S.R. 0001 SECTION RC3

Middletown Township and Langhorne Manor Borough
Bucks County

U.S. 1 FRONTAGE ROAD TRAFFIC ASSESSMENT TECHNICAL MEMORANDUM

JULY 2012

PREPARED FOR:
PENNSYLVANIA DEPARTMENT OF
TRANSPORTATION
DISTRICT 6-0
7000 GEERDES BOULEVARD
KING OF PRUSSIA, PA 19406-1525

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S.R. 0001, Section RC3, Bucks County, PA
July 2012

I. INTRODUCTION AND BACKGROUND

This technical memorandum documents the results of a traffic assessment of proposed safety improvements within the section of the U.S. 1 Corridor that contains a frontage road system in Middletown Township and the Borough of Langhorne Manor in Bucks County. The project map shown in Figure 1 illustrates the limits of the frontage road corridor study (shaded in yellow), which begin north of the S.R. 8067 (Penndel) interchange and end south of S.R. 0413 (Pine Street), for an overall length of two (2) miles. The entire length of two (2) service (frontage) roads along U.S 1 (S.R. 0001), T-679 and T-680, is included in the study area.

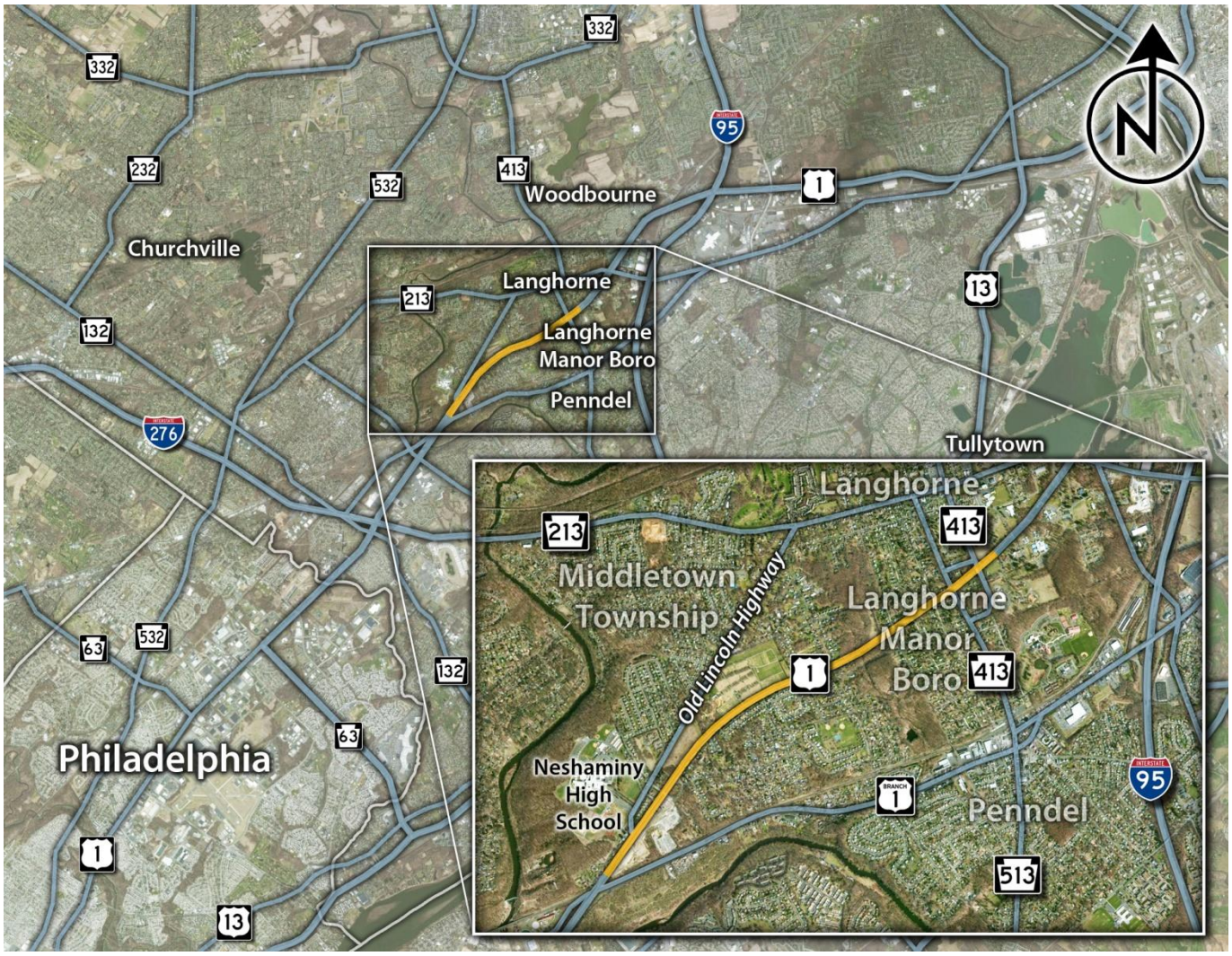

FIGURE 1 – PROJECT LOCATION MAP

This section of the U.S. 1 Corridor was originally part of the S.R. 0001, Section 03S project. PennDOT has divided the S.R. 0001, Section 03S projects into four (4) separate projects (Section LHB, Section RC1, Section RC2 and Section RC3) for reasons including type of improvements, size of projects, budgeting, funding & programming.

II. RELATIONSHIP TO EARLIER PROJECT DOCUMENTS

Due to a combination of transportation improvement projects (planned, programmed and/or under construction) and redevelopment that has occurred in the area surrounding the U.S. 1 Corridor, DVRPC performed a traffic study of the U.S. 1 Corridor and has developed traffic volume projections for the U.S. 1 Corridor from the City of Philadelphia/Bucks County line to the I-95 Interchange. These traffic projections were developed using DVRPC's current regional travel demand model and are contained in a document prepared by DVRPC titled, *US 1 Widening and Reconstruction Traffic Study*, dated August 2008.

Previously, JMT performed an engineering assessment of six (6) alternatives to improve the safety for disabled vehicles and emergency responders throughout this corridor. The final report of this engineering assessment, dated March 2011 last revised April 2011, is titled *U.S. 1 Frontage Road Corridor Assessment Report*. The traffic assessment documented in this technical memorandum evaluates the recommended alternative as the "Build" conditions.

III. EXISTING/NO-BUILD AND PROPOSED ROADWAY CONFIGURATIONS

Existing U.S. 1/Frontage Road System

There are currently two (2) 12-foot travel lanes in each direction on mainline U.S. 1, which are separated by a double-face guiderail median throughout the length of the project study area. Additionally, a one-lane frontage road parallels the U.S. 1 mainline in each direction to provide access to the local road network. The frontage roads are separated from the mainline travel lanes by a sixteen-foot wide raised concrete median island. This frontage road system extends from approximately 2500 feet north of the Penndel Interchange ramps on the south to the PA 413 bridge overpass on the north.

In addition to the beginning and ending points, access between the U.S. 1 mainline and the subject frontage roads is provided at cross-over locations, also called slip ramps, situated within the raised concrete median island. Throughout the length of the frontage road system, there are three (3) slip ramps between the U.S. 1 mainline and the frontage road in each direction. The approximate locations of these slip ramps are described in Table 1 below and illustrated in Figure 2.

Table 1. Existing Slip Ramps within Frontage Road System

Slip Ramp (Location)	Northbound	Southbound
Old Lincoln Highway (located south of Parkvale Avenue)	On-Ramp	Off-Ramp
Hulmeville Avenue (located between Hulmeville Road and Hulmeville Avenue)	Off-Ramp	On-Ramp
PA 413 (located between Station Avenue and Bellevue Avenue)	Off-Ramp	On-Ramp

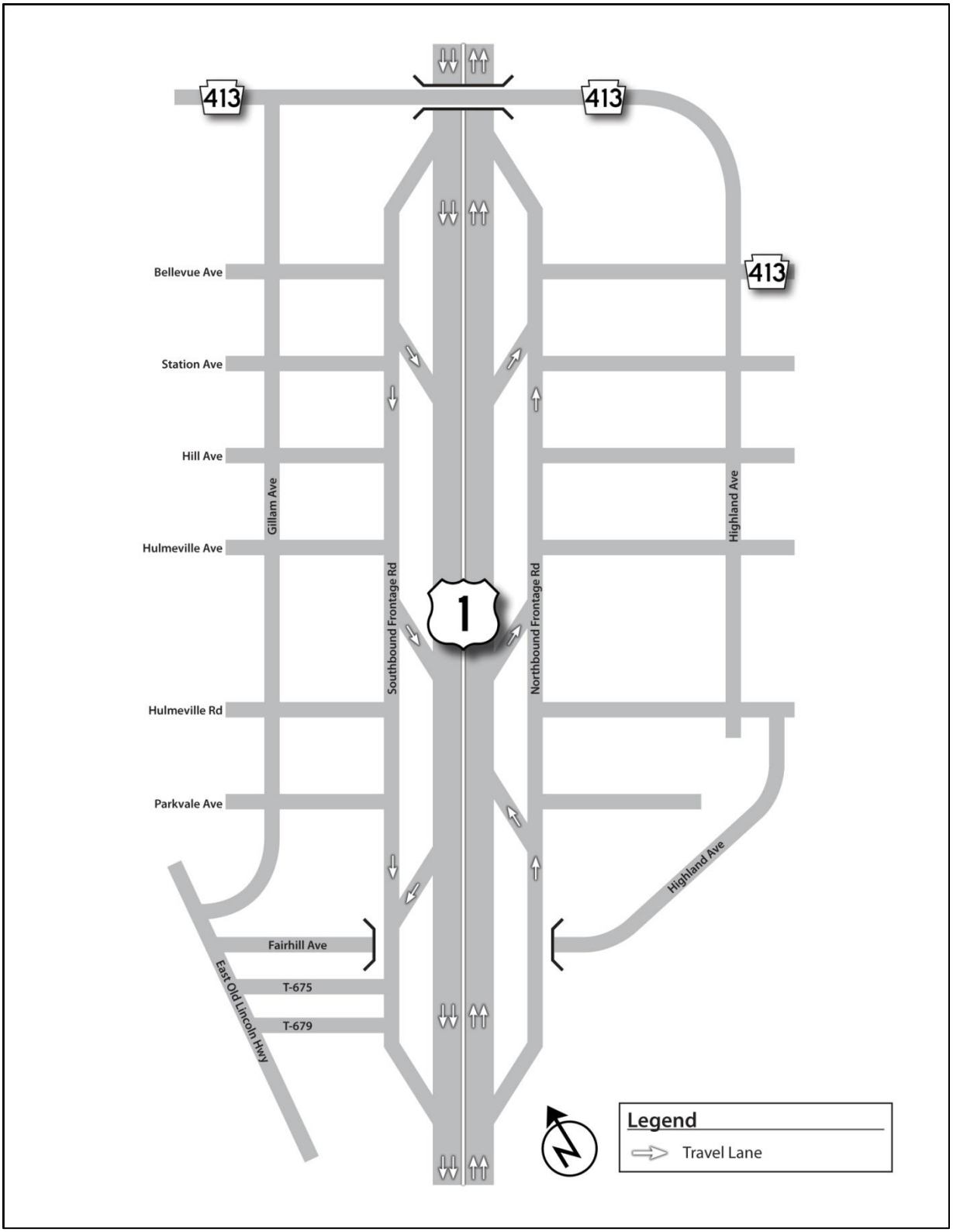

FIGURE 2 – EXISTING U.S. 1/FRONTAGE ROAD SYSTEM CONFIGURATION

Proposed U.S. 1/Frontage Road System

As discussed in the *U.S. 1 Frontage Road Corridor Assessment Report*, several improvement alternatives were considered and evaluated. In order to address the existing safety issues, it was recommended that in each direction the three (3) slip ramps between the mainline and frontage roads be removed along the entire length of the frontage road system. The proposed U.S. 1/Frontage Road system configuration is shown in Figure 3.

IV. TRAFFIC VOLUMES

Existing Traffic Volumes

JMT developed and conducted a traffic count program during April/May 2012 to obtain current AM and PM peak hour traffic volumes along the U.S. 1 mainline and the frontage road system. This count program consisted of peak period intersection manual turning movement (MTM) counts and automated traffic recorder (ATR) utilizing video recording equipment. The MTM and ATR count locations are shown on Figure 4.

MTM counts were performed on Tuesday, April 17, 2012 and Thursday, May 3, 2012 at several locations along the northbound and southbound frontage roads during the AM and PM peak periods (7-9am and 4-6pm). ATR counts collected 24-hour traffic volume data on the U.S. 1 mainline and the frontage roads in the vicinity of the Old Lincoln Highway slip ramps on Wednesday, May 2, 2012 and Thursday, May 3, 2012. Miovision video traffic recorders were utilized to collect this ATR data. The video data was then processed for three (3) vehicular classifications (passenger vehicles, including pickup trucks and SUV's; medium trucks and heavy trucks and buses).

Existing AM and PM peak hour traffic volumes were then determined from the count data and are shown in Figure 5. The traffic count data is contained in Appendix A.

Future Year 2035 Traffic Volume Projections

As previously noted, due to the extent of development/redevelopment of the land uses and planned transportation improvement projects within and adjacent to the project study area, all traffic forecasts were developed in cooperation with Delaware Valley Regional Planning Commission (DVRPC). Utilizing its regional travel demand model, DVRPC performed a traffic study of existing and future no-build and build scenarios to develop future 2035 year peak hour traffic link volumes. These forecasts are contained in a report prepared by DVRPC titled *US 1 Widening and Reconstruction Traffic Study*, dated August 2008. The DVRPC traffic volume forecasts are contained in Appendix B. (It should be noted that for the referenced DVRPC report, the build conditions included widening of the U.S. 1 corridor between the Street Road (S.R. 132) and Business Route 1 interchanges.)

JMT contacted DVRPC in June 2012 and verified that these forecasts are currently valid for the project area.

Utilizing the DVRPC link volume forecasts and the current year count data collected for this project, Year 2035 AM and PM peak hour volumes were then developed for the study area by JMT. These traffic volume projections for No-Build and proposed Build conditions are shown in Figure 6 and Figure 7, respectively.

