Build	2015 No-bl'd	2030 Build	2030 No-bl'd
Two-way															
0:00	2,403	3,605	3,004	4,506	1,589	15	22	19	28	24	0	0	0	0	0
1:00	1,223	1,834	1,528	2,292	808	8	11	9	14	12	0	0	0	0	0
2:00	1,223	1,834	1,528	2,292	836	8	11	10	14	12	0	0	0	0	0
3:00	1,256	1,885	1,570	2,356	1,014	8	12	10	15	13	0	0	0	0	0
4:00	2,707	4,060	3,383	5,075	4,398	17	25	21	32	28	0	0	0	0	0
5:00	10,009	15,013	12,511	18,766	16,264	63	94	79	119	102	0	0	0	0	0
6:00	19,334	29,001	24,168	36,252	31,418	127	191	171	257	211	0	0	0	0	0
7:00	25,110	37,665	31,388	47,081	40,804	186	280	300	451	323	0	0	148	222	0
8:00	26,459	39,689	33,074	49,611	42,996	209	314	378	567	373	134	201	167	251	217
9:00	25,203	37,804	31,504	47,255	40,955	185	278	294	441	320	0	0	149	224	0
10:00	23,382	35,072	29,227	43,840	37,995	165	247	244	366	280	0	0	135	202	0
11:00	25,700	38,550	32,125	48,188	41,763	189	284	300	450	327	0	0	147	220	0
12:00	29,891	44,836	37,364	56,046	48,573	246	370	464	695	445	0	0	328	492	426
13:00	28,643	42,965	35,804	53,706	46,545	226	339	398	597	402	0	0	314	471	214
14:00	27,597	41,396	34,497	51,745	44,846	213	319	360	540	374	0	0	303	454	0
15:00	29,984	44,976	37,480	56,219	48,724	262	393	570	855	487	149	223	329	494	242
16:00	37,400	56,100	46,750	70,125	60,775	622	933	1,273	1,909	1,544	328	493	410	616	534
17:00	39,160	58,740	48,950	73,425	63,635	628	941	1,467	2,200	1,636	344	516	430	645	559
18:00	39,600	59,400	49,500	74,250	64,350	554	831	1,800	2,700	1,274	348	521	435	652	565
19:00	23,044	34,566	28,805	43,208	37,447	158	238	228	342	267	0	0	0	0	0
20:00	16,265	24,398	20,331	30,497	26,431	104	156	135	202	170	0	0	0	0	0
21:00	13,584	20,376	16,980	25,470	22,074	86	128	109	163	140	0	0	0	0	0
22:00	8,322	12,483	10,403	15,604	13,524	52	78	65	98	84	0	0	0	0	0
23:00	4,452	6,678	5,565	8,348	7,235	28	42	35	52	45	0	0	0	0	0
Daily	461,951	692,926	577,438	866,158	744,997	4,359	6,538	8,738	13,107	8,894	1,303	1,954	3,295	4,942	2,757

ENTRADA - Environmental Traffic Data Output (V/C)

Starting Time	Eastbound					Westbound					Two-way				
	Present	2015 Build	2015 No-bl'd	2030 Build	2030 No-bl'd	Present	2015 Build	2015 No-bl'd	2030 Build	2030 No-bl'd	Present	2015 Build	2015 No-bl'd	2030 Build	2030 No-bl'd
Volume-to-capacity (v/c)															
0:00	0.07	0.07	0.08	0.08	0.07	0.09	0.09	0.12	0.12	0.10	0.08	0.08	0.10	0.10	0.09
1:00	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.05	0.04	0.04	0.05	0.05	0.04
2:00	0.04	0.04	0.05	0.05	0.04	0.05	0.05	0.06	0.06	0.05	0.04	0.04	0.05	0.05	0.05
3:00	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.06	0.06	0.05	0.04	0.04	0.05	0.05	0.05
4:00	0.10	0.10	0.13	0.13	0.11	0.08	0.08	0.10	0.10	0.09	0.09	0.09	0.12	0.12	0.10
5:00	0.39	0.39	0.49	0.49	0.43	0.29	0.29	0.36	0.36	0.32	0.34	0.34	0.43	0.43	0.37
6:00	0.69	0.69	0.86	0.86	0.74	0.64	0.64	0.80	0.80	0.70	0.66	0.66	0.83	0.83	0.72
7:00	0.96	0.96	1.20	1.20	1.04	0.81	0.81	1.01	1.01	0.87	0.88	0.88	1.10	1.10	0.96
8:00	1.05	1.05	1.32	1.32	1.14	0.78	0.78	0.97	0.97	0.84	0.92	0.92	1.14	1.14	0.99
9:00	0.94	0.94	1.18	1.18	1.02	0.80	0.80	1.00	1.00	0.86	0.87	0.87	1.09	1.09	0.94
10:00	0.86	0.86	1.07	1.07	0.93	0.77	0.77	0.97	0.97	0.84	0.81	0.81	1.02	1.02	0.88
11:00	0.93	0.93	1.16	1.16	1.00	0.84	0.84	1.05	1.05	0.91	0.89	0.89	1.11	1.11	0.96
12:00	0.97	0.97	1.22	1.22	1.05	1.06	1.06	1.33	1.33	1.15	1.02	1.02	1.27	1.27	1.10
13:00	0.94	0.94	1.17	1.17	1.01	1.01	1.01	1.27	1.27	1.10	0.97	0.97	1.22	1.22	1.06
14:00	0.93	0.93	1.16	1.16	1.00	0.98	0.98	1.22	1.22	1.06	0.95	0.95	1.19	1.19	1.03
15:00	0.88	0.88	1.11	1.11	0.96	1.16	1.16	1.45	1.45	1.26	1.02	1.02	1.28	1.28	1.11
16:00	1.06	1.06	1.32	1.32	1.14	1.49	1.49	1.86	1.86	1.61	1.27	1.27	1.59	1.59	1.38
17:00	1.16	1.16	1.45	1.45	1.26	1.47	1.47	1.83	1.83	1.59	1.31	1.31	1.64	1.64	1.42
18:00	1.26	1.26	1.57	1.57	1.36	1.38	1.38	1.73	1.73	1.50	1.32	1.32	1.65	1.65	1.43
19:00	0.75	0.75	0.93	0.93	0.81	0.82	0.82	1.02	1.02	0.88	0.78	0.78	0.98	0.98	0.85
20:00	0.48	0.48	0.59	0.59	0.51	0.61	0.61	0.76	0.76	0.66	0.54	0.54	0.68	0.68	0.59
21:00	0.42	0.42	0.52	0.52	0.45	0.48	0.48	0.61	0.61	0.52	0.45	0.45	0.56	0.56	0.49
22:00	0.24	0.24	0.30	0.30	0.26	0.32	0.32	0.39	0.39	0.34	0.28	0.28	0.35	0.35	0.30
23:00	0.14	0.14	0.17	0.17	0.15	0.17	0.17	0.21	0.21	0.18	0.15	0.15	0.19	0.19	0.16

Vehicle Hour of Delay, VHD (Inbound)



□ NB

□ EB

— Present — 2015 Build — 2015 No-bld — 2030 Build — 2030 No-bld