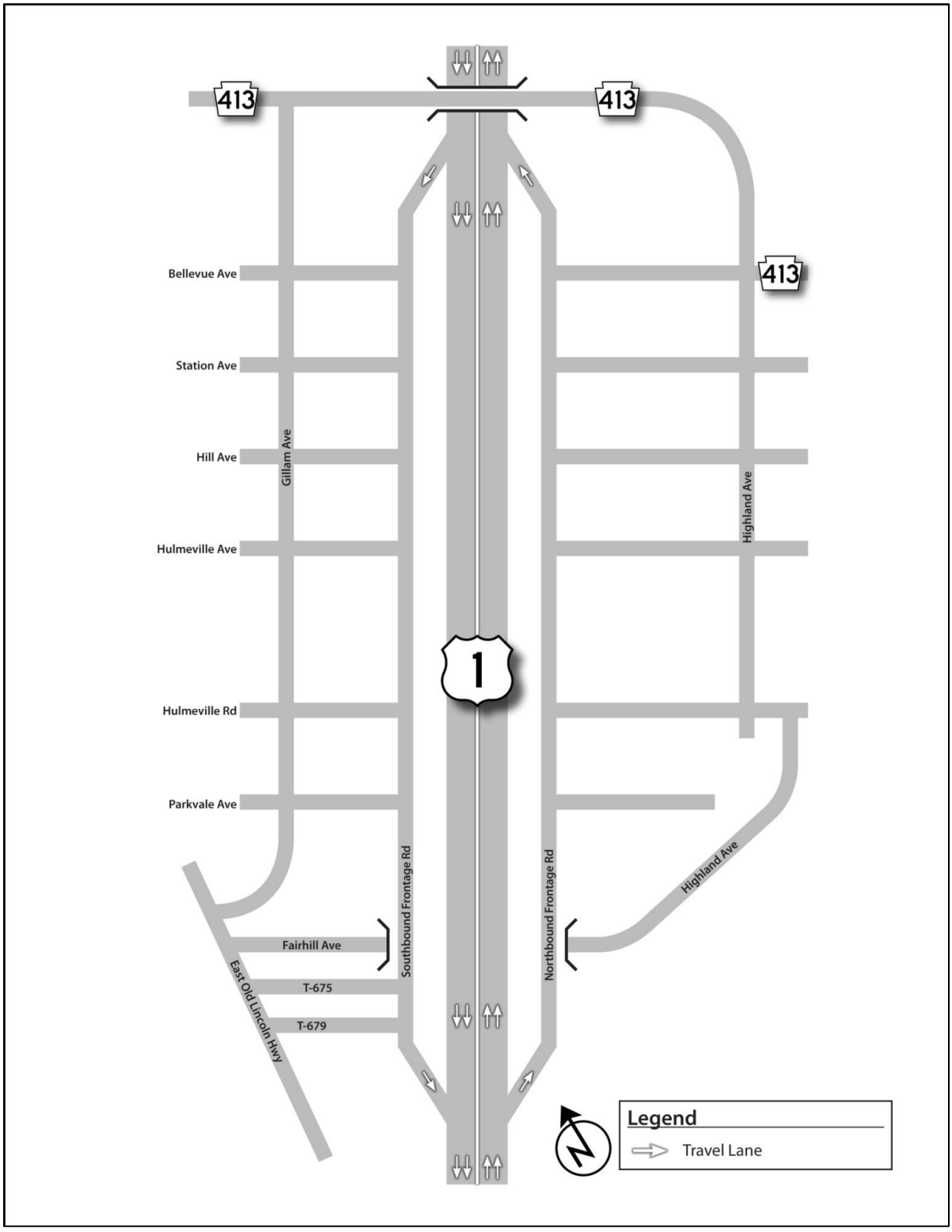

FIGURE 3 – PROPOSED U.S. 1/FRONTAGE ROAD SYSTEM CONFIGURATION

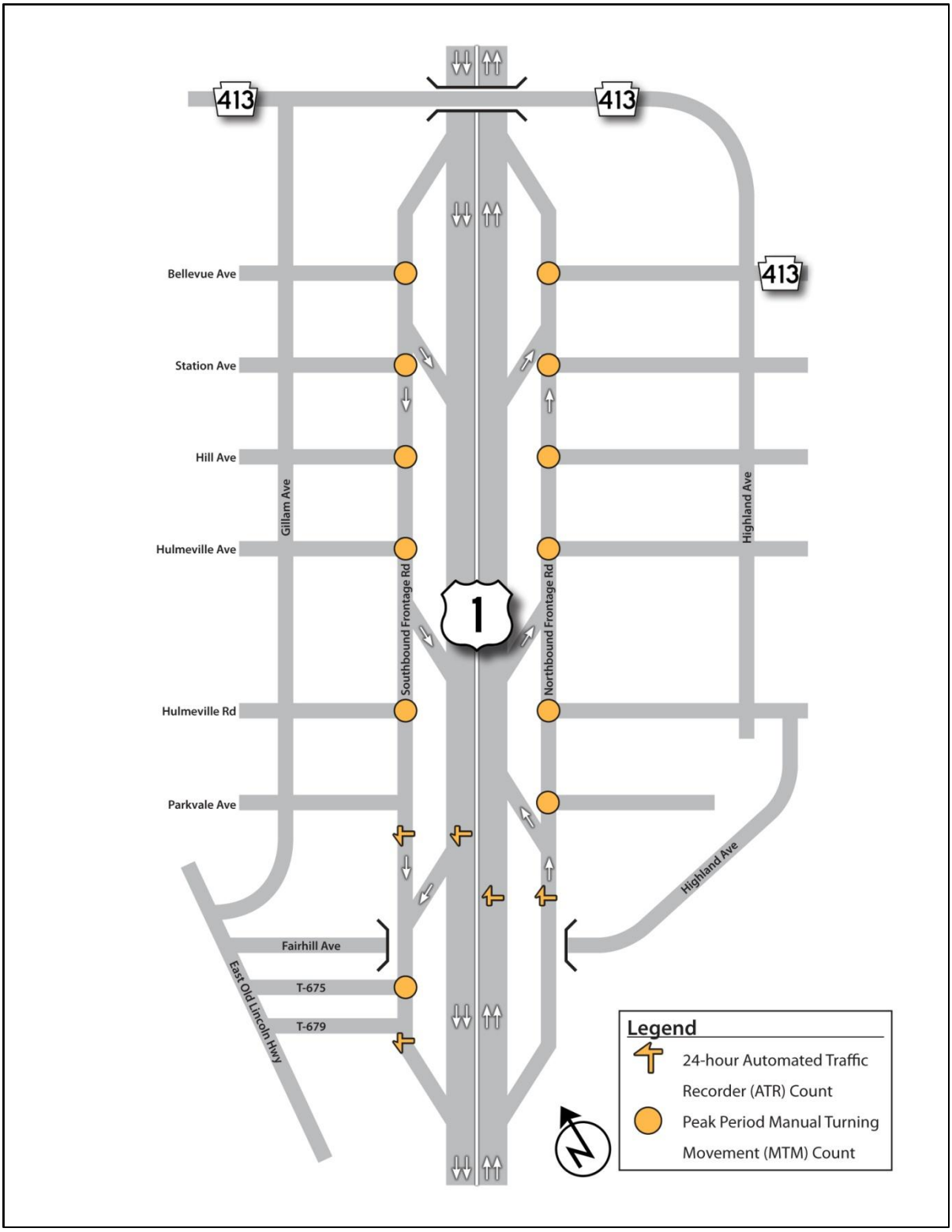

FIGURE 4 – TRAFFIC DATA COUNT LOCATIONS

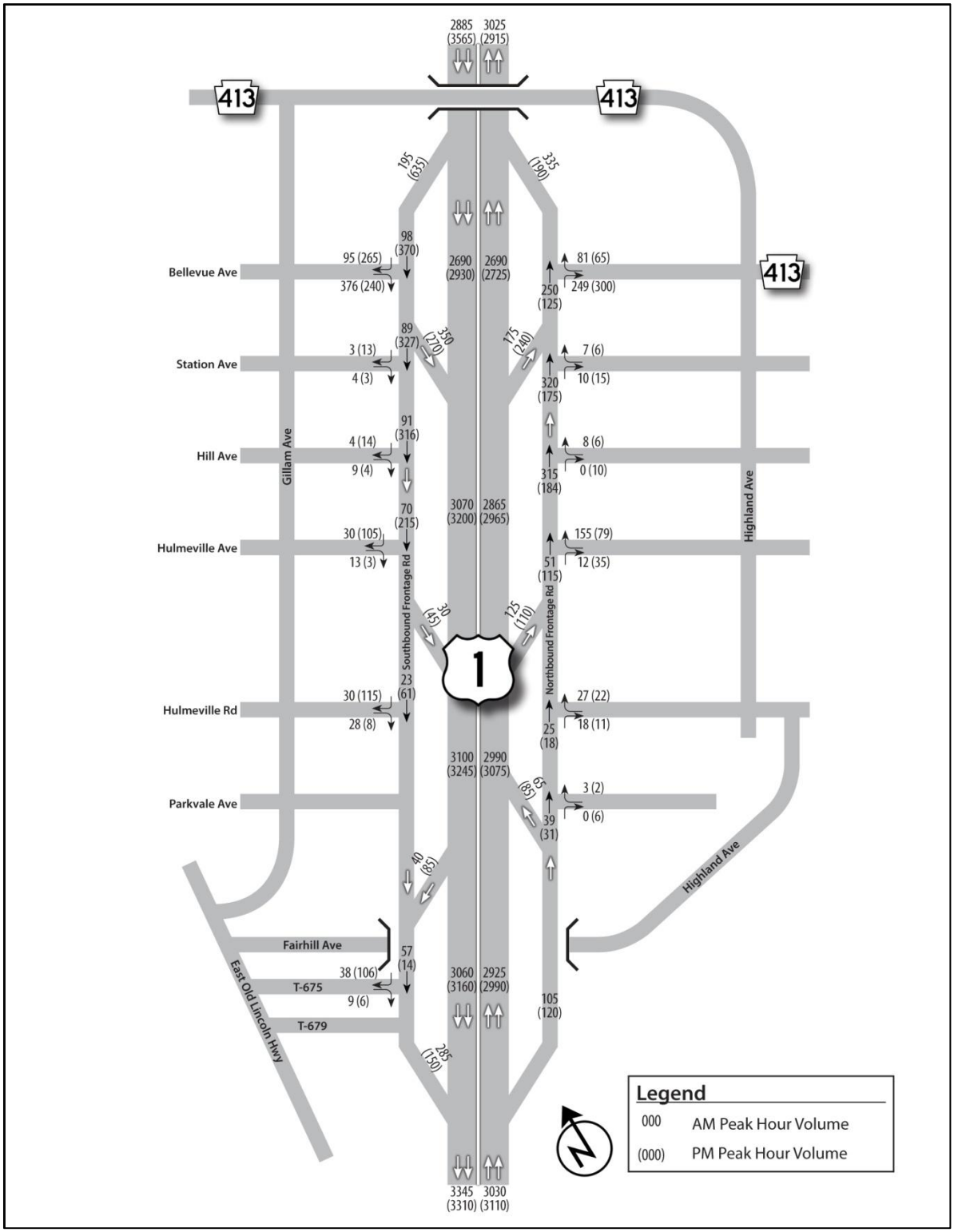

FIGURE 5 – EXISTING TRAFFIC VOLUMES

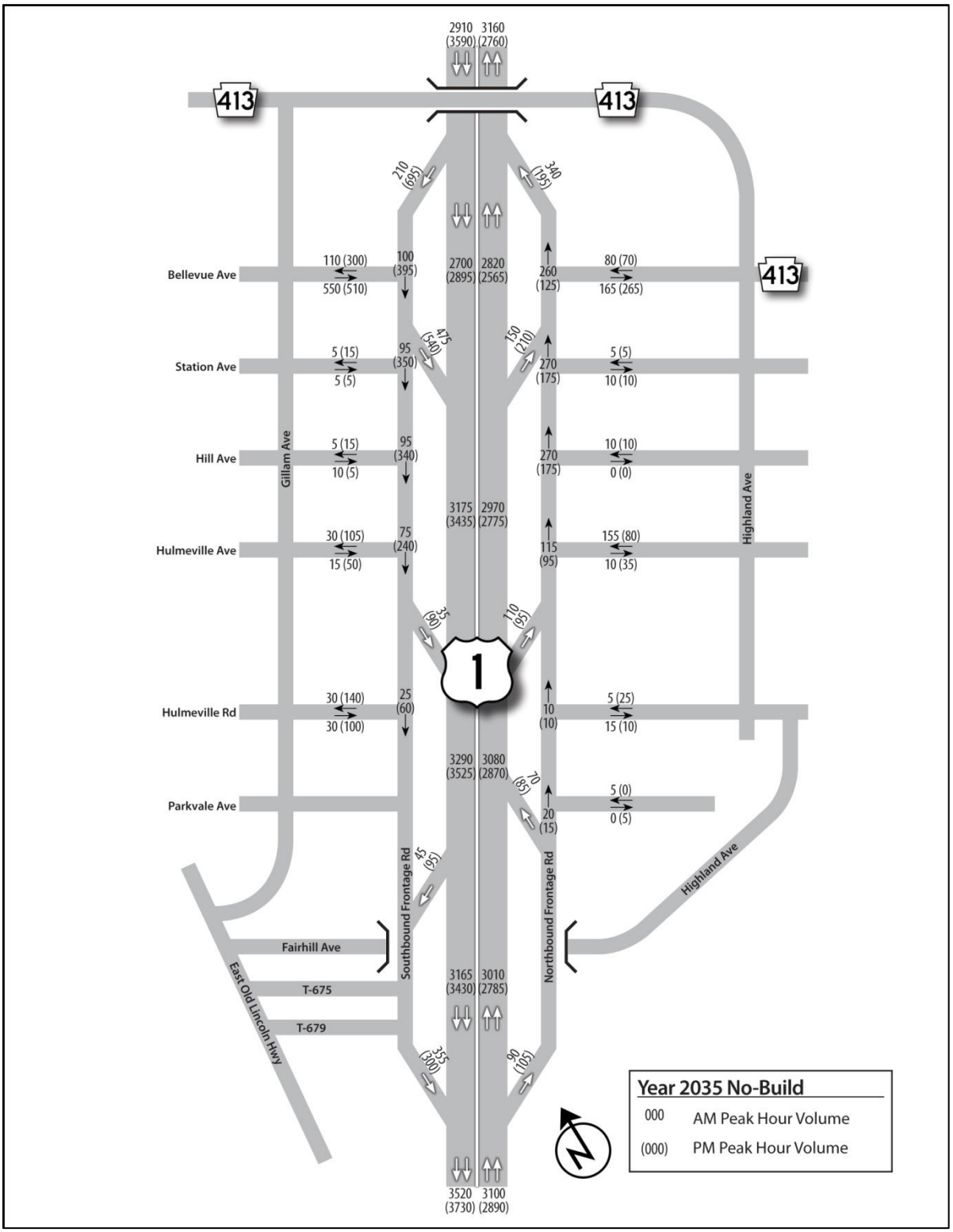

FIGURE 6 – YEAR 2035 NO-BUILD AM/PM PEAK HOUR TRAFFIC VOLUMES

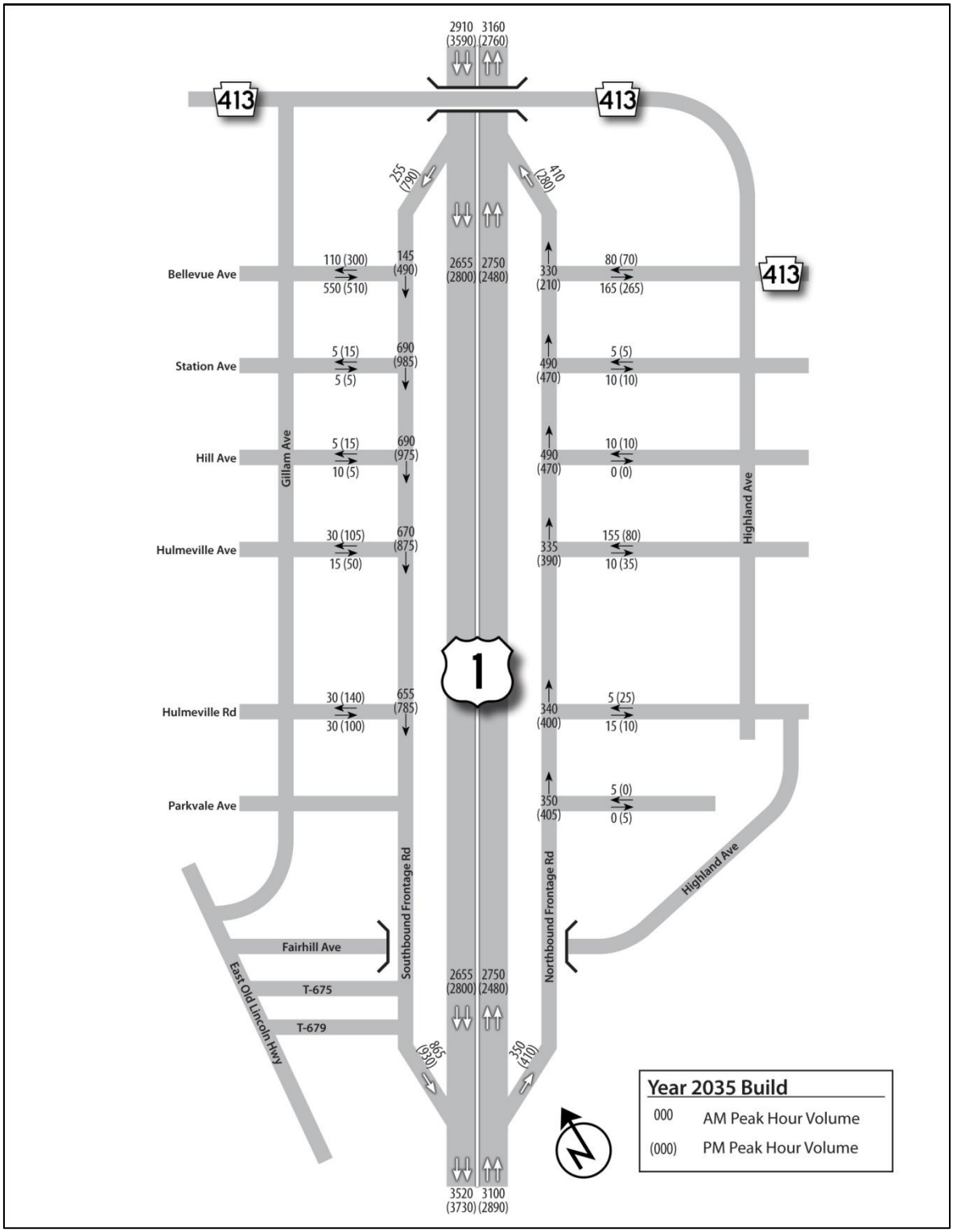

FIGURE 7 – YEAR 2035 BUILD AM/PM PEAK HOUR TRAFFIC VOLUMES

V. CAPACITY ANALYSES/LEVELS OF SERVICE (LOS)

Traffic analyses were performed for the existing, no-build and proposed build scenarios. These analyses consisted of:

- Basic Freeway (Expressway) analyses of the U.S. 1 mainline,
- Ramp Merge/Diverge analyses of the slip ramps along the U.S. 1/Frontage Road system, and
- Unsignalized Intersection capacity analyses of several of the intersections along the frontage roads.

The Basic Freeway and Ramp Merge/Diverge analyses were performed using the Highway Capacity Software Version 6.1. The Unsignalized Intersection analyses utilized the Synchro/SimTraffic Version 7, which implements the methodology of the 2000 HCM. A summary of the results of these analyses are discussed below and presented in Table 2 (Freeway/Expressway Sections), Table 3 (Ramp Merges/Diverges) and Table 4 (Frontage Road Intersections).

As shown in the tables below, the northbound U.S. 1 freeway sections and merge/diverge areas with the existing slip ramps currently operate at LOS D or better. Southbound U.S. 1 operates mainly at LOS D but there are three (3) areas that currently experience LOS E conditions. The freeway sections that operate at LOS E are south of the Frontage Road section in the AM peak and north of the Frontage Road in the PM peak. Also at LOS E in the southbound direction is the diverging ramp section at the beginning of the Frontage Road in the PM peak.

It should be noted that the DVRPC traffic projections result in an increase in southbound U.S. 1 volumes while the northbound volumes either decrease or remain close to the existing volumes. Therefore, in general, there is a degradation in LOS in the southbound direction for future Year 2035 conditions.

The northbound U.S. 1 freeway/expressway mainline and merge/diverge areas with the slip ramps are expected operate at LOS D or better under Year 2035 No-Build or proposed Build scenarios. In Year 2035, the southbound U.S. 1 mainline is anticipated to operate mainly at LOS D during the AM peak hours; however, during the PM peak hour, five (5) of the six (6) existing sections of the southbound U.S. 1 mainline will operate at LOS E and three (3) of five (5) slip ramp merge/diverge areas are also expected to operate at LOS E.

Since the proposed build configuration removes the three (3) slip ramps in each direction from the center of the Frontage Road section, there are fewer freeway sections and merge/diverge areas. Under the proposed Build scenario, these northbound and southbound freeway sections would continue to operate at LOS D or better in both the AM and PM peaks. The slip ramp merge/diverge areas would operate at LOS D or better for both northbound ramps in both peaks while the southbound ramps would operate at LOS D in the AM peak but LOS E in the PM peak.

The results of the intersection analyses (Table 4) show that all intersections along the northbound frontage road currently operate at LOS B or better and will continue to operate as such under Year 2035 No-Build or proposed Build conditions. The intersections along the southbound frontage road currently operate at LOS C or better during the AM and PM peak hours. Under Year 2035 No-Build conditions, all intersections along the

southbound frontage road would be expected to operate at LOS C or better, except at the intersection with Bellevue Avenue; this intersection would operate at LOS D in the AM peak hour and LOS F in the PM peak hour.

As shown in the project traffic volumes for the proposed build conditions, traffic volumes along the frontage roads will increase since all local traffic will need to exit the U.S. 1 mainline at the beginning of the frontage road and will not enter the U.S. 1 mainline until the end of the frontage road. Without any modification of intersection configurations (e.g. added turn lane from the frontage road), this would result in LOS E or LOS F conditions at three (3) unsignalized intersections on the southbound frontage road during the PM peak hour:

- Bellevue Avenue
- Hulmeville Avenue
- Hulmeville Road

It should also be noted that during the AM peak hour under the proposed Build scenario, the Bellevue intersection will also experience LOS E conditions.

TABLE 2. CAPACITY ANALYSIS OF BASIC FREEWAY/EXPRESSWAY SECTIONS

FREEWAY/EXPRESSWAY SECTIONS	EXISTING		2035 NO-BUILD		2035 BUILD	
	AM	PM	AM	PM	AM	PM
NORTHBOUND U.S. 1						
South of frontage road (Sta. 150+00)	D	D	D	D	D	D
South end of frontage road to Old Lincoln Hwy (Sta 150+00 to Sta 192+00)	D	D	D	D	D	C
Old Lincoln Hwy to Hulmeville Ave (Sta 192+00 to Sta 232+00)	D	D	D	D		
Hulmeville Ave to Bellevue Ave (Sta 232+00 to Sta 252+00)	D	D	D	D		
Bellevue Ave to north end of frontage road (Sta 252+00 to Sta 262+00)	D	C	D	C		
North of frontage road (Sta 262+00)	D	D	D	D	D	D
SOUTHBOUND U.S. 1						
South of frontage road system (Sta. 150+00)	E	D	E	E	E	E
South end of frontage road to Old Lincoln Hwy (Sta 150+00 to Sta 180+00)	D	D	D	E	D	D
Old Lincoln Hwy to Hulmeville Ave (Sta. 180+00 to Sta. 230+00)	D	D	D	E		
Hulmeville Ave to Bellevue Ave (Sta. 230+00 to Sta. 250+00)	D	D	D	E		
Bellevue Ave to north end of frontage road (Sta 250+00 to Sta 265+00)	D	D	D	D		
North of frontage road system (Sta 265+00)	D	E	D	E	D	E

TABLE 3. CAPACITY ANALYSIS OF RAMP MERGES/DIVERGES

RAMP MERGES/DIVERGES – Slip Ramps between S.R. 0001 and Frontage Roads	EXISTING		2035 NO-BUILD		2035 BUILD	
	AM	PM	AM	PM	AM	PM
NORTHBOUND U.S. 1						
Beginning of Frontage Road (Off-ramp @ Sta 150+00)	D	D	D	D	D	D
Old Lincoln Hwy Slip Ramp (On-ramp @ Sta 192+00)	C	C	C	C	--	--
Hulmeville Ave Slip Ramp (Off-ramp @ Sta 232+00)	D	D	D	C	--	--
Bellevue Ave Slip Ramp (Off-ramp @ Sta 252+00)	C	D	D	C	--	--
End of Frontage Road (On-ramp @ Sta 262+00)	D	D	D	C	D	C
SOUTHBOUND U.S. 1						
End of Frontage Road (On-ramp @ Sta. 150+00)	D	D	D	E	D	E
Old Lincoln Hwy Slip Ramp (Off-ramp @ Sta. 182+00)	D	D	D	E	--	--
Hulmeville Ave Slip Ramp (On-ramp @ Sta. 232+00)	D	D	D	D	--	--
Bellevue Ave Slip Ramp (On-ramp @ Sta. 250+00)	D	D	D	D	--	--
Beginning of Frontage Road (Off-ramp @ Sta 265+00)	D	E	D	E	D	E

TABLE 4. CAPACITY ANALYSIS OF FRONTAGE ROAD INTERSECTIONS

INTERSECTIONS – Service Roads and Side Streets	EXISTING		2035 NO-BUILD		2035 BUILD	
	AM	PM	AM	PM	AM	PM
NORTHBOUND FRONTAGE ROAD (T-680)						
T-680 (NB Frontage Road) and T-336 (Parkvale Ave)	A	A	A	A	B	A
T-680 (NB Frontage Road) and S.R. 2027 (Hulmeville Rd)	A	A	A	A	B	B
T-680 (NB FrontageRoad) and S.R. 2047 (Hulmeville Ave)	A	A	B	A	B	B
T-680 (NB Frontage Road) and Hill Avenue	B	A	B	A	B	B
T-680 (NB Frontage Road) and Station Avenue	B	A	B	A	B	B
T-680 (NB Frontage Road) and S.R. 2049 (Bellevue Ave)	B	B	B	B	B	B
SOUTHBOUND FRONTAGE ROAD (T-679)						
T-679 (SB Frontage Road) and T-675 (Service Rd)	A	A	A	A	A	A
T-679 (SB Frontage Road) and T-336 (Parkvale Ave)	A	A	A	A	A	A
T-679 (SB Frontage Road) and S.R. 2027 (Hulmeville Rd)	A	A	A	B	C	F
T-679 (SB Frontage Road) and S.R. 2047 (Hulmeville Ave)	A	A	A	B	C	E
T-679 (SB Frontage Road) and Hill Avenue	A	B	A	B	B	C
T-679 (SB Frontage Road) and Station Avenue	A	B	A	B	B	C
T-679 (SB Frontage Road) and S.R. 2049 (Bellevue Ave)	B	C	D	F	E	F

VI. SUMMARY

The traffic assessment performed to evaluate the removal of the slip ramps along the U.S. 1/ Frontage Road system showed the following:

- The northbound U.S. 1 mainline will operate at LOS D or better under all scenarios.
- Under Year 2035 No-Build conditions, the southbound U.S. 1 mainline will operate at LOS E throughout most of the study area. Under proposed Build conditions, removal of the slip ramps within the frontage road section would improve mainline operations to LOS D.
- In Year 2035, under either No-Build or proposed Build conditions, the diverge at the beginning and the merge at the end of the southbound frontage road will operate at LOS D in the AM peak hour and LOS E in the PM peak hour. The northbound frontage road ramps will operate at LOS D or better under all conditions.

- Under Year 2035 No-Build conditions, the intersection of Bellevue Avenue with the southbound frontage road will operate at LOS D and LOS F conditions in the AM and PM peak hours, respectively. The proposed reconfiguration of the frontage road system would result in LOS E and LOS F during the AM and PM peak hours at this intersection. Also under the proposed build conditions, the Hulmeville Avenue and Hulmeville Road intersections with the southbound frontage road would experience LOS E or LOS F conditions, respectively.

Appendix A

Traffic Count Data

Intersection Manual Turning Movement (MTM) Counts

Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: NB Frontage Rd & Parkvale Ave
Date: 04/17/2012
Counter(s): Stanley Chen

File Name : NB1 F-Rd_Parkvale Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Eastbound					Parkvale Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	11	0	11	0	2	1	0	3	0	0	0	0	0	14
07:15 AM	0	0	0	0	0	0	0	9	0	9	0	1	2	0	3	0	0	0	0	0	12
07:30 AM	0	0	0	0	0	0	0	9	0	9	0	5	3	0	8	0	0	0	0	0	17
07:45 AM	0	0	0	0	0	0	0	11	0	11	0	8	5	0	13	0	0	0	0	0	24
Total	0	0	0	0	0	0	0	40	0	40	0	16	11	0	27	0	0	0	0	0	67
08:00 AM	0	0	0	0	0	0	0	5	0	5	0	8	3	0	11	0	0	0	0	0	16
08:15 AM	0	0	0	0	0	0	0	5	0	5	0	5	3	0	8	0	0	0	0	0	13
08:30 AM	0	0	0	0	0	0	0	6	0	6	0	8	7	0	15	0	0	0	0	0	21
08:45 AM	0	0	0	0	0	0	0	4	0	4	0	5	1	0	6	0	0	0	0	0	10
Total	0	0	0	0	0	0	0	20	0	20	0	26	14	0	40	0	0	0	0	0	60
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	5	0	5	0	3	3	0	6	1	0	0	0	1	12
04:15 PM	0	0	0	0	0	0	0	3	0	3	0	7	3	0	10	0	0	0	0	0	13
04:30 PM	0	0	0	0	0	0	0	8	0	8	0	4	3	0	7	0	0	0	0	0	15
04:45 PM	0	0	0	0	0	0	0	6	0	6	0	4	2	0	6	0	0	0	0	0	12
Total	0	0	0	0	0	0	0	22	0	22	0	18	11	0	29	1	0	0	0	1	52
05:00 PM	0	0	0	0	0	0	0	4	0	4	0	3	3	0	6	0	0	0	0	0	10
05:15 PM	0	0	0	0	0	0	0	6	0	6	0	3	5	0	8	0	0	0	0	0	14
05:30 PM	0	0	0	0	0	0	0	7	0	7	0	7	1	0	8	0	0	0	0	0	15
05:45 PM	0	0	0	0	0	0	0	2	0	2	0	5	5	0	10	0	0	0	0	0	12
Total	0	0	0	0	0	0	0	19	0	19	0	18	14	0	32	0	0	0	0	0	51
Grand Total	0	0	0	0	0	0	0	101	0	101	0	78	50	0	128	1	0	0	0	1	230
Apprch %	0	0	0	0		0	0	100	0		0	60.9	39.1	0		100	0	0	0		
Total %	0	0	0	0	0	0	0	43.9	0	43.9	0	33.9	21.7	0	55.7	0.4	0	0	0	0.4	
Pass Vehicles	0	0	0	0	0	0	0	101	0	101	0	78	50	0	128	1	0	0	0	1	230
% Pass Vehicles	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	100	0	0	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Johnson, Mirmiran & Thompson, Inc.

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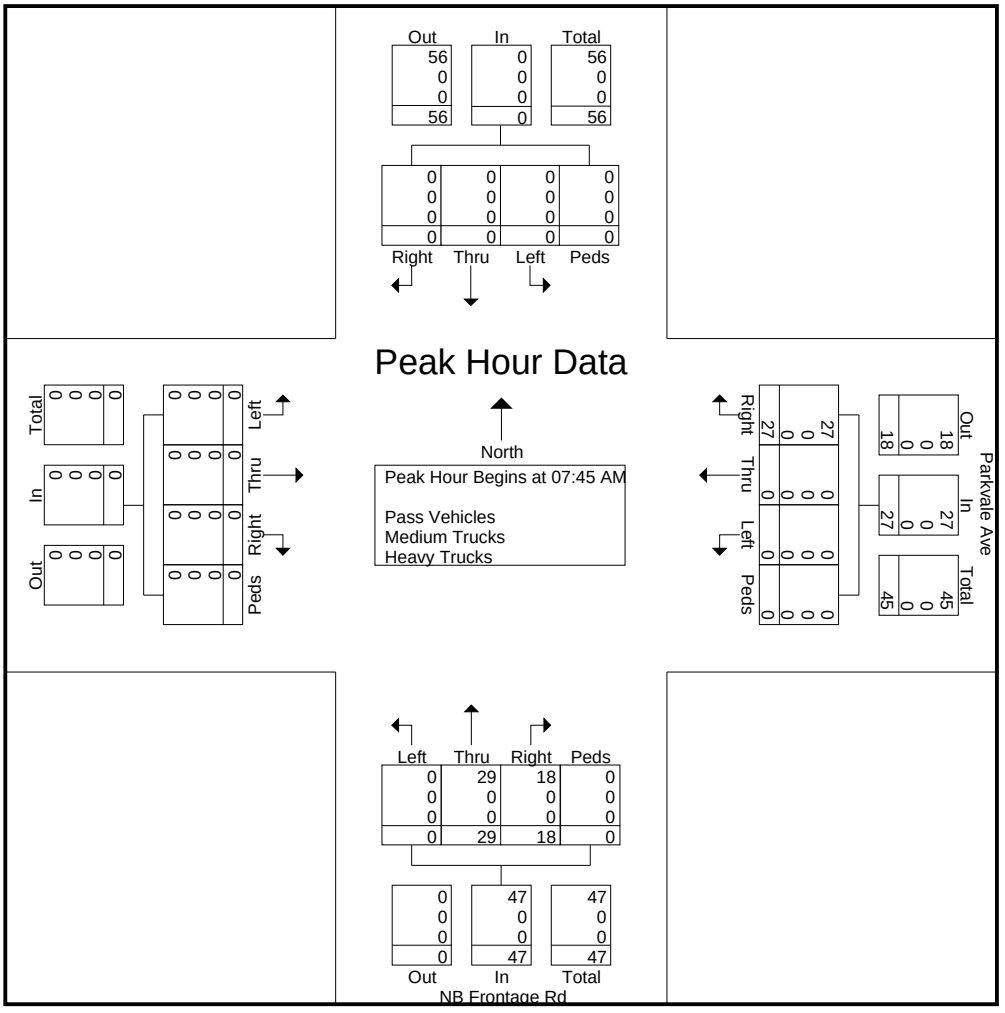
	Eastbound					Parkvale Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	**11**	0	**11**	0	**8**	5	0	13	0	0	0	0	0	**24**
08:00 AM	0	0	0	0	0	0	0	5	0	5	0	8	3	0	11	0	0	0	0	0	16
08:15 AM	0	0	0	0	0	0	0	5	0	5	0	5	3	0	8	0	0	0	0	0	13
08:30 AM	0	0	0	0	0	0	0	6	0	6	0	8	**7**	0	**15**	0	0	0	0	0	21
Total Volume	0	0	0	0	0	0	0	27	0	27	0	29	18	0	47	0	0	0	0	0	74
% App. Total	0	0	0	0		0	0	100	0		0	61.7	38.3	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.614	.000	.614	.000	.906	.643	.000	.783	.000	.000	.000	.000	.000	.771
Pass Vehicles																					
% Pass Vehicles	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	0	0	0	0	0	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



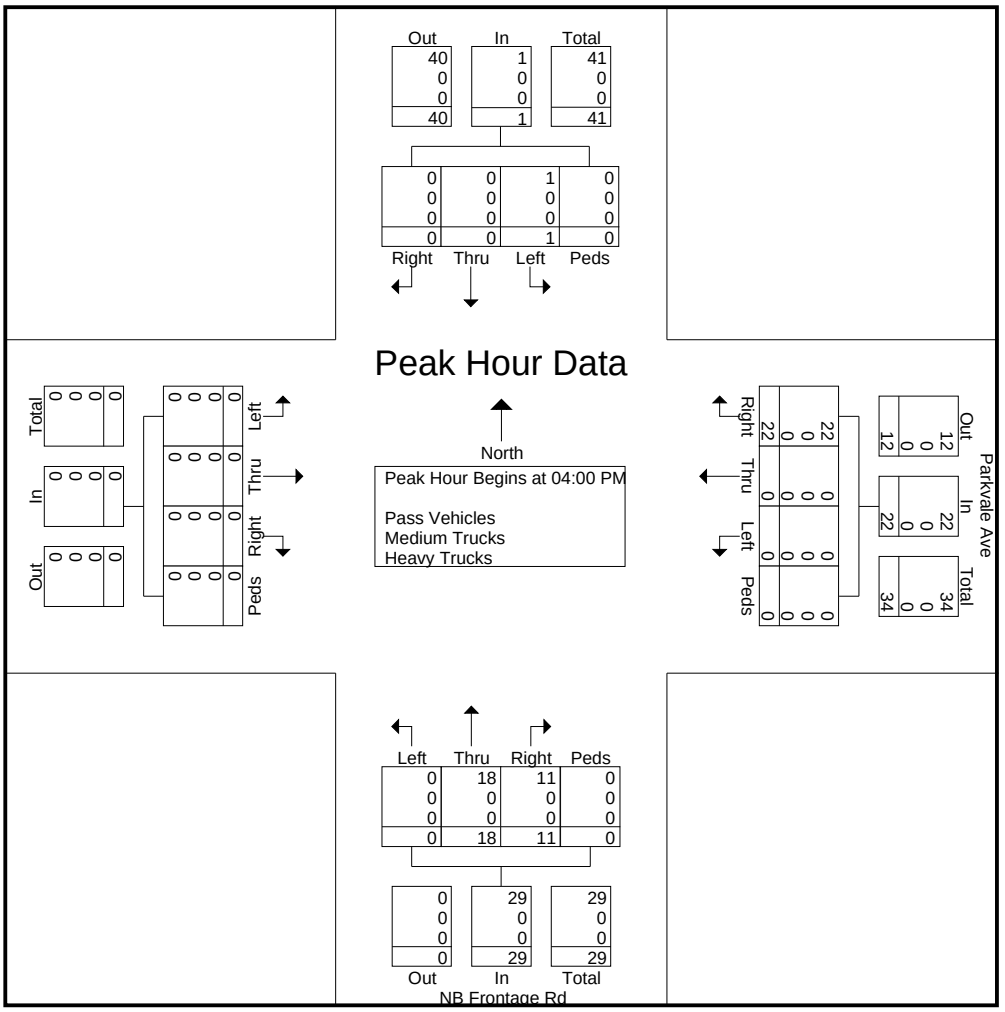
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: NB Frontage Rd & Parkvale Ave
Date: 04/17/2012
Counter(s): Stanley Chen

File Name : NB1 F-Rd_Parkvale Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Eastbound					Parkvale Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	5	0	5	0	3	**3**	0	6	**1**	0	0	0	**1**	12
04:15 PM	0	0	0	0	0	0	0	3	0	3	0	**7**	3	0	**10**	0	0	0	0	0	13
04:30 PM	0	0	0	0	0	0	0	**8**	0	**8**	0	4	3	0	7	0	0	0	0	0	**15**
04:45 PM	0	0	0	0	0	0	0	6	0	6	0	4	2	0	6	0	0	0	0	0	12
Total Volume	0	0	0	0	0	0	0	22	0	22	0	18	11	0	29	1	0	0	0	1	52
% App. Total	0	0	0	0		0	0	100	0		0	62.1	37.9	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.688	.000	.688	.000	.643	.917	.000	.725	.250	.000	.000	.000	.250	.867
Pass Vehicles																					
% Pass Vehicles	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	100	0	0	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hulmeville Rd
Date: 04/17/2012
Counter(s): Ed McFadden

File Name : NB2 F-Rd_Hulmeville Rd
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Eastbound					Hulmeville Rd Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	11	0	11	0	2	1	0	3	0	0	0	0	0	14
07:15 AM	0	0	0	0	0	0	0	9	0	9	0	1	2	0	3	0	0	0	0	0	12
07:30 AM	0	0	0	0	0	0	0	9	0	9	0	5	3	0	8	0	0	0	0	0	17
07:45 AM	0	0	0	0	0	0	0	11	0	11	0	8	5	0	13	0	0	0	0	0	24
Total	0	0	0	0	0	0	0	40	0	40	0	16	11	0	27	0	0	0	0	0	67
08:00 AM	0	0	0	0	0	0	0	5	0	5	0	8	3	0	11	0	0	0	0	0	16
08:15 AM	0	0	0	0	0	0	0	5	0	5	0	5	3	0	8	0	0	0	0	0	13
08:30 AM	0	0	0	0	0	0	0	6	0	6	0	8	7	0	15	0	0	0	0	0	21
08:45 AM	0	0	0	0	0	0	0	4	0	4	0	5	1	0	6	0	0	0	0	0	10
Total	0	0	0	0	0	0	0	20	0	20	0	26	14	0	40	0	0	0	0	0	60
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	5	0	5	0	3	3	0	6	1	0	0	0	1	12
04:15 PM	0	0	0	0	0	0	0	3	0	3	0	7	3	0	10	0	0	0	0	0	13
04:30 PM	0	0	0	0	0	0	0	8	0	8	0	4	3	0	7	0	0	0	0	0	15
04:45 PM	0	0	0	0	0	0	0	6	0	6	0	4	2	0	6	0	0	0	0	0	12
Total	0	0	0	0	0	0	0	22	0	22	0	18	11	0	29	1	0	0	0	1	52
05:00 PM	0	0	0	0	0	0	0	4	0	4	0	3	3	0	6	0	0	0	0	0	10
05:15 PM	0	0	0	0	0	0	0	6	0	6	0	3	5	0	8	0	0	0	0	0	14
05:30 PM	0	0	0	0	0	0	0	7	0	7	0	7	1	0	8	0	0	0	0	0	15
05:45 PM	0	0	0	0	0	0	0	2	0	2	0	5	5	0	10	0	0	0	0	0	12
Total	0	0	0	0	0	0	0	19	0	19	0	18	14	0	32	0	0	0	0	0	51
Grand Total	0	0	0	0	0	0	0	101	0	101	0	78	50	0	128	1	0	0	0	1	230
Apprch %	0	0	0	0		0	0	100	0		0	60.9	39.1	0		100	0	0	0		
Total %	0	0	0	0	0	0	0	43.9	0	43.9	0	33.9	21.7	0	55.7	0.4	0	0	0	0.4	
Pass Vehicles	0	0	0	0	0	0	0	101	0	101	0	78	50	0	128	1	0	0	0	1	230
% Pass Vehicles	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	100	0	0	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

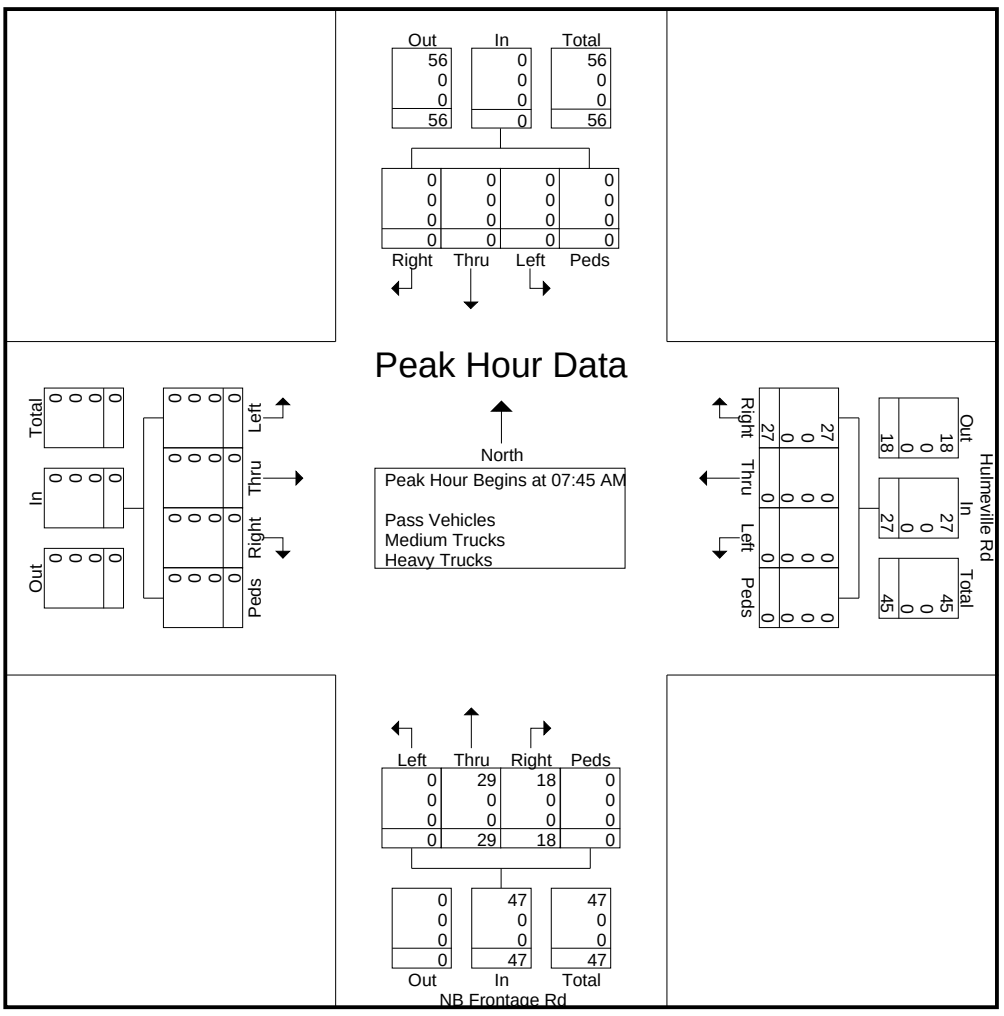
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hulmeville Rd
Date: 04/17/2012
Counter(s): Ed McFadden

File Name : NB2 F-Rd_Hulmeville Rd
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Eastbound					Hulmeville Rd Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	**11**	0	**11**	0	**8**	5	0	13	0	0	0	0	0	**24**
08:00 AM	0	0	0	0	0	0	0	5	0	5	0	8	3	0	11	0	0	0	0	0	16
08:15 AM	0	0	0	0	0	0	0	5	0	5	0	5	3	0	8	0	0	0	0	0	13
08:30 AM	0	0	0	0	0	0	0	6	0	6	0	8	**7**	0	**15**	0	0	0	0	0	21
Total Volume	0	0	0	0	0	0	0	27	0	27	0	29	18	0	47	0	0	0	0	0	74
% App. Total	0	0	0	0		0	0	100	0		0	61.7	38.3	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.614	.000	.614	.000	.906	.643	.000	.783	.000	.000	.000	.000	.000	.771
Pass Vehicles																					
% Pass Vehicles	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	0	0	0	0	0	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



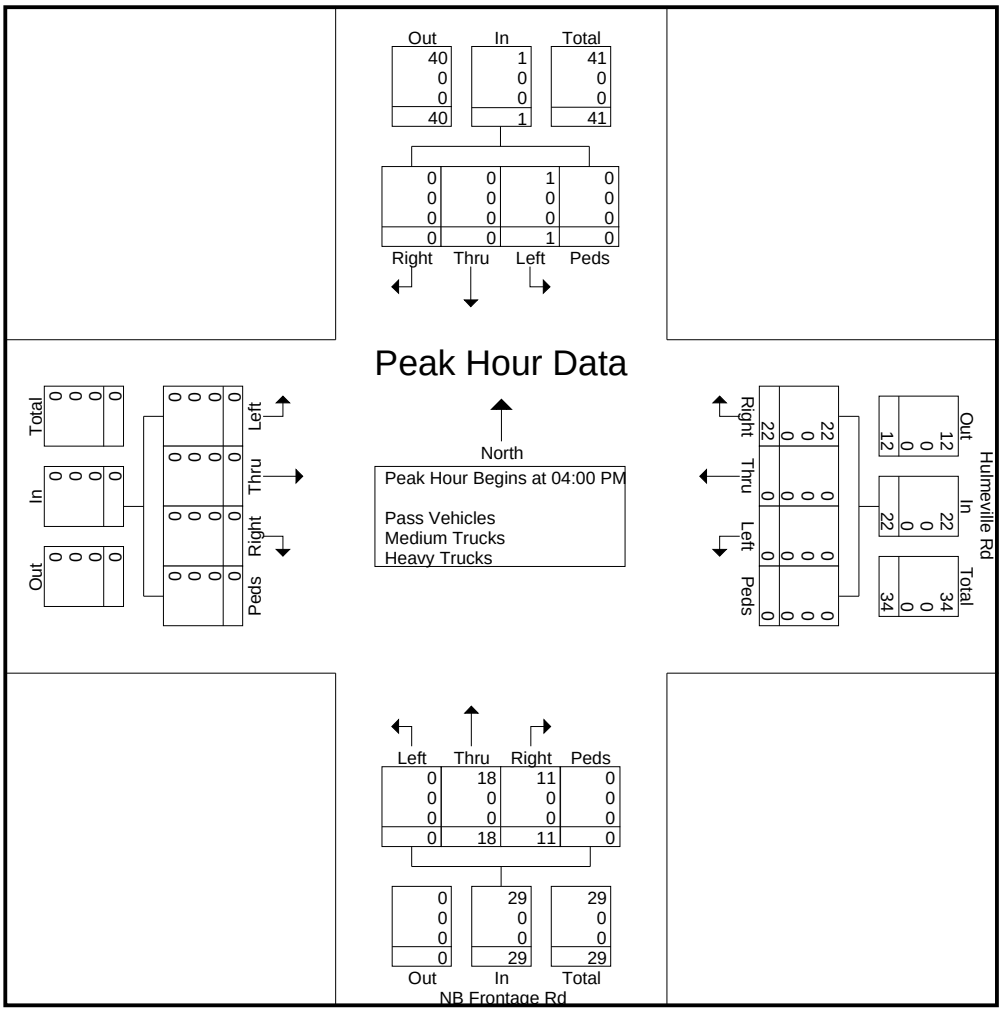
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hulmeville Rd
Date: 04/17/2012
Counter(s): Ed McFadden

File Name : NB2 F-Rd_Hulmeville Rd
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Eastbound					Hulmeville Rd Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	5	0	5	0	3	**3**	0	6	**1**	0	0	0	**1**	12
04:15 PM	0	0	0	0	0	0	0	3	0	3	0	**7**	3	0	**10**	0	0	0	0	0	13
04:30 PM	0	0	0	0	0	0	0	**8**	0	**8**	0	4	3	0	7	0	0	0	0	0	**15**
04:45 PM	0	0	0	0	0	0	0	6	0	6	0	4	2	0	6	0	0	0	0	0	12
Total Volume	0	0	0	0	0	0	0	22	0	22	0	18	11	0	29	1	0	0	0	1	52
% App. Total	0	0	0	0		0	0	100	0		0	62.1	37.9	0		100	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.688	.000	.688	.000	.643	.917	.000	.725	.250	.000	.000	.000	.250	.867
Pass Vehicles																					
% Pass Vehicles	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	100	0	0	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hulmeville Ave
Date: 04/17/2012
Counter(s): John Jarbough

File Name : NB3 F-Rd_Hulmeville Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Eastbound					Hulmeville Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	1	1	0	2	0	0	26	0	26	1	5	6	0	12	0	0	0	0	0	40
07:15 AM	0	0	0	0	0	0	0	34	0	34	0	14	3	0	17	0	0	0	0	0	51
07:30 AM	0	0	0	0	0	0	0	50	0	50	0	15	0	0	15	0	0	0	0	0	65
07:45 AM	0	0	0	0	0	0	0	45	0	45	0	16	3	0	19	0	0	0	0	0	64
Total	0	1	1	0	2	0	0	155	0	155	1	50	12	0	63	0	0	0	0	0	220
08:00 AM	0	0	0	0	0	0	0	22	0	22	0	5	2	0	7	0	0	0	0	0	29
08:15 AM	0	0	0	0	0	0	0	26	0	26	0	11	4	0	15	0	0	0	0	0	41
08:30 AM	0	0	0	0	0	0	1	19	0	20	0	10	10	0	20	0	0	0	0	0	40
08:45 AM	0	0	0	0	0	0	0	23	0	23	0	21	6	0	27	0	0	0	0	0	50
Total	0	0	0	0	0	0	1	90	0	91	0	47	22	0	69	0	0	0	0	0	160
*** BREAK ***																					
04:30 PM	0	0	0	0	0	0	0	21	0	21	0	20	10	0	30	0	0	0	0	0	51
04:45 PM	0	0	0	0	0	0	0	15	1	16	0	20	7	0	27	0	0	0	0	0	43
Total	0	0	0	0	0	0	0	36	1	37	0	40	17	0	57	0	0	0	0	0	94
05:00 PM	0	0	0	0	0	0	0	19	0	19	0	14	10	0	24	0	0	0	0	0	43
05:15 PM	0	0	0	0	0	0	0	24	0	24	0	27	8	0	35	0	0	0	0	0	59
05:30 PM	0	0	0	0	0	0	0	21	0	21	0	12	12	0	24	0	0	0	0	0	45
05:45 PM	0	0	0	0	0	0	0	19	0	19	0	12	4	0	16	0	0	0	0	0	35
Total	0	0	0	0	0	0	0	83	0	83	0	65	34	0	99	0	0	0	0	0	182
Grand Total	0	1	1	0	2	0	1	364	1	366	1	202	85	0	288	0	0	0	0	0	656
Apprch %	0	50	50	0		0	0.3	99.5	0.3		0.3	70.1	29.5	0		0	0	0	0		
Total %	0	0.2	0.2	0	0.3	0	0.2	55.5	0.2	55.8	0.2	30.8	13	0	43.9	0	0	0	0	0	
Pass Vehicles	0	1	1	0	2	0	1	364	1	366	1	202	85	0	288	0	0	0	0	0	656
% Pass Vehicles	0	100	100	0	100	0	100	100	100	100	100	100	100	0	100	0	0	0	0	0	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

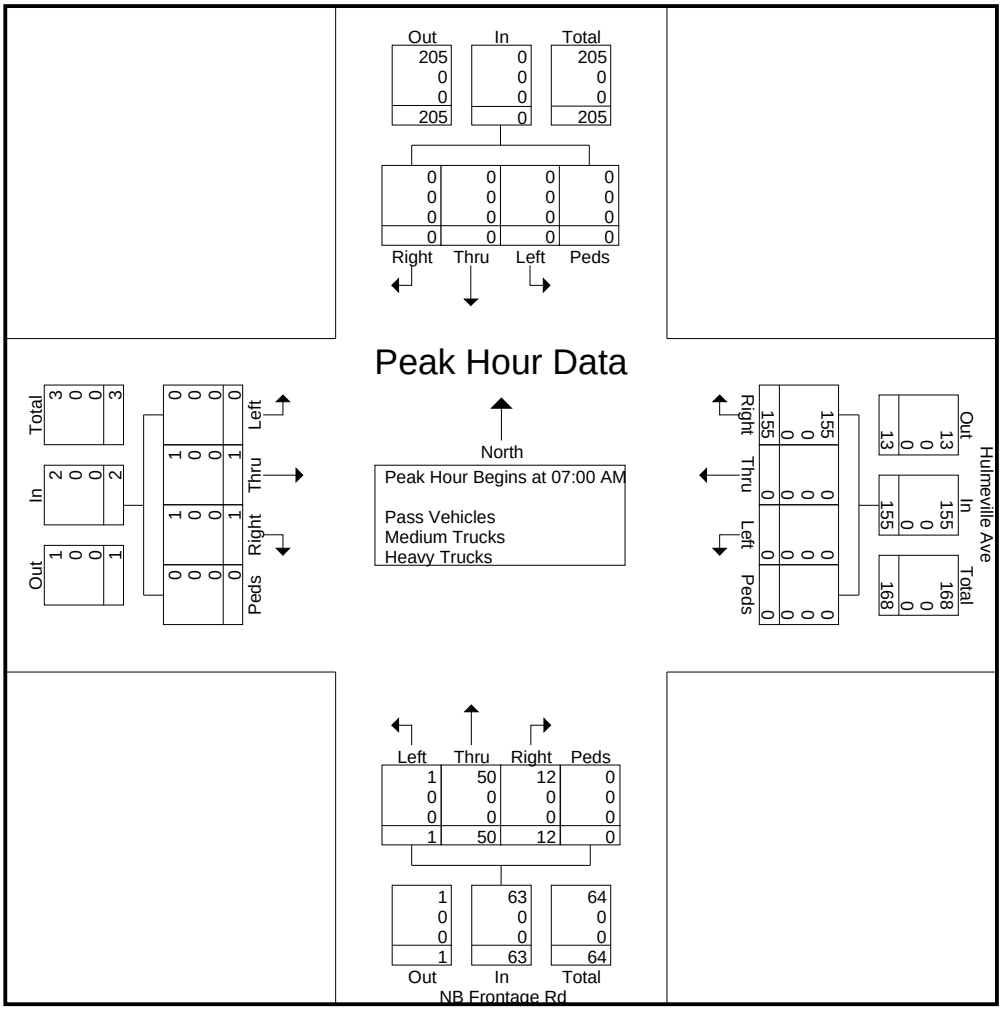
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hulmeville Ave
Date: 04/17/2012
Counter(s): John Jarbough

File Name : NB3 F-Rd_Hulmeville Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Eastbound					Hulmeville Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	**1**	**1**	0	**2**	0	0	26	0	26	**1**	5	**6**	0	12	0	0	0	0	0	40
07:15 AM	0	0	0	0	0	0	0	34	0	34	0	14	3	0	17	0	0	0	0	0	51
07:30 AM	0	0	0	0	0	0	0	**50**	0	**50**	0	15	0	0	15	0	0	0	0	0	**65**
07:45 AM	0	0	0	0	0	0	0	45	0	45	0	**16**	3	0	**19**	0	0	0	0	0	64
Total Volume	0	1	1	0	2	0	0	155	0	155	1	50	12	0	63	0	0	0	0	0	220
% App. Total	0	50	50	0		0	0	100	0		1.6	79.4	19	0		0	0	0	0		
PHF	.000	.250	.250	.000	.250	.000	.000	.775	.000	.775	.250	.781	.500	.000	.829	.000	.000	.000	.000	.000	.846
Pass Vehicles																					
% Pass Vehicles	0	100	100	0	100	0	0	100	0	100	100	100	100	0	100	0	0	0	0	0	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



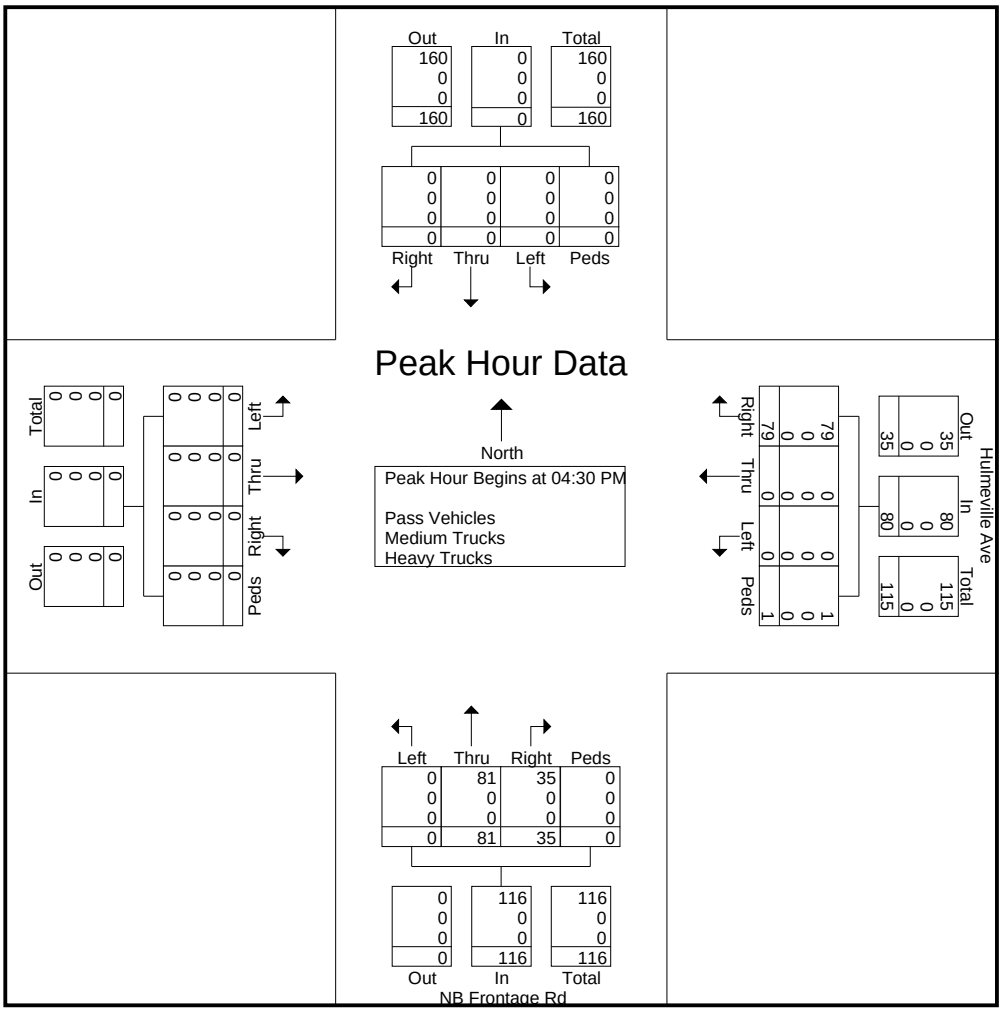
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hulmeville Ave
Date: 04/17/2012
Counter(s): John Jarbough

File Name : NB3 F-Rd_Hulmeville Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Eastbound					Hulmeville Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	0	21	0	21	0	20	**10**	0	30	0	0	0	0	0	51
04:45 PM	0	0	0	0	0	0	0	15	**1**	16	0	20	7	0	27	0	0	0	0	0	43
05:00 PM	0	0	0	0	0	0	0	19	0	19	0	14	10	0	24	0	0	0	0	0	43
05:15 PM	0	0	0	0	0	0	0	**24**	0	**24**	0	**27**	8	0	**35**	0	0	0	0	0	**59**
Total Volume	0	0	0	0	0	0	0	79	1	80	0	81	35	0	116	0	0	0	0	0	196
% App. Total	0	0	0	0		0	0	98.8	1.2		0	69.8	30.2	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.823	.250	.833	.000	.750	.875	.000	.829	.000	.000	.000	.000	.000	.831
Pass Vehicles																					
% Pass Vehicles	0	0	0	0	0	0	0	100	100	100	0	100	100	0	100	0	0	0	0	0	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hill Ave
Date: 04/17/2012
Counter(s): Lindsay Klesitz

File Name : NB4 F-Road_Hill Ave
Site Code : NB 4
Start Date : 4/17/2012
Page No : 1

Groups Printed- Passenger Car - Med Truck - Heavy Truck

	Eastbound					Hill Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	2	0	2	0	59	0	0	59	0	0	0	0	0	61
07:15 AM	0	0	0	0	0	0	0	1	0	1	0	70	0	0	70	0	0	0	0	0	71
07:30 AM	0	0	0	0	0	0	0	3	0	3	0	97	0	0	97	0	0	0	0	0	100
07:45 AM	0	0	0	0	0	0	0	2	0	2	0	92	0	0	92	0	0	0	0	0	94
Total	0	0	0	0	0	0	0	8	0	8	0	318	0	0	318	0	0	0	0	0	326
08:00 AM	0	0	0	0	0	0	0	3	0	3	0	51	1	0	52	0	0	0	0	0	55
08:15 AM	0	0	0	0	0	0	0	2	0	2	0	58	1	0	59	0	0	0	1	1	62
08:30 AM	0	0	0	0	0	0	0	2	0	2	0	53	0	0	53	0	0	0	0	0	55
08:45 AM	0	0	0	0	0	0	0	3	0	3	0	51	0	0	51	0	0	0	0	0	54
Total	0	0	0	0	0	0	0	10	0	10	0	213	2	0	215	0	0	0	1	1	226
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	1	0	1	0	36	1	0	37	0	0	0	0	0	38
04:15 PM	0	0	0	0	0	0	0	2	0	2	0	44	2	0	46	0	0	0	0	0	48
04:30 PM	0	0	0	0	0	0	0	2	0	2	0	45	1	0	46	0	0	0	0	0	48
04:45 PM	0	0	0	0	0	0	0	2	0	2	0	47	4	0	51	0	0	0	0	0	53
Total	0	0	0	0	0	0	0	7	0	7	0	172	8	0	180	0	0	0	0	0	187
05:00 PM	0	0	0	0	0	0	0	2	0	2	0	45	0	0	45	0	0	0	0	0	47
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	44	2	0	46	0	0	0	0	0	47
05:30 PM	0	0	0	0	0	0	0	2	0	2	0	46	2	0	48	0	0	0	0	0	50
05:45 PM	0	0	0	0	0	0	0	1	0	1	0	48	6	0	54	0	0	0	0	0	55
Total	0	0	0	0	0	0	0	6	0	6	0	183	10	0	193	0	0	0	0	0	199
Grand Total	0	0	0	0	0	0	0	31	0	31	0	886	20	0	906	0	0	0	1	1	938
Apprch %	0	0	0	0		0	0	100	0		0	97.8	2.2	0		0	0	0	100		
Total %	0	0	0	0	0	0	0	3.3	0	3.3	0	94.5	2.1	0	96.6	0	0	0	0.1	0.1	
Passenger Car	0	0	0	0	0	0	0	29	0	29	0	871	19	0	890	0	0	0	1	1	920
% Passenger Car	0	0	0	0	0	0	0	93.5	0	93.5	0	98.3	95	0	98.2	0	0	0	100	100	98.1
Med Truck	0	0	0	0	0	0	0	1	0	1	0	10	0	0	10	0	0	0	0	0	11
% Med Truck	0	0	0	0	0	0	0	3.2	0	3.2	0	1.1	0	0	1.1	0	0	0	0	0	1.2
Heavy Truck	0	0	0	0	0	0	0	1	0	1	0	5	1	0	6	0	0	0	0	0	7
% Heavy Truck	0	0	0	0	0	0	0	3.2	0	3.2	0	0.6	5	0	0.7	0	0	0	0	0	0.7

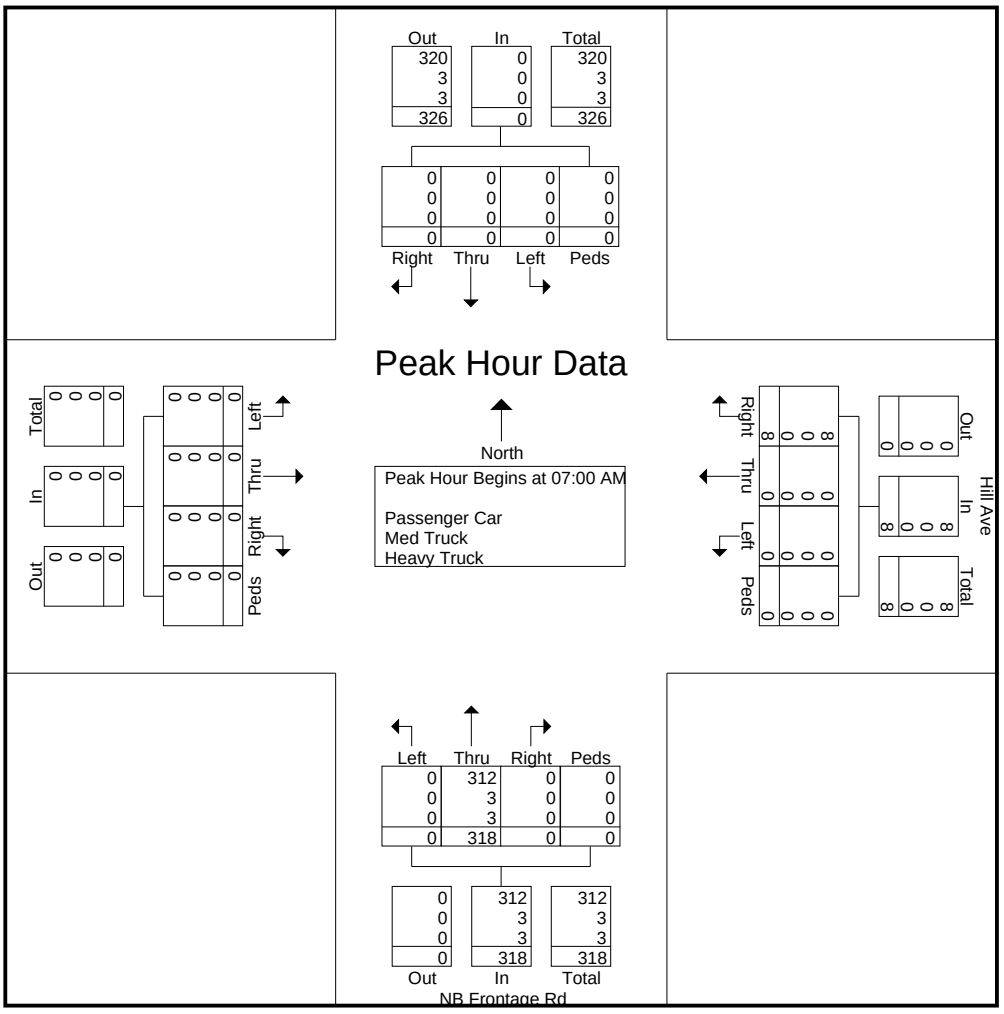
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hill Ave
Date: 04/17/2012
Counter(s): Lindsay Klesitz

File Name : NB4 F-Road_Hill Ave
Site Code : NB 4
Start Date : 4/17/2012
Page No : 2

	Eastbound					Hill Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	2	0	2	0	59	0	0	59	0	0	0	0	0	61
07:15 AM	0	0	0	0	0	0	0	1	0	1	0	70	0	0	70	0	0	0	0	0	71
07:30 AM	0	0	0	0	0	0	0	**3**	0	**3**	0	**97**	0	0	**97**	0	0	0	0	0	**100**
07:45 AM	0	0	0	0	0	0	0	2	0	2	0	92	0	0	92	0	0	0	0	0	94
Total Volume	0	0	0	0	0	0	0	8	0	8	0	318	0	0	318	0	0	0	0	0	326
% App. Total	0	0	0	0		0	0	100	0		0	100	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.667	.000	.667	.000	.820	.000	.000	.820	.000	.000	.000	.000	.000	.815
Passenger Car																					
% Passenger Car	0	0	0	0	0	0	0	100	0	100	0	98.1	0	0	98.1	0	0	0	0	0	98.2
Med Truck	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
% Med Truck	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0.9	0	0	0	0	0	0.9
Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
% Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0.9	0	0	0	0	0	0.9



Johnson, Mirmiran & Thompson, Inc.

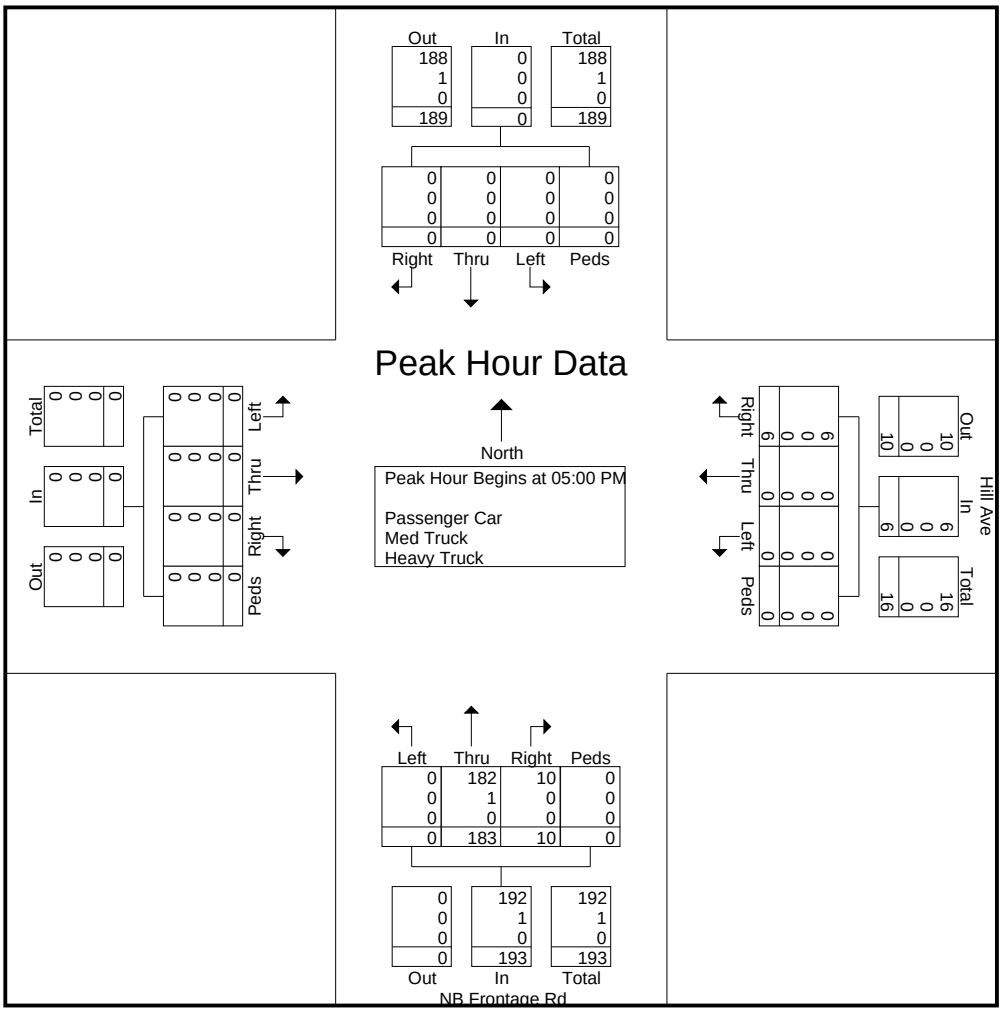
1550 Coraopolis Heights Road
Moon Township, PA 15108

Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Hill Ave
Date: 04/17/2012
Counter(s): Lindsay Klesitz

File Name : NB4 F-Road_Hill Ave
Site Code : NB 4
Start Date : 4/17/2012
Page No : 3

	Eastbound					Hill Ave Westbound					NB Frontage Rd Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	0	0	0	0	0	**2**	0	**2**	0	45	0	0	45	0	0	0	0	0	47
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	44	2	0	46	0	0	0	0	0	47
05:30 PM	0	0	0	0	0	0	0	2	0	2	0	46	2	0	48	0	0	0	0	0	50
05:45 PM	0	0	0	0	0	0	0	1	0	1	0	**48**	**6**	0	**54**	0	0	0	0	0	**55**
Total Volume	0	0	0	0	0	0	0	6	0	6	0	183	10	0	193	0	0	0	0	0	199
% App. Total	0	0	0	0		0	0	100	0		0	94.8	5.2	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.750	.000	.750	.000	.953	.417	.000	.894	.000	.000	.000	.000	.000	.905
Passenger Car																					
% Passenger Car	0	0	0	0	0	0	0	100	0	100	0	99.5	100	0	99.5	0	0	0	0	0	99.5
Med Truck	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
% Med Truck	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.5	0	0	0	0	0	0.5
Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Station Ave
Date: 04/17/2012
Conter(s): John Nettuno

File Name : NB5 F-Road_Station Ave
Site Code : NB 5
Start Date : 4/17/2012
Page No : 1

Groups Printed- Passenger Car - Med Truck - Heavy Truck

	Eastbound					Westbound					Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	1	0	1	0	57	5	0	62	0	0	0	0	0	63
07:15 AM	0	0	0	1	1	0	0	4	0	4	0	71	1	0	72	0	0	0	0	0	77
07:30 AM	0	0	0	0	0	0	0	1	0	1	0	100	1	0	101	0	0	0	0	0	102
07:45 AM	0	0	0	0	0	0	0	1	0	1	0	92	3	0	95	0	0	0	0	0	96
Total	0	0	0	1	1	0	0	7	0	7	0	320	10	0	330	0	0	0	0	0	338
08:00 AM	0	0	0	0	0	0	0	3	0	3	0	53	2	0	55	0	0	0	0	0	58
08:15 AM	0	0	0	0	0	0	0	1	0	1	0	57	1	1	59	0	0	0	0	0	60
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	52	3	0	55	0	0	0	0	0	55
08:45 AM	0	0	0	0	0	0	0	3	0	3	0	51	4	0	55	0	0	0	0	0	58
Total	0	0	0	0	0	0	0	7	0	7	0	213	10	1	224	0	0	0	0	0	231
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	35	4	0	39	0	0	0	0	0	39
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	44	1	0	45	0	0	0	0	0	45
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	43	5	0	48	0	0	0	0	0	48
04:45 PM	0	0	0	0	0	0	0	1	0	1	0	46	4	0	50	0	0	0	0	0	51
Total	0	0	0	0	0	0	0	1	0	1	0	168	14	0	182	0	0	0	0	0	183
05:00 PM	0	0	0	0	0	0	0	1	0	1	0	43	5	0	48	0	0	0	0	0	49
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	42	3	0	45	0	0	0	0	0	46
05:30 PM	0	0	0	0	0	0	0	3	0	3	0	47	3	0	50	0	0	0	0	0	53
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	45	3	0	48	0	0	0	0	0	48
Total	0	0	0	0	0	0	0	5	0	5	0	177	14	0	191	0	0	0	0	0	196
Grand Total	0	0	0	1	1	0	0	20	0	20	0	878	48	1	927	0	0	0	0	0	948
Apprch %	0	0	0	100		0	0	100	0		0	94.7	5.2	0.1		0	0	0	0		
Total %	0	0	0	0.1	0.1	0	0	2.1	0	2.1	0	92.6	5.1	0.1	97.8	0	0	0	0	0	
Passenger Car	0	0	0	1	1	0	0	20	0	20	0	867	48	1	916	0	0	0	0	0	937
% Passenger Car	0	0	0	100	100	0	0	100	0	100	0	98.7	100	100	98.8	0	0	0	0	0	98.8
Med Truck	0	0	0	0	0	0	0	0	0	0	0	8	0	0	8	0	0	0	0	0	8
% Med Truck	0	0	0	0	0	0	0	0	0	0	0	0.9	0	0	0.9	0	0	0	0	0	0.8
Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
% Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0	0.3	0	0	0	0	0	0.3

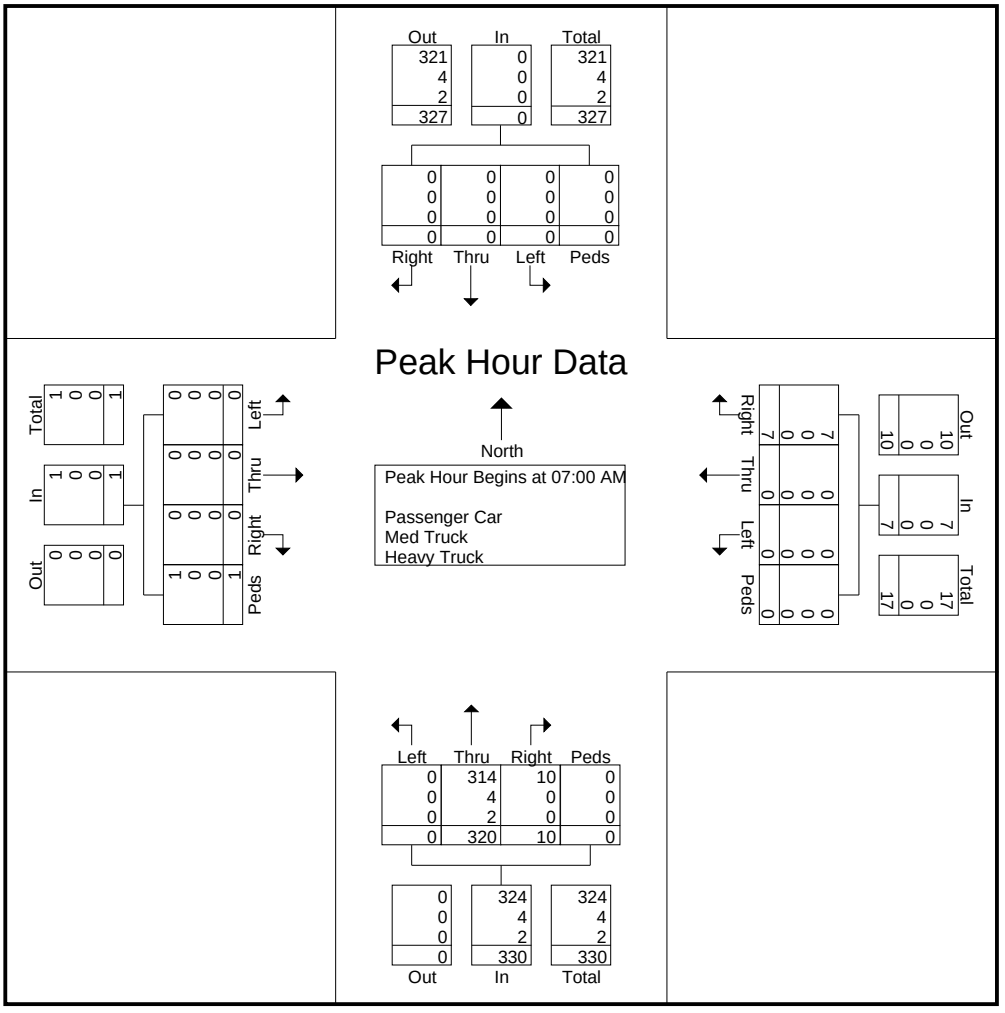
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Station Ave
Date: 04/17/2012
Conter(s): John Nettuno

File Name : NB5 F-Road_Station Ave
Site Code : NB 5
Start Date : 4/17/2012
Page No : 2

	Eastbound					Westbound					Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	1	0	1	0	57	**5**	0	62	0	0	0	0	0	63
07:15 AM	0	0	0	**1**	**1**	0	0	**4**	0	**4**	0	71	1	0	72	0	0	0	0	0	77
07:30 AM	0	0	0	0	0	0	0	1	0	1	0	**100**	1	0	**101**	0	0	0	0	0	**102**
07:45 AM	0	0	0	0	0	0	0	1	0	1	0	92	3	0	95	0	0	0	0	0	96
Total Volume	0	0	0	1	1	0	0	7	0	7	0	320	10	0	330	0	0	0	0	0	338
% App. Total	0	0	0	100		0	0	100	0		0	97	3	0		0	0	0	0		
PHF	.000	.000	.000	.250	.250	.000	.000	.438	.000	.438	.000	.800	.500	.000	.817	.000	.000	.000	.000	.000	.828
Passenger Car																					
% Passenger Car	0	0	0	100	100	0	0	100	0	100	0	98.1	100	0	98.2	0	0	0	0	0	98.2
Med Truck	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	4
% Med Truck	0	0	0	0	0	0	0	0	0	0	0	1.3	0	0	1.2	0	0	0	0	0	1.2
Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	2
% Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0.6	0	0	0.6	0	0	0	0	0	0.6



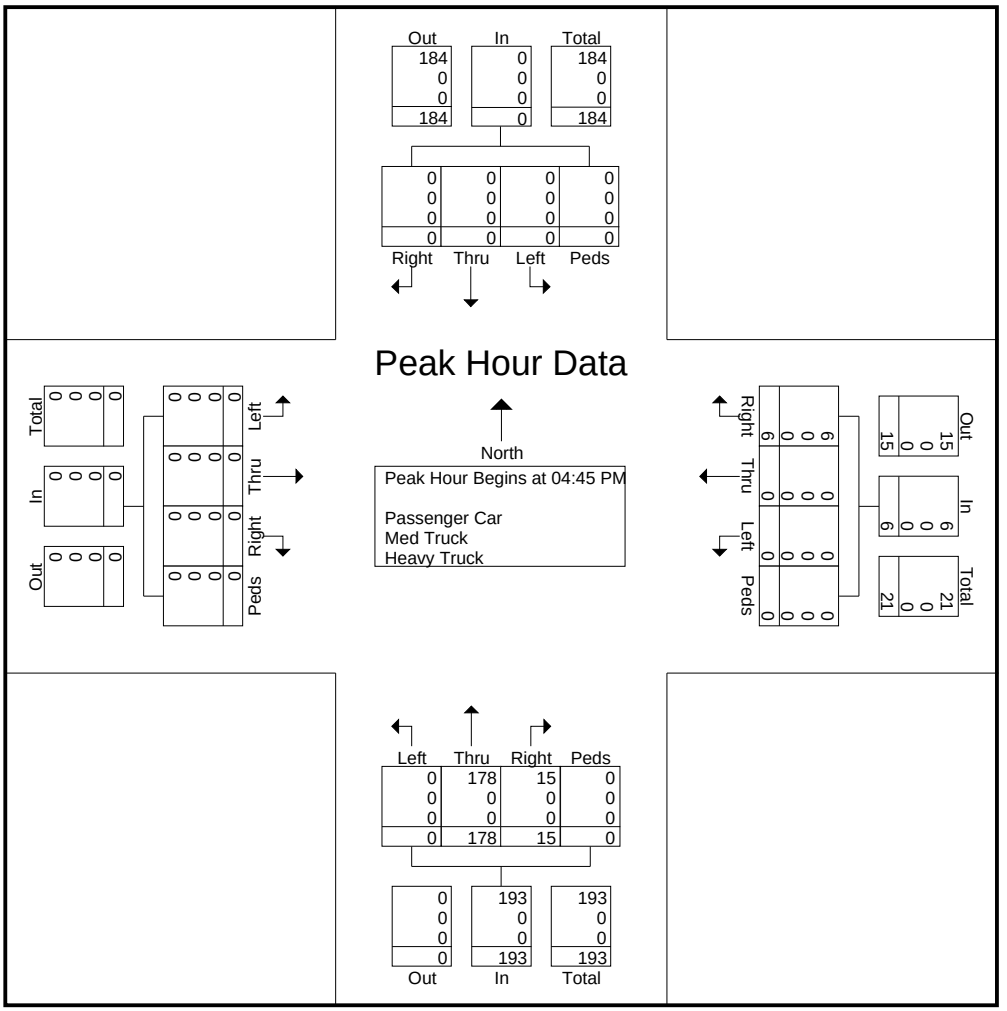
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Station Ave
Date: 04/17/2012
Conter(s): John Nettuno

File Name : NB5 F-Road_Station Ave
Site Code : NB 5
Start Date : 4/17/2012
Page No : 3

	Eastbound					Westbound					Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	0	0	1	0	1	0	46	4	0	**50**	0	0	0	0	0	51
05:00 PM	0	0	0	0	0	0	0	1	0	1	0	43	**5**	0	48	0	0	0	0	0	49
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	42	3	0	45	0	0	0	0	0	46
05:30 PM	0	0	0	0	0	0	0	**3**	0	**3**	0	**47**	3	0	50	0	0	0	0	0	**53**
Total Volume	0	0	0	0	0	0	0	6	0	6	0	178	15	0	193	0	0	0	0	0	199
% App. Total	0	0	0	0		0	0	100	0		0	92.2	7.8	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.500	.000	.500	.000	.947	.750	.000	.965	.000	.000	.000	.000	.000	.939
Passenger Car																					
% Passenger Car	0	0	0	0	0	0	0	100	0	100	0	100	100	0	100	0	0	0	0	0	100
Med Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Med Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Bellevue Ave
Date: 04/17/2012
Counter(s): Jaime Vargas

File Name : NB6 F-Road_Bellevue Ave
Site Code : NB 6
Start Date : 4/17/2012
Page No : 1

Groups Printed- Passenger Car - Med Truck - Heavy Truck

	Eastbound					Westbound					Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	19	0	19	0	41	47	0	88	0	0	0	0	0	107
07:15 AM	0	0	0	0	0	0	0	13	0	13	0	60	54	0	114	0	0	0	0	0	127
07:30 AM	0	0	0	0	0	0	0	30	0	30	0	77	77	0	154	0	0	0	0	0	184
07:45 AM	0	0	0	0	0	0	0	22	0	22	0	70	64	0	134	0	0	0	0	0	156
Total	0	0	0	0	0	0	0	84	0	84	0	248	242	0	490	0	0	0	0	0	574
08:00 AM	0	0	0	1	1	0	0	16	0	16	0	46	54	1	101	0	0	0	0	0	118
08:15 AM	0	0	0	0	0	0	0	19	0	19	0	38	58	0	96	0	0	0	0	0	115
08:30 AM	0	0	0	0	0	0	0	25	0	25	0	36	59	0	95	0	0	0	0	0	120
08:45 AM	0	0	0	0	0	0	0	19	0	19	0	34	60	0	94	0	0	0	0	0	113
Total	0	0	0	1	1	0	0	79	0	79	0	154	231	1	386	0	0	0	0	0	466
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	5	0	5	0	15	50	0	65	0	0	0	0	0	70
04:15 PM	0	0	0	1	1	0	0	12	0	12	0	28	67	0	95	0	0	0	0	0	108
04:30 PM	0	0	0	0	0	0	0	7	0	7	0	28	71	0	99	0	0	0	0	0	106
04:45 PM	0	0	0	0	0	0	0	17	0	17	0	30	78	0	108	0	0	0	0	0	125
Total	0	0	0	1	1	0	0	41	0	41	0	101	266	0	367	0	0	0	0	0	409
05:00 PM	0	0	0	0	0	0	0	14	0	14	0	30	76	0	106	0	0	0	0	0	120
05:15 PM	0	0	0	0	0	0	0	21	0	21	0	33	65	0	98	0	0	0	0	0	119
05:30 PM	0	0	0	0	0	0	0	11	0	11	0	32	79	0	111	0	0	0	0	0	122
05:45 PM	0	0	0	0	0	0	0	13	0	13	0	34	65	0	99	0	0	0	0	0	112
Total	0	0	0	0	0	0	0	59	0	59	0	129	285	0	414	0	0	0	0	0	473
Grand Total	0	0	0	2	2	0	0	263	0	263	0	632	1024	1	1657	0	0	0	0	0	1922
Apprch %	0	0	0	100		0	0	100	0		0	38.1	61.8	0.1		0	0	0	0		
Total %	0	0	0	0.1	0.1	0	0	13.7	0	13.7	0	32.9	53.3	0.1	86.2	0	0	0	0	0	
Passenger Car	0	0	0	2	2	0	0	255	0	255	0	624	992	1	1617	0	0	0	0	0	1874
% Passenger Car	0	0	0	100	100	0	0	97	0	97	0	98.7	96.9	100	97.6	0	0	0	0	0	97.5
Med Truck	0	0	0	0	0	0	0	2	0	2	0	1	9	0	10	0	0	0	0	0	12
% Med Truck	0	0	0	0	0	0	0	0.8	0	0.8	0	0.2	0.9	0	0.6	0	0	0	0	0	0.6
Heavy Truck	0	0	0	0	0	0	0	6	0	6	0	7	23	0	30	0	0	0	0	0	36
% Heavy Truck	0	0	0	0	0	0	0	2.3	0	2.3	0	1.1	2.2	0	1.8	0	0	0	0	0	1.9

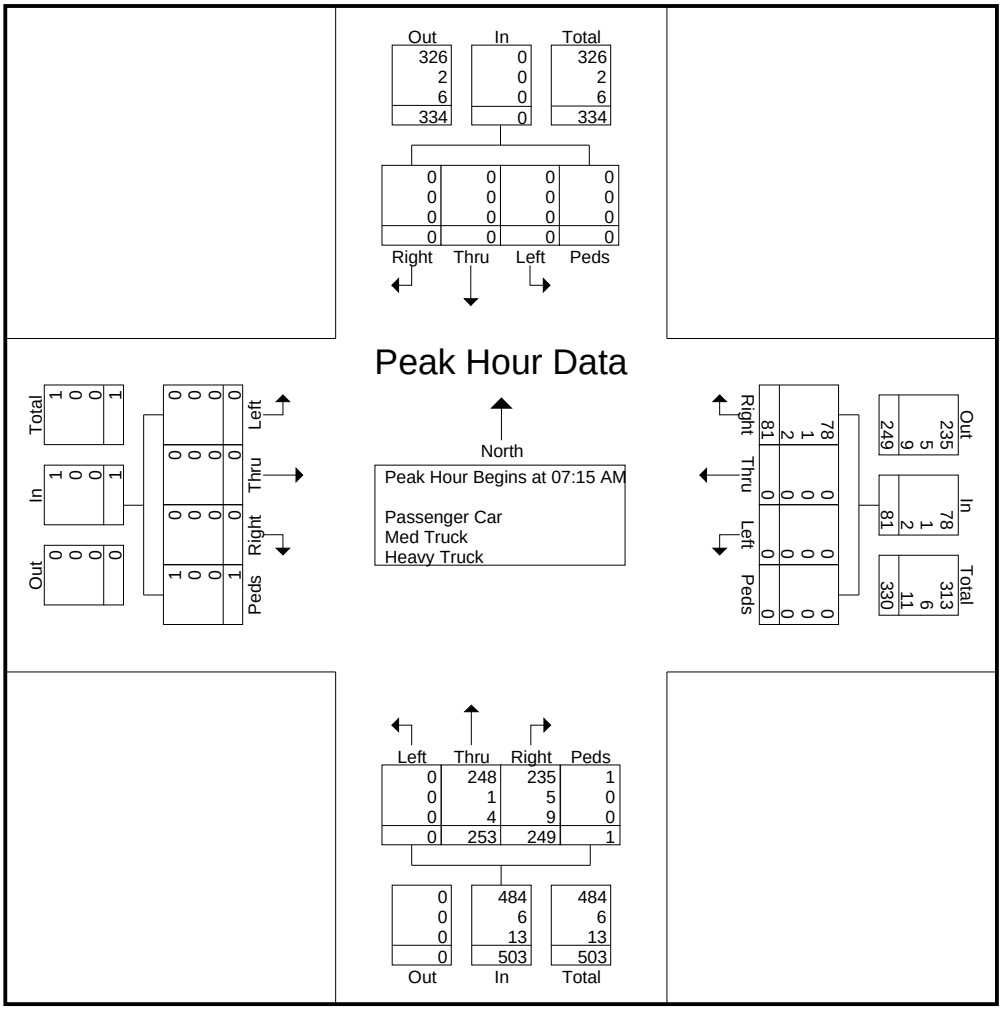
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Bellevue Ave
Date: 04/17/2012
Counter(s): Jaime Vargas

File Name : NB6 F-Road_Bellevue Ave
Site Code : NB 6
Start Date : 4/17/2012
Page No : 2

	Eastbound					Westbound					Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	0	13	0	13	0	60	54	0	114	0	0	0	0	0	127
07:30 AM	0	0	0	0	0	0	0	**30**	0	**30**	0	**77**	**77**	0	**154**	0	0	0	0	0	**184**
07:45 AM	0	0	0	0	0	0	0	22	0	22	0	70	64	0	134	0	0	0	0	0	156
08:00 AM	0	0	0	**1**	**1**	0	0	16	0	16	0	46	54	**1**	101	0	0	0	0	0	118
Total Volume	0	0	0	1	1	0	0	81	0	81	0	253	249	1	503	0	0	0	0	0	585
% App. Total	0	0	0	100		0	0	100	0		0	50.3	49.5	0.2		0	0	0	0		
PHF	.000	.000	.000	.250	.250	.000	.000	.675	.000	.675	.000	.821	.808	.250	.817	.000	.000	.000	.000	.000	.795
Passenger Car																					
% Passenger Car	0	0	0	100	100	0	0	96.3	0	96.3	0	98.0	94.4	100	96.2	0	0	0	0	0	96.2
Med Truck	0	0	0	0	0	0	0	1	0	1	0	1	5	0	6	0	0	0	0	0	7
% Med Truck	0	0	0	0	0	0	0	1.2	0	1.2	0	0.4	2.0	0	1.2	0	0	0	0	0	1.2
Heavy Truck	0	0	0	0	0	0	0	2	0	2	0	4	9	0	13	0	0	0	0	0	15
% Heavy Truck	0	0	0	0	0	0	0	2.5	0	2.5	0	1.6	3.6	0	2.6	0	0	0	0	0	2.6



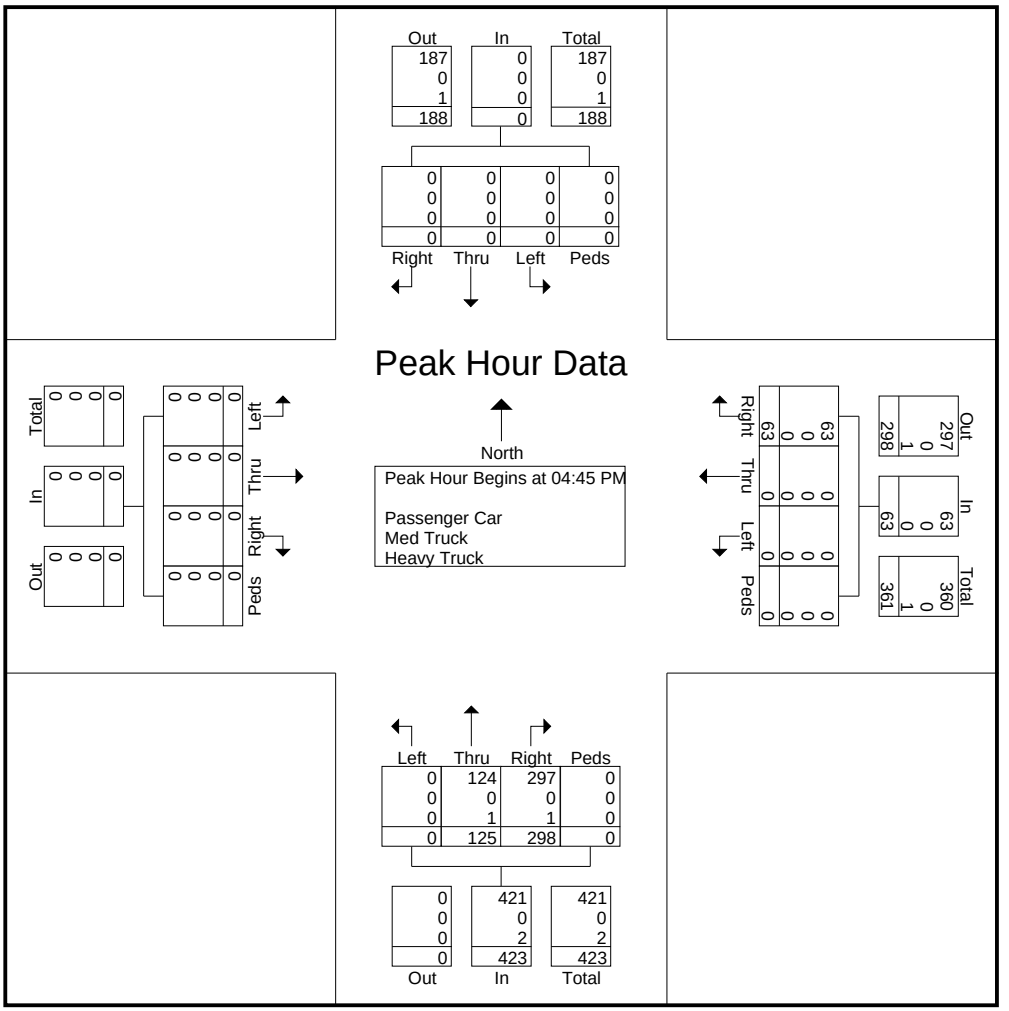
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 NB Frontage Rd & Bellevue Ave
Date: 04/17/2012
Counter(s): Jaime Vargas

File Name : NB6 F-Road_Bellevue Ave
Site Code : NB 6
Start Date : 4/17/2012
Page No : 3

	Eastbound					Westbound					Northbound					Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	0	0	17	0	17	0	30	78	0	108	0	0	0	0	0	**125**
05:00 PM	0	0	0	0	0	0	0	14	0	14	0	30	76	0	106	0	0	0	0	0	120
05:15 PM	0	0	0	0	0	0	0	**21**	0	**21**	0	**33**	65	0	98	0	0	0	0	0	119
05:30 PM	0	0	0	0	0	0	0	11	0	11	0	32	**79**	0	**111**	0	0	0	0	0	122
Total Volume	0	0	0	0	0	0	0	63	0	63	0	125	298	0	423	0	0	0	0	0	486
% App. Total	0	0	0	0		0	0	100	0		0	29.6	70.4	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.750	.000	.750	.000	.947	.943	.000	.953	.000	.000	.000	.000	.000	.972
Passenger Car																					
% Passenger Car	0	0	0	0	0	0	0	100	0	100	0	99.2	99.7	0	99.5	0	0	0	0	0	99.6
Med Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Med Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
% Heavy Truck	0	0	0	0	0	0	0	0	0	0	0	0.8	0.3	0	0.5	0	0	0	0	0	0.4



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne
Intersection: NB Frontage Rd & T-675
Date: 05/03/2012
Counter(s): Ed McFadden

File Name : SB1 F-Rd_T-675
Site Code : 00000000
Start Date : 5/3/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	T-675 Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	32	12	0	44	46
07:15 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	12	11	0	23	26
07:30 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	5	9	0	14	17
07:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	8	6	0	14	15
Total	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	57	38	0	95	104
08:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	2	7	0	9	11
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	0	11	11
08:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	11
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	15	0	19	19
Total	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	8	41	0	49	52
*** BREAK ***																					
04:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	7	20	0	27	28
04:15 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	1	31	0	32	35
04:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	5	30	0	35	36
04:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	26	0	27	28
Total	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	14	107	0	121	127
05:00 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	5	17	0	22	24
05:15 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	3	23	0	26	28
05:30 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	3	23	0	26	28
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	3	36	0	39	40
Total	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	14	99	0	113	120
Grand Total	0	0	25	0	25	0	0	0	0	0	0	0	0	0	0	0	93	285	0	378	403
Apprch %	0	0	100	0		0	0	0	0		0	0	0	0		0	24.6	75.4	0		
Total %	0	0	6.2	0	6.2	0	0	0	0	0	0	0	0	0	0	0	23.1	70.7	0	93.8	
Pass Vehicles	0	0	25	0	25	0	0	0	0	0	0	0	0	0	0	0	93	285	0	378	403
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

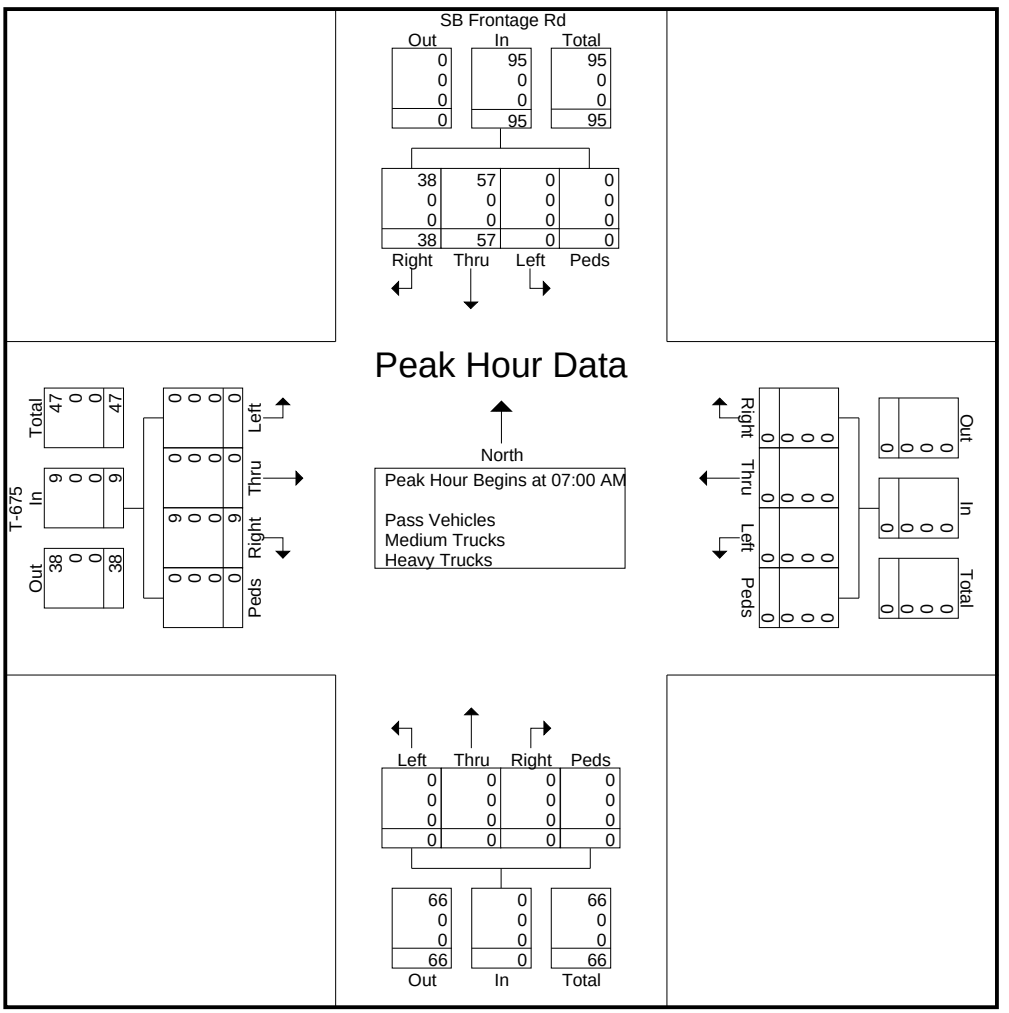
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne
Intersection: NB Frontage Rd & T-675
Date: 05/03/2012
Counter(s): Ed McFadden

File Name : SB1 F-Rd_T-675
Site Code : 00000000
Start Date : 5/3/2012
Page No : 2

	T-675 Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	**32**	**12**	0	**44**	**46**
07:15 AM	0	0	**3**	0	**3**	0	0	0	0	0	0	0	0	0	0	0	12	11	0	23	26
07:30 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	5	9	0	14	17
07:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	8	6	0	14	15
Total Volume	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	57	38	0	95	104
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	60	40	0		
PHF	.000	.000	.750	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.445	.792	.000	.540	.565
Pass Vehicles																					
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



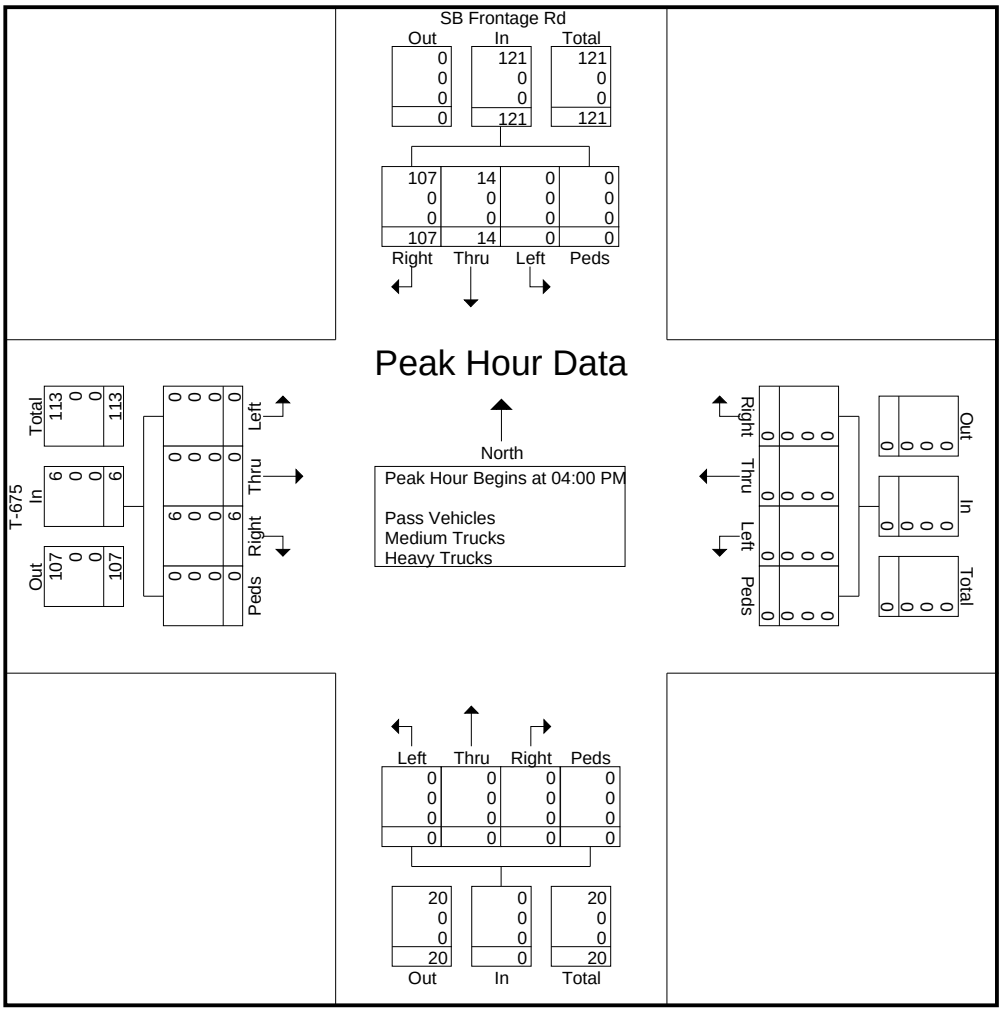
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne
Intersection: NB Frontage Rd & T-675
Date: 05/03/2012
Counter(s): Ed McFadden

File Name : SB1 F-Rd_T-675
Site Code : 00000000
Start Date : 5/3/2012

	T-675 Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**7**	20	0	27	28
04:15 PM	0	0	**3**	0	**3**	0	0	0	0	0	0	0	0	0	0	0	1	**31**	0	32	35
04:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	5	30	0	**35**	**36**
04:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	26	0	27	28
Total Volume	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	14	107	0	121	127
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	11.6	88.4	0		
PHF	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.500	.863	.000	.864	.882
Pass Vehicles																					
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hulmeville Rd
Date: 04/17/2012
Counter(s): Adam Croker

File Name : SB2 F-Rd_Hulmeville Rd
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Hulmeville Rd Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	10	6	0	16	27
07:15 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	4	9	0	13	15
07:30 AM	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	4	8	0	12	20
07:45 AM	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	5	7	0	12	19
Total	0	0	28	0	28	0	0	0	0	0	0	0	0	0	0	0	23	30	0	53	81
08:00 AM	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	1	5	0	6	13
08:15 AM	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	7	9	0	16	20
08:30 AM	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	6	5	0	11	17
08:45 AM	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	5	1	0	6	15
Total	0	0	26	0	26	0	0	0	0	0	0	0	0	0	0	0	19	20	0	39	65
*** BREAK ***																					
04:00 PM	0	1	6	0	7	0	0	0	0	0	0	0	0	0	0	0	8	17	0	25	32
04:15 PM	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	7	27	0	34	37
04:30 PM	0	6	12	1	19	0	0	0	0	0	0	0	1	2	3	0	10	11	0	21	43
04:45 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	6	24	0	30	32
Total	0	7	22	2	31	0	0	0	0	0	0	0	1	2	3	0	31	79	0	110	144
05:00 PM	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	15	23	0	38	42
05:15 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	16	34	0	50	52
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	16	25	0	41	42
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	14	33	0	47	48
Total	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	61	115	0	176	184
Grand Total	0	7	84	2	93	0	0	0	0	0	0	0	1	2	3	0	134	244	0	378	474
Apprch %	0	7.5	90.3	2.2		0	0	0	0		0	0	33.3	66.7		0	35.4	64.6	0		
Total %	0	1.5	17.7	0.4	19.6	0	0	0	0	0	0	0	0.2	0.4	0.6	0	28.3	51.5	0	79.7	
Pass Vehicles	0	7	82	2	91	0	0	0	0	0	0	0	1	2	3	0	131	240	0	371	465
% Pass Vehicles	0	100	97.6	100	97.8	0	0	0	0	0	0	0	100	100	100	0	97.8	98.4	0	98.1	98.1
Medium Trucks	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	3	4	0	7	9
% Medium Trucks	0	0	2.4	0	2.2	0	0	0	0	0	0	0	0	0	0	0	2.2	1.6	0	1.9	1.9
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

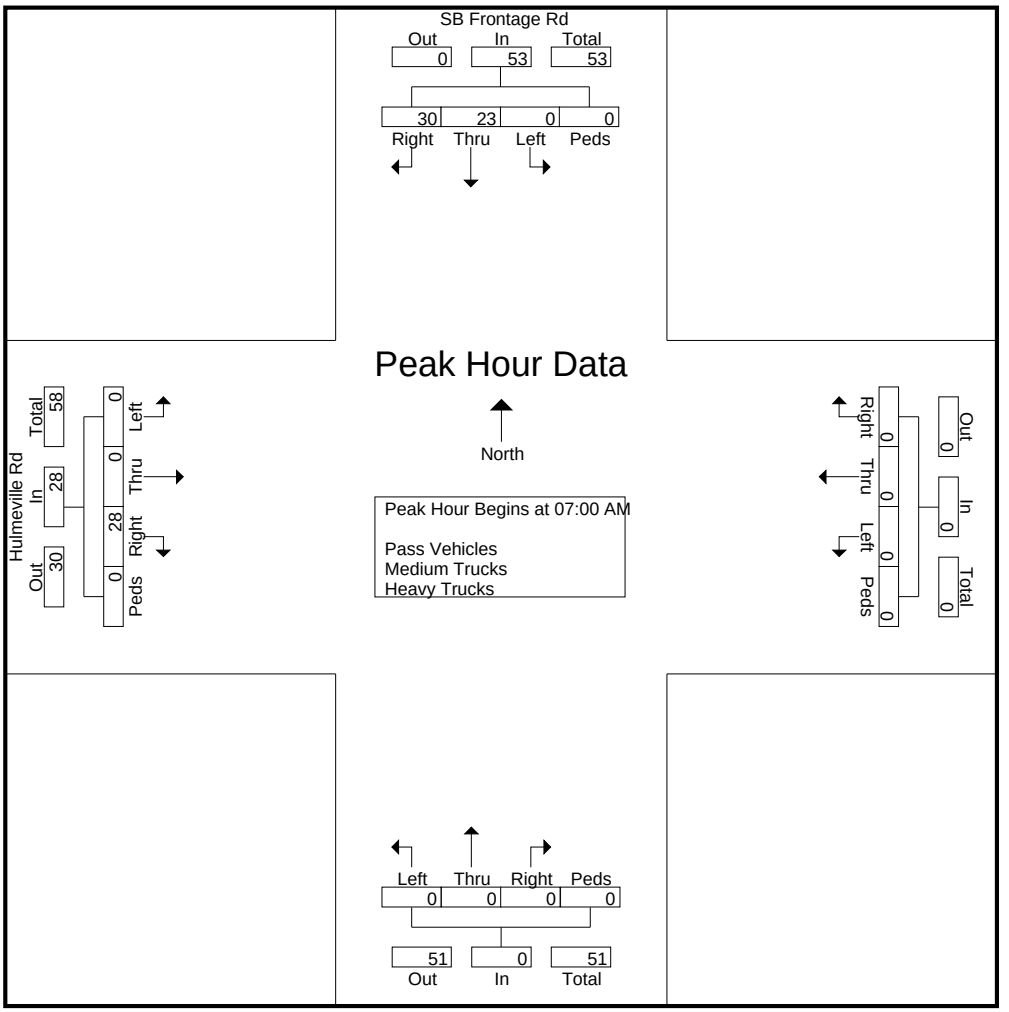
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hulmeville Rd
Date: 04/17/2012
Counter(s): Adam Croker

File Name : SB2 F-Rd_Hulmeville Rd
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Hulmeville Rd Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:30 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	**11**	0	**11**	0	0	0	0	0	0	0	0	0	0	0	**10**	6	0	**16**	**27**
07:15 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	4	**9**	0	13	15
07:30 AM	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	4	8	0	12	20
07:45 AM	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	5	7	0	12	19
Total Volume	0	0	28	0	28	0	0	0	0	0	0	0	0	0	0	0	23	30	0	53	81
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	43.4	56.6	0		
PHF	.000	.000	.636	.000	.636	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.575	.833	.000	.828	.750



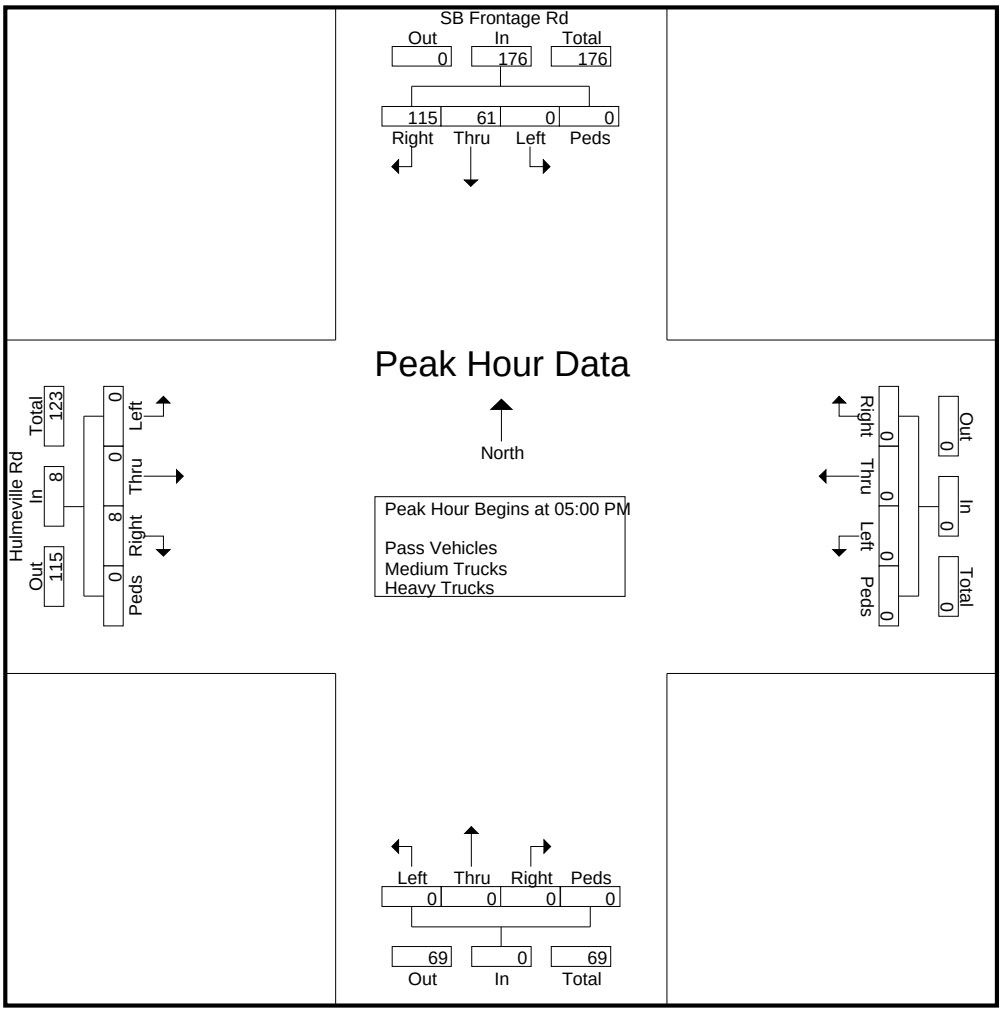
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hulmeville Rd
Date: 04/17/2012
Counter(s): Adam Croker

File Name : SB2 F-Rd_Hulmeville Rd
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Hulmeville Rd Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:45 AM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	**4**	0	**4**	0	0	0	0	0	0	0	0	0	0	0	15	23	0	38	42
05:15 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	**16**	**34**	0	**50**	**52**
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	16	25	0	41	42
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	14	33	0	47	48
Total Volume	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	61	115	0	176	184
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	34.7	65.3	0		
PHF	.000	.000	.500	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.953	.846	.000	.880	.885



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hulmeville Ave
Date: 04/17/2012
Counter(s): Katie O'Hara

File Name : SB3 F-Rd_Hulmeville Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Hulmeville Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	18	4	0	22	30
07:15 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	15	3	0	18	21
07:30 AM	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	14	3	0	17	21
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	9	0	26	26
Total	0	0	15	0	15	0	0	0	0	0	0	0	0	0	0	0	64	19	0	83	98
08:00 AM	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	15	7	0	22	27
08:15 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	24	4	0	28	31
08:30 AM	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	11	10	0	21	26
08:45 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	7	5	0	12	13
Total	0	0	14	0	14	0	0	0	0	0	0	0	0	0	0	0	57	26	0	83	97
*** BREAK ***																					
04:00 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	27	24	0	51	54
04:15 PM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	39	26	0	65	68
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	19	0	59	59
04:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	39	24	0	63	64
Total	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	145	93	0	238	245
05:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	49	24	0	73	74
05:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	55	31	0	86	87
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	29	0	83	83
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	52	22	0	74	75
Total	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	210	106	0	316	319
Grand Total	0	0	39	0	39	0	0	0	0	0	0	0	0	0	0	0	476	244	0	720	759
Apprch %	0	0	100	0		0	0	0	0		0	0	0	0		0	66.1	33.9	0		
Total %	0	0	5.1	0	5.1	0	0	0	0	0	0	0	0	0	0	0	62.7	32.1	0	94.9	
Pass Vehicles	0	0	39	0	39	0	0	0	0	0	0	0	0	0	0	0	476	244	0	720	759
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

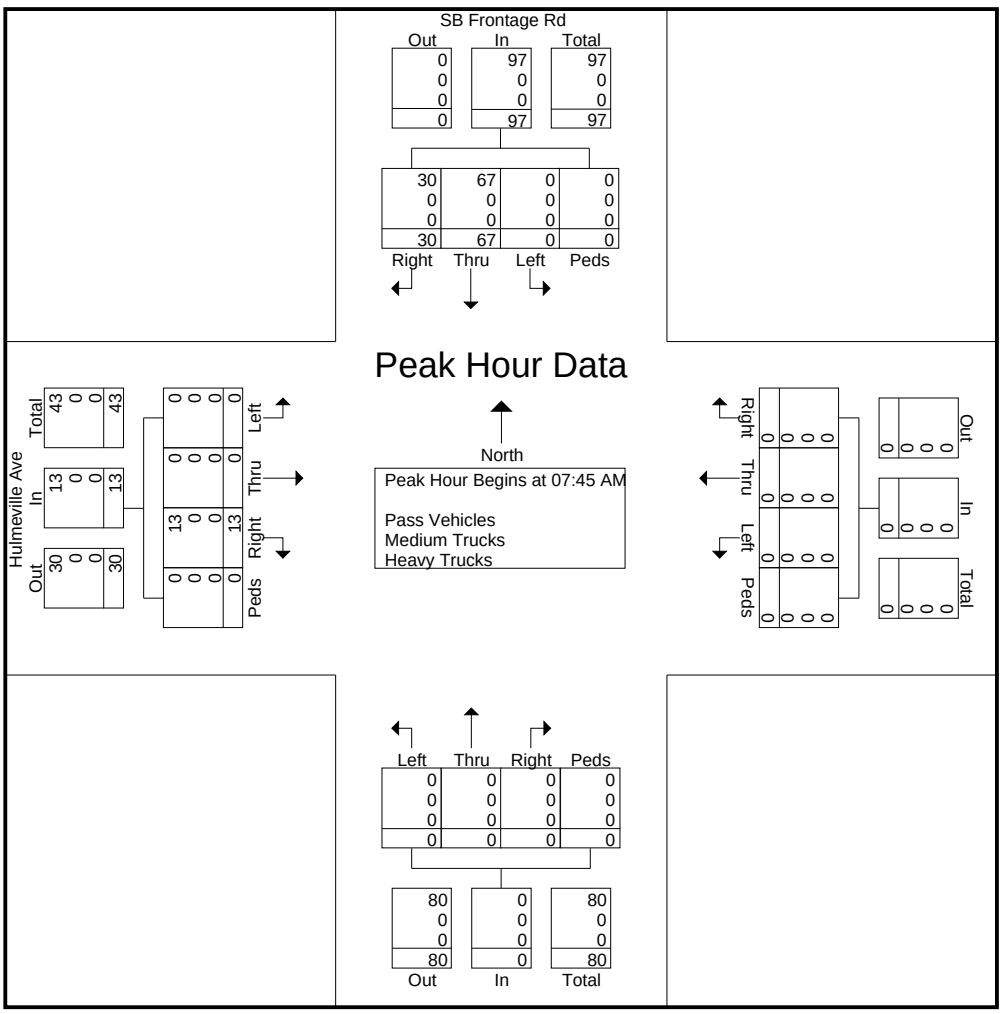
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hulmeville Ave
Date: 04/17/2012
Counter(s): Katie O'Hara

File Name : SB3 F-Rd_Hulmeville Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Hulmeville Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	9	0	26	26
08:00 AM	0	0	**5**	0	**5**	0	0	0	0	0	0	0	0	0	0	0	15	7	0	22	27
08:15 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	**24**	4	0	**28**	**31**
08:30 AM	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	11	**10**	0	21	26
Total Volume	0	0	13	0	13	0	0	0	0	0	0	0	0	0	0	0	67	30	0	97	110
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	69.1	30.9	0		
PHF	.000	.000	.650	.000	.650	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.698	.750	.000	.866	.887
Pass Vehicles																					
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



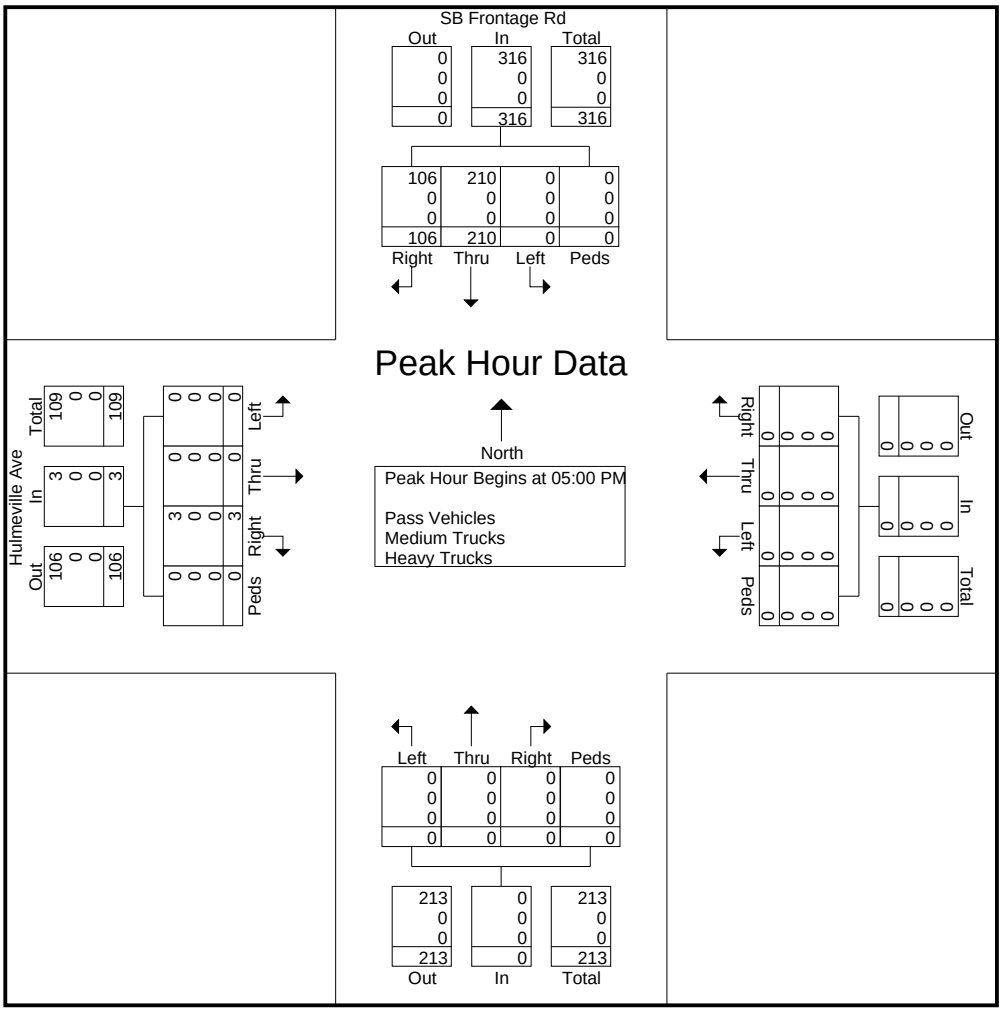
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hulmeville Ave
Date: 04/17/2012
Counter(s): Katie O'Hara

File Name : SB3 F-Rd_Hulmeville Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Hulmeville Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	**1**	0	**1**	0	0	0	0	0	0	0	0	0	0	0	49	24	0	73	74
05:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**55**	**31**	0	**86**	**87**
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54	29	0	83	83
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	52	22	0	74	75
Total Volume	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	210	106	0	316	319
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	66.5	33.5	0		
PHF	.000	.000	.750	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.955	.855	.000	.919	.917
Pass Vehicles																					
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hill Ave
Date: 04/17/2012
Counter(s): Caitlin Orner

File Name : SB4 F-Road_Hill Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Hill Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	0	5	0	6	0	0	0	0	0	0	0	0	0	0	0	18	3	0	21	27
07:15 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	16	4	0	20	23
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	19	19
07:45 AM	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	25	1	0	26	29
Total	1	0	11	0	12	0	0	0	0	0	0	0	0	0	0	0	78	8	0	86	98
08:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	18	0	0	18	20
08:15 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	26	1	0	27	29
08:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	19	0	0	19	21
08:45 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	14	1	0	15	17
Total	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	77	2	0	79	87
*** BREAK ***																					
04:00 PM	0	0	1	0	1	0	0	1	0	1	0	0	0	1	1	0	52	1	0	53	56
04:15 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	67	5	0	72	73
04:30 PM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	53	7	0	60	61
04:45 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	65	3	0	68	70
Total	0	0	3	2	5	0	0	1	0	1	0	0	0	1	1	0	237	16	0	253	260
05:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	73	2	0	75	76
05:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	83	3	0	86	87
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	84	3	0	87	88
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	78	6	0	84	85
Total	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	318	14	0	332	336
Grand Total	1	0	26	2	29	0	0	1	0	1	0	0	0	1	1	0	710	40	0	750	781
Apprch %	3.4	0	89.7	6.9		0	0	100	0		0	0	0	100		0	94.7	5.3	0		
Total %	0.1	0	3.3	0.3	3.7	0	0	0.1	0	0.1	0	0	0	0.1	0.1	0	90.9	5.1	0	96	
Pass Vehicles	1	0	26	2	29	0	0	1	0	1	0	0	0	1	1	0	710	40	0	750	781
% Pass Vehicles	100	0	100	100	100	0	0	100	0	100	0	0	0	100	100	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
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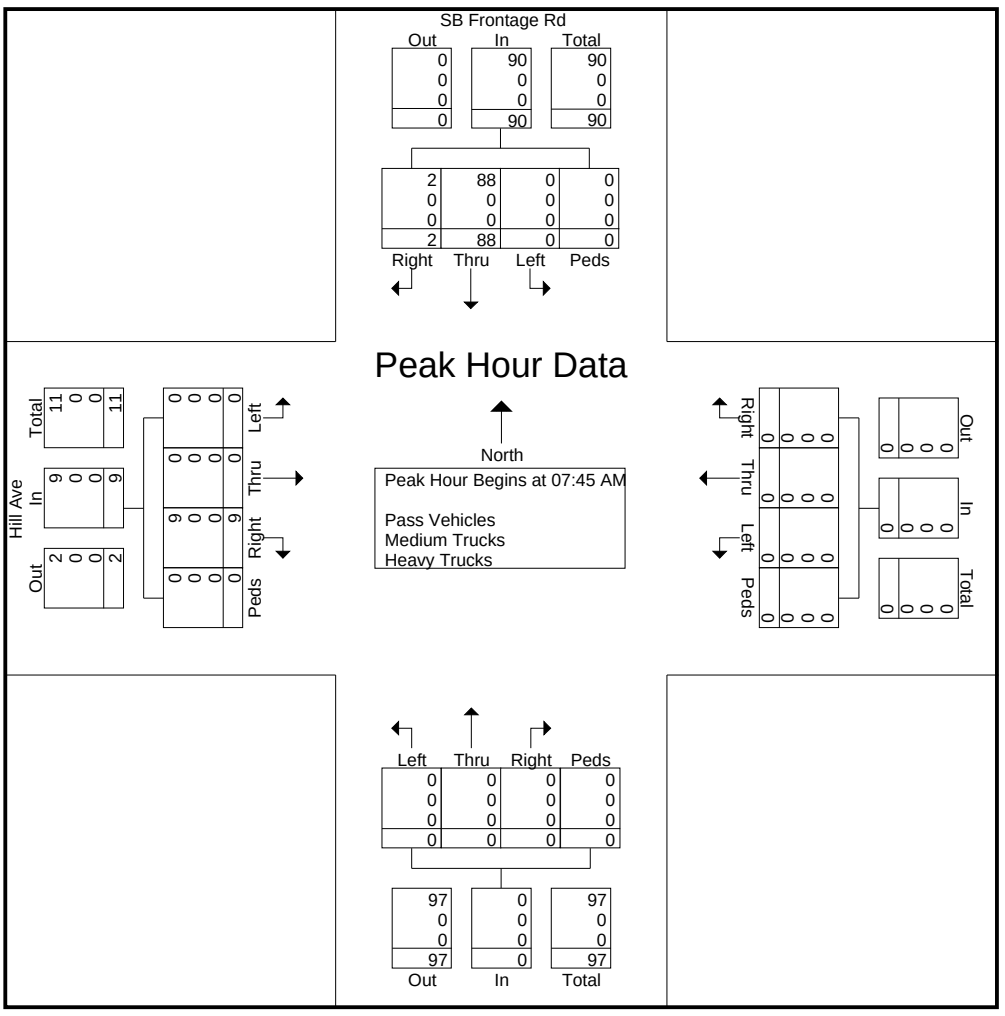
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hill Ave
Date: 04/17/2012
Counter(s): Caitlin Orner

File Name : SB4 F-Road_Hill Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Hill Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	**3**	0	**3**	0	0	0	0	0	0	0	0	0	0	0	25	**1**	0	26	**29**
08:00 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	18	0	0	18	20
08:15 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	**26**	1	0	**27**	29
08:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	19	0	0	19	21
Total Volume	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	88	2	0	90	99
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	97.8	2.2	0		
PHF	.000	.000	.750	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.846	.500	.000	.833	.853
Pass Vehicles																					
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



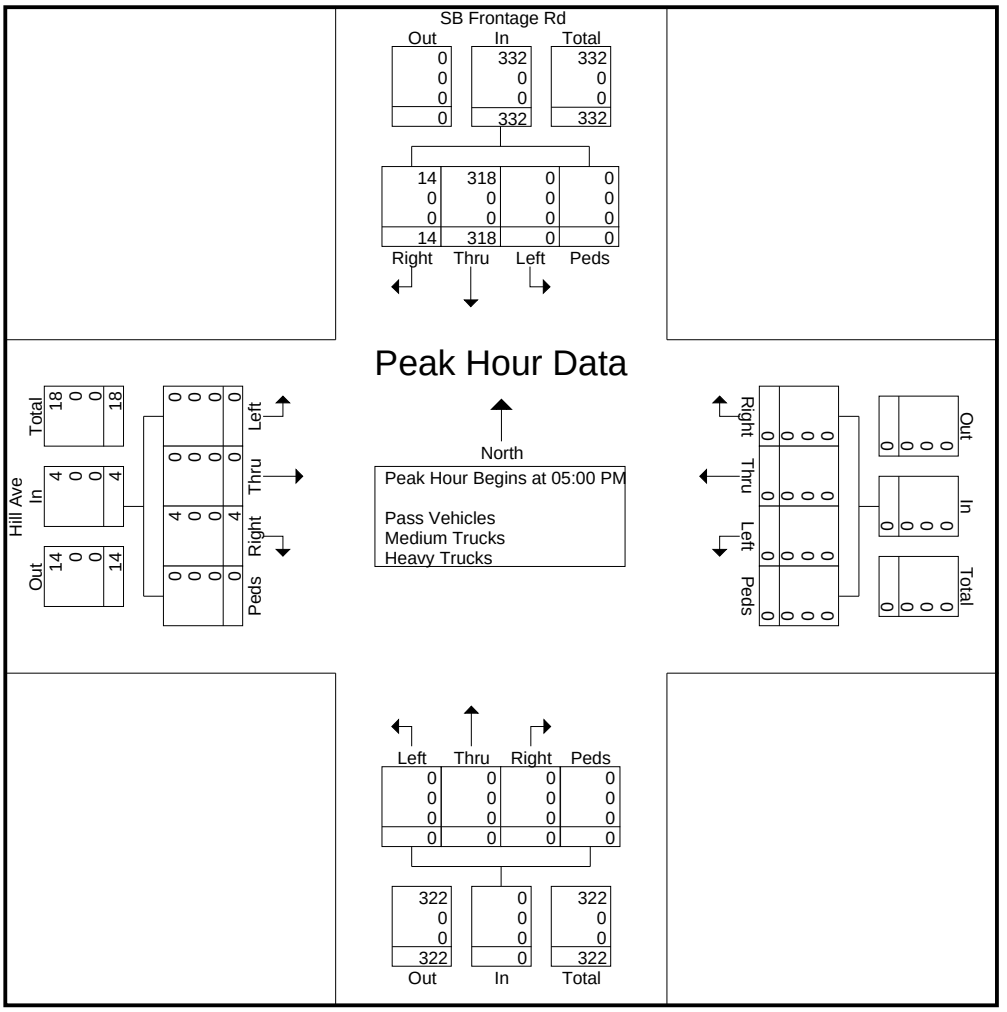
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Hill Ave
Date: 04/17/2012
Counter(s): Caitlin Orner

File Name : SB4 F-Road_Hill Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Hill Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	**1**	0	**1**	0	0	0	0	0	0	0	0	0	0	0	73	2	0	75	76
05:15 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	83	3	0	86	87
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**84**	3	0	**87**	**88**
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	78	**6**	0	84	85
Total Volume	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	318	14	0	332	336
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	95.8	4.2	0		
PHF	.000	.000	1.00	.000	1.00	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.946	.583	.000	.954	.955
Pass Vehicles																					
% Pass Vehicles	0	0	100	0	100	0	0	0	0	0	0	0	0	0	0	0	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108

Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Station Ave
Date: 04/17/2012
Counter(s): Amber Gallas

File Name : SB5 F-Road_Station Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Station Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	104	24	0	0	128	132
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	117	22	1	0	140	140
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	17	1	0	96	96
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	26	1	0	108	108
Total	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	380	89	3	0	472	476
08:00 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	70	20	0	0	90	91
08:15 AM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	88	24	0	0	112	113
08:30 AM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	60	16	3	0	79	81
08:45 AM	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	61	13	1	0	75	77
Total	1	0	5	0	6	0	0	0	0	0	0	0	0	0	0	279	73	4	0	356	362
*** BREAK ***																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66	51	6	0	123	123
04:15 PM	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	66	58	1	0	125	127
04:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	63	60	4	0	127	128
04:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	58	63	0	0	121	122
Total	0	0	3	0	3	0	0	0	0	0	0	1	0	0	1	253	232	11	0	496	500
05:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	68	70	1	0	139	140
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	98	3	0	168	168
05:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	76	82	7	0	165	166
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	53	76	2	0	131	132
Total	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	264	326	13	0	603	606
Grand Total	1	2	13	0	16	0	0	0	0	0	0	1	0	0	1	1176	720	31	0	1927	1944
Apprch %	6.2	12.5	81.2	0		0	0	0	0		0	100	0	0		61	37.4	1.6	0		
Total %	0.1	0.1	0.7	0	0.8	0	0	0	0	0	0	0.1	0	0	0.1	60.5	37	1.6	0	99.1	
Pass Vehicles	1	2	13	0	16	0	0	0	0	0	0	1	0	0	1	1176	720	31	0	1927	1944
% Pass Vehicles	100	100	100	0	100	0	0	0	0	0	0	100	0	0	100	100	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

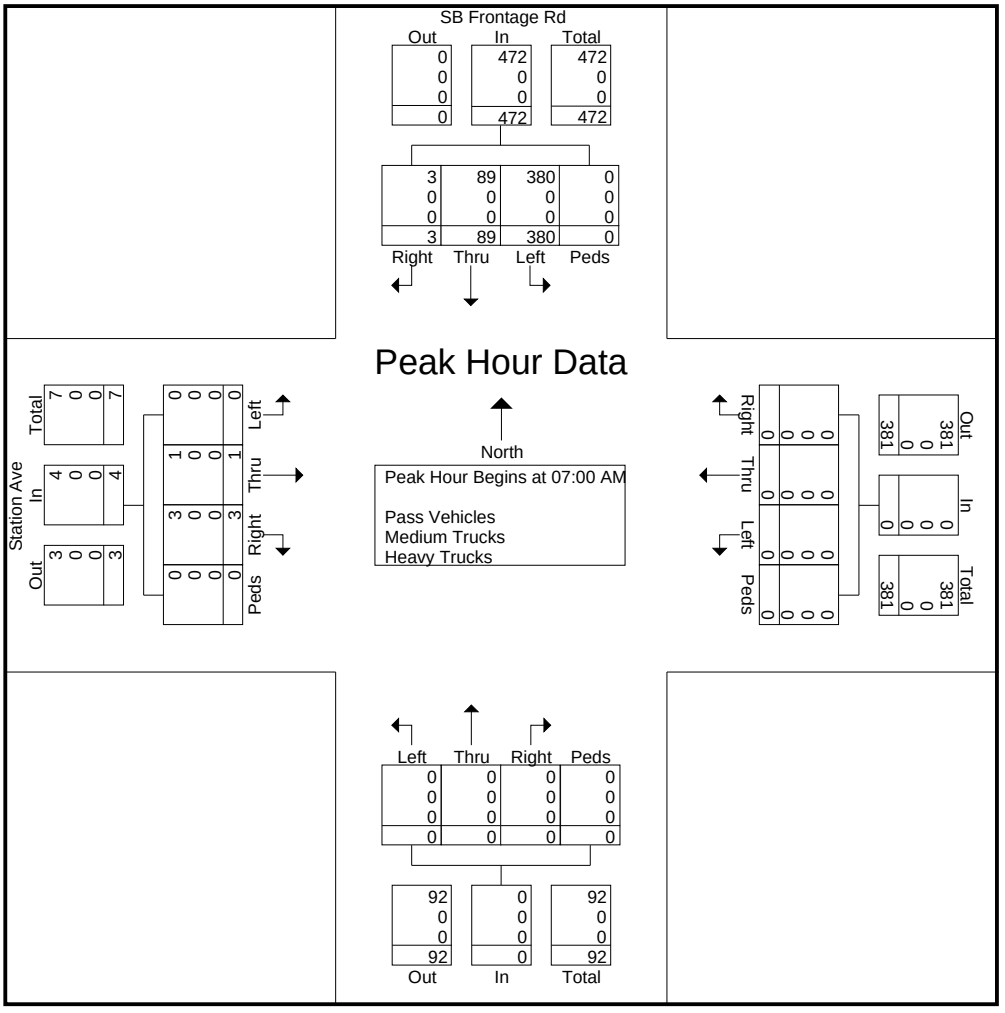
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Station Ave
Date: 04/17/2012
Counter(s): Amber Gallas

File Name : SB5 F-Road_Station Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Station Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 12:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	**1**	**3**	0	**4**	0	0	0	0	0	0	0	0	0	0	104	24	0	0	128	132
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**117**	22	**1**	0	**140**	**140**
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	17	1	0	96	96
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	**26**	1	0	108	108
Total Volume	0	1	3	0	4	0	0	0	0	0	0	0	0	0	0	380	89	3	0	472	476
% App. Total	0	25	75	0		0	0	0	0		0	0	0	0		80.5	18.9	0.6	0		
PHF	.000	.250	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.812	.856	.750	.000	.843	.850
Pass Vehicles																					
% Pass Vehicles	0	100	100	0	100	0	0	0	0	0	0	0	0	0	0	100	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



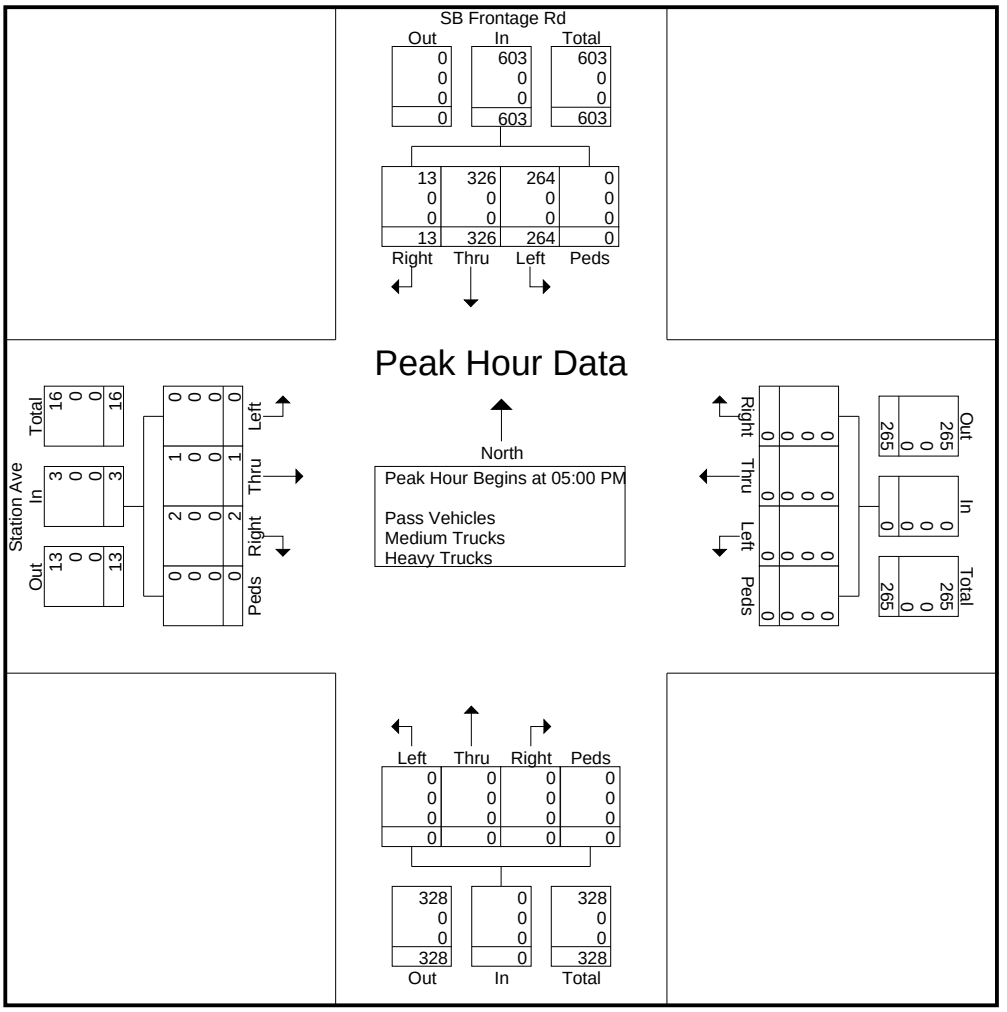
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Station Ave
Date: 04/17/2012
Counter(s): Amber Gallas

File Name : SB5 F-Road_Station Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Station Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:30 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	**1**	0	**1**	0	0	0	0	0	0	0	0	0	0	68	70	1	0	139	140
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	**98**	3	0	**168**	**168**
05:30 PM	0	**1**	0	0	1	0	0	0	0	0	0	0	0	0	0	**76**	82	**7**	0	165	166
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	53	76	2	0	131	132
Total Volume	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	264	326	13	0	603	606
% App. Total	0	33.3	66.7	0		0	0	0	0		0	0	0	0		43.8	54.1	2.2	0		
PHF	.000	.250	.500	.000	.750	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.868	.832	.464	.000	.897	.902
Pass Vehicles																					
% Pass Vehicles	0	100	100	0	100	0	0	0	0	0	0	0	0	0	0	100	100	100	0	100	100
Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Medium Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Bellevue Ave
Date: 04/17/2012
Counter(s): Ryan Mattie

File Name : SB6 F-Rd_Bellevue Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 1

Groups Printed- Pass Vehicles - Medium Trucks - Heavy Trucks

	Bellevue Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	122	0	122	0	0	0	0	0	0	0	0	0	0	0	25	21	0	46	168
07:15 AM	0	0	98	0	98	0	0	0	0	0	0	0	0	0	0	0	30	21	0	51	149
07:30 AM	0	0	80	0	80	0	0	0	0	0	0	0	0	0	0	0	18	29	0	47	127
07:45 AM	0	0	76	0	76	0	0	0	0	0	0	0	0	0	0	0	23	25	0	48	124
Total	0	0	376	0	376	0	0	0	0	0	0	0	0	0	0	0	96	96	0	192	568
08:00 AM	0	0	72	0	72	0	0	0	0	0	0	0	0	0	0	0	22	17	0	39	111
08:15 AM	0	0	78	0	78	0	0	0	0	0	0	0	0	0	0	0	26	25	0	51	129
08:30 AM	0	0	65	0	65	0	0	0	0	0	0	0	0	0	0	0	22	21	0	43	108
08:45 AM	0	0	50	0	50	0	0	0	0	0	0	0	0	0	0	0	20	29	0	49	99
Total	0	0	265	0	265	0	0	0	0	0	0	0	0	0	0	0	90	92	0	182	447
*** BREAK ***																					
04:00 PM	0	0	70	0	70	0	0	0	0	0	0	0	0	0	0	0	61	64	0	125	195
04:15 PM	0	0	69	0	69	0	0	0	0	0	0	0	0	0	0	0	79	53	0	132	201
04:30 PM	0	0	63	0	63	0	0	0	0	0	0	0	0	0	0	0	72	35	0	107	170
04:45 PM	0	0	53	0	53	0	0	0	0	0	0	0	0	0	0	0	63	80	0	143	196
Total	0	0	255	0	255	0	0	0	0	0	0	0	0	0	0	0	275	232	0	507	762
05:00 PM	0	0	60	0	60	0	0	0	0	0	0	0	0	0	0	0	74	54	0	128	188
05:15 PM	0	0	57	0	57	0	0	0	0	0	0	0	0	0	0	0	107	81	0	188	245
05:30 PM	0	0	70	0	70	0	0	0	0	0	0	0	0	0	0	0	100	67	0	167	237
05:45 PM	0	0	52	0	52	0	0	0	0	0	0	0	0	0	0	0	89	61	0	150	202
Total	0	0	239	0	239	0	0	0	0	0	0	0	0	0	0	0	370	263	0	633	872
Grand Total	0	0	1135	0	1135	0	0	0	0	0	0	0	0	0	0	0	831	683	0	1514	2649
Apprch %	0	0	100	0		0	0	0	0		0	0	0	0		0	54.9	45.1	0		
Total %	0	0	42.8	0	42.8	0	0	0	0	0	0	0	0	0	0	0	31.4	25.8	0	57.2	
Pass Vehicles	0	0	1119	0	1119	0	0	0	0	0	0	0	0	0	0	0	824	679	0	1503	2622
% Pass Vehicles	0	0	98.6	0	98.6	0	0	0	0	0	0	0	0	0	0	0	99.2	99.4	0	99.3	99
Medium Trucks	0	0	12	0	12	0	0	0	0	0	0	0	0	0	0	0	3	3	0	6	18
% Medium Trucks	0	0	1.1	0	1.1	0	0	0	0	0	0	0	0	0	0	0	0.4	0.4	0	0.4	0.7
Heavy Trucks	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	4	1	0	5	9
% Heavy Trucks	0	0	0.4	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0.5	0.1	0	0.3	0.3

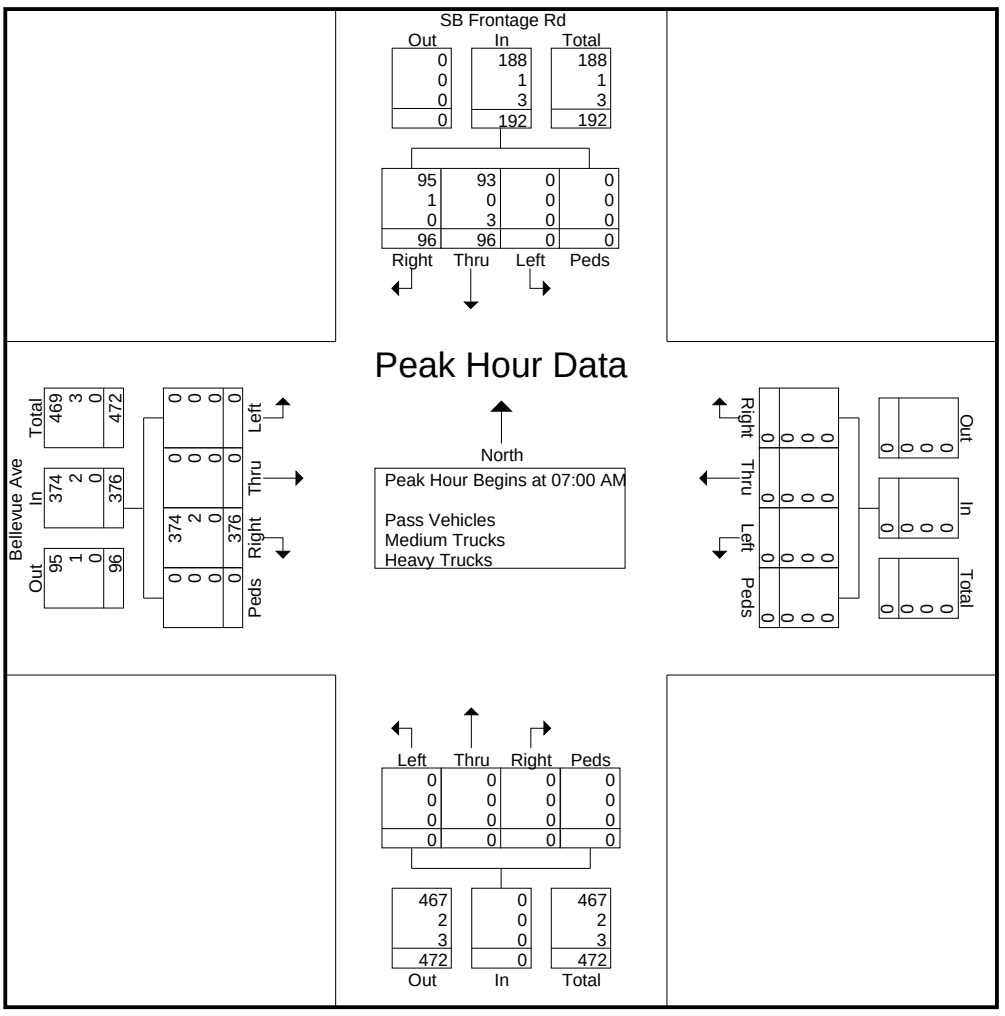
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Bellevue Ave
Date: 04/17/2012
Counter(s): Ryan Mattie

File Name : SB6 F-Rd_Bellevue Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 2

	Bellevue Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:00 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	**122**	0	**122**	0	0	0	0	0	0	0	0	0	0	0	25	21	0	46	**168**
07:15 AM	0	0	98	0	98	0	0	0	0	0	0	0	0	0	0	0	**30**	21	0	**51**	149
07:30 AM	0	0	80	0	80	0	0	0	0	0	0	0	0	0	0	0	18	**29**	0	47	127
07:45 AM	0	0	76	0	76	0	0	0	0	0	0	0	0	0	0	0	23	25	0	48	124
Total Volume	0	0	376	0	376	0	0	0	0	0	0	0	0	0	0	0	96	96	0	192	568
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	50	50	0		
PHF	.000	.000	.770	.000	.770	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.800	.828	.000	.941	.845
Pass Vehicles																					
% Pass Vehicles	0	0	99.5	0	99.5	0	0	0	0	0	0	0	0	0	0	0	96.9	99.0	0	97.9	98.9
Medium Trucks	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
% Medium Trucks	0	0	0.5	0	0.5	0	0	0	0	0	0	0	0	0	0	0	0	1.0	0	0.5	0.5
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	3
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.1	0	0	1.6	0.5



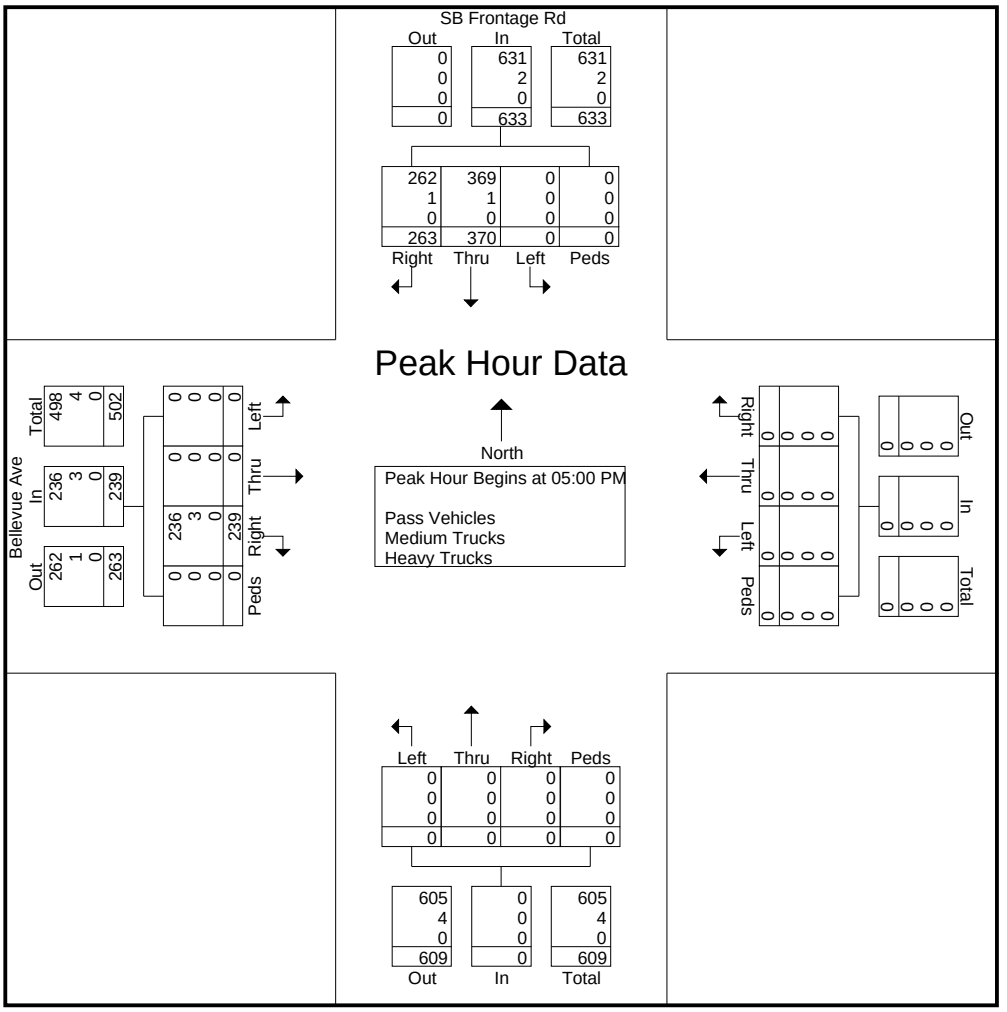
Johnson, Mirmiran & Thompson, Inc.

1550 Coraopolis Heights Road
Moon Township, PA 15108
Engineering a Brighter Future

Location: Middletown Twp, PA & Langhorne Manor, PA
Intersection: US 1 SB Frontage Rd & Bellevue Ave
Date: 04/17/2012
Counter(s): Ryan Mattie

File Name : SB6 F-Rd_Bellevue Ave
Site Code : 00000000
Start Date : 4/17/2012
Page No : 3

	Bellevue Ave Eastbound					Westbound					Northbound					SB Frontage Rd Southbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 11:15 AM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	0	60	0	60	0	0	0	0	0	0	0	0	0	0	0	74	54	0	128	188
05:15 PM	0	0	57	0	57	0	0	0	0	0	0	0	0	0	0	0	**107**	**81**	0	**188**	**245**
05:30 PM	0	0	**70**	0	**70**	0	0	0	0	0	0	0	0	0	0	0	100	67	0	167	237
05:45 PM	0	0	52	0	52	0	0	0	0	0	0	0	0	0	0	0	89	61	0	150	202
Total Volume	0	0	239	0	239	0	0	0	0	0	0	0	0	0	0	0	370	263	0	633	872
% App. Total	0	0	100	0		0	0	0	0		0	0	0	0		0	58.5	41.5	0		
PHF	.000	.000	.854	.000	.854	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.864	.812	.000	.842	.890
Pass Vehicles																					
% Pass Vehicles	0	0	98.7	0	98.7	0	0	0	0	0	0	0	0	0	0	0	99.7	99.6	0	99.7	99.4
Medium Trucks	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	5
% Medium Trucks	0	0	1.3	0	1.3	0	0	0	0	0	0	0	0	0	0	0	0.3	0.4	0	0.3	0.6
Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Miovision Automated Traffic Recorder (ATR) Counts

SR 0001, Section RC3 (Frontage Road)
May 2012 Traffic Volume Count

	NORTHBOUND									SOUTHBOUND								
Begin	ALL VEHICLES - 15 min			ALL VEHICLES - Hrly			HEAVY VEHICLES - Hrly			ALL VEHICLES - 15 min			ALL VEHICLES - Hrly			HEAVY VEHICLES - Hrly		
Time	TOTAL	Frontage	Mainline	TOTAL	Frontage	Mainline	TOTAL	Frontage	Mainline	TOTAL	Frontage	Mainline	TOTAL	Frontage	Mainline	TOTAL	Frontage	Mainline
12:00 AM	78	1	77	272	3	269	13	0	13	74	0	74	230	0	230	14	0	14
12:15 AM	67	0	67	247	3	244	16	0	16	66	0	66	201	1	200	17	0	17
12:30 AM	68	1	67	232	5	227	17	0	17	54	0	54	175	1	174	22	0	22
12:45 AM	60	1	59	210	4	206	17	0	17	38	0	38	155	1	154	20	0	20
1:00 AM	53	1	52	197	4	193	20	0	20	44	1	43	143	1	142	20	0	20
1:15 AM	52	2	50	185	4	181	21	0	21	40	0	40	147	0	147	26	0	26
1:30 AM	47	0	47	176	4	172	21	0	21	34	0	34	140	0	140	22	0	22
1:45 AM	47	1	46	172	5	167	19	0	19	26	0	26	125	0	125	19	0	19
2:00 AM	41	2	39	157	4	153	16	0	16	48	0	48	119	0	119	20	0	20
2:15 AM	43	2	41	144	3	141	15	0	15	33	0	33	96	0	96	14	0	14
2:30 AM	43	1	42	141	2	139	16	0	16	19	0	19	89	0	89	15	0	15
2:45 AM	33	1	32	139	2	137	16	0	16	20	0	20	96	1	95	19	0	19
3:00 AM	28	1	27	149	1	148	23	0	23	25	0	25	112	2	110	26	0	26
3:15 AM	39	0	39	174	1	173	33	0	33	26	0	26	121	2	119	29	0	29
3:30 AM	40	1	39	200	3	197	38	0	38	26	1	25	135	4	131	32	0	32
3:45 AM	43	0	43	244	2	242	39	0	39	36	1	35	168	3	165	36	0	36
4:00 AM	53	1	52	275	4	271	36	0	36	34	1	33	192	3	189	31	0	31
4:15 AM	65	2	63	324	5	319	30	0	30	41	2	39	240	4	236	35	0	35
4:30 AM	85	0	85	423	7	416	30	0	30	59	1	58	336	6	330	41	0	41
4:45 AM	74	2	72	575	12	563	37	0	37	59	0	59	461	7	454	39	0	39
5:00 AM	102	2	100	767	17	750	45	2	43	82	2	80	637	9	628	44	0	44
5:15 AM	162	3	159	979	24	955	54	5	49	137	4	133	869	9	860	45	0	45
5:30 AM	238	6	232	1277	34	1243	66	11	55	184	2	182	1167	12	1155	52	0	52
5:45 AM	267	7	260	1711	47	1664	72	14	58	236	2	234	1575	25	1550	62	0	62
6:00 AM	314	9	305	2220	72	2148	81	19	62	314	2	312	2152	60	2092	87	4	83
6:15 AM	462	14	448	2579	103	2476	91	21	70	436	7	429	2743	109	2634	94	5	89
6:30 AM	670	18	652	2823	118	2705	84	17	67	590	14	576	3049	115	2934	86	5	81
6:45 AM	776	32	744	2931	127	2804	82	16	66	814	38	776	3210	113	3097	84	5	79
7:00 AM	672	39	633	2951	121	2830	71	10	61	903	50	853	3089	88	3001	71	1	70
7:15 AM	705	29	676	2985	101	2884	56	4	52	743	14	729	2921	53	2868	67	0	67
7:30 AM	779	27	752	3028	103	2925	59	4	55	751	12	739	2866	48	2818	70	0	70
7:45 AM	795	26	769	3014	111	2903	62	6	56	694	13	681	2738	45	2693	76	1	75
8:00 AM	708	20	688	2948	112	2836	62	6	56	735	15	720	2670	40	2630	80	1	79
8:15 AM	747	30	717	2807	110	2697	64	6	58	688	9	679	2476	30	2446	86	2	84
8:30 AM	766	36	730	2607	103	2504	66	5	61	623	9	614	2297	34	2263	89	3	86
8:45 AM	730	27	703	2327	91	2236	59	1	58	625	8	617	2141	28	2113	87	2	85
9:00 AM	565	17	548	2051	78	1973	65	1	64	541	5	536	1945	25	1920	76	2	74
9:15 AM	548	24	524	1876	71	1805	74	1	73	509	13	496	1854	24	1830	74	1	73
9:30 AM	485	23	462	1694	56	1638	74	1	73	467	2	465	1781	18	1763	80	1	79
9:45 AM	454	14	440	1576	44	1532	76	1	75	429	5	424	1747	19	1728	78	1	77
10:00 AM	390	10	380	1494	40	1454	69	2	67	450	4	446	1711	20	1691	84	1	83
10:15 AM	366	9	357	1471	50	1421	65	2	63	436	7	429	1667	23	1644	88	1	87
10:30 AM	366	11	355	1465	54	1411	61	1	60	433	3	430	1652	22	1630	81	0	81
10:45 AM	372	10	362	1482	59	1423	69	1	68	393	6	387	1626	24	1602	83	0	83
11:00 AM	367	20	347	1476	68	1408	73	1	72	406	7	399	1661	23	1638	84	0	84
11:15 AM	360	13	347	1475	62	1413	71	1	70	421	6	415	1674	21	1653	79	0	79
11:30 AM	383	16	367	1505	59	1446	70	1	69	407	5	402	1656	17	1639	79	0	79
11:45 AM	366	19	347	1500	53	1447	70	2	68	429	6	423	1678	20	1658	77	0	77
12:00 PM	367	15	352	1542	49	1493	75	1	74	419	5	414	1634	20	1614	77	0	77
12:15 PM	390	10	380	1573	49	1524	72	2	70	403	2	401	1606	20	1586	73	0	73
12:30 PM	378	10	368	1604	53	1551	73	3	70	429	8	421	1632	26	1606	74	0	74
12:45 PM	408	15	393	1654	67	1587	72	9	63	384	5	379	1602	26	1576	71	0	71
1:00 PM	398	15	383	1649	64	1585	68	10	58	392	6	386	1671	28	1643	67	0	67
1:15 PM	422	14	408	1689	69	1620	67	9	58	429	8	421	1725	29	1696	74	0	74
1:30 PM	429	25	404	1771	113	1658	75	14	61	399	8	391	1759	27	1732	76	1	75
1:45 PM	403	12	391	1910	162	1748	88	20	68	452	7	445	1826	24	1802	75	1	74
2:00 PM	438	20	418	2059	179	1880	89	19	70	446	6	440	1883	18	1865	67	1	66
2:15 PM	504	58	446	2109	184	1925	92	20	72	463	6	457	2036	19	2017	53	1	52
2:30 PM	568	74	494	2138	151	1987	93	15	78	465	5	460	2199	15	2184	41	1	40
2:45 PM	551	28	523	2164	100	2064	70	1	69	510	2	508	2400	16	2384	36	1	35
3:00 PM	488	25	463	2209	100	2109	68	2	66	599	7	592	2597	19	2578	33	1	32
3:15 PM	532	25	507	2330	101	2229	64	1	63	627	2	625	2735	25	2710	44	5	39
3:30 PM	594	23	571	2465	106	2359	52	1	51	665	5	660	2890	34	2856	51	4	47
3:45 PM	596	28	568	2592	112	2480	50	1	49	707	5	702	2997	39	2958	52	5	47
4:00 PM	609	26	583	2687	117	2570	44	1	43	737	13	724	3050	42	3008	55	5	50
4:15 PM	667	30	637	2846	124	2722	39	1	38	782	12	770	3092	35	3057	46	1	45
4:30 PM	721	29	692	2994	122	2872	34	2	32	773	10	763	3209	31	3178	40	1	39
4:45 PM	692	33	659	3027	120	2907	33	2	31	760	8	752	3249	30	3219	38	0	38
5:00 PM	768	33	735	3107	120	2987	31	2	29	779	6	773	3281	35	3246	33	0	33
5:15 PM	815	28	787	3052	113	2939	28	2	26	899	8	891	3225	38	3187	34	1	33
5:30 PM	754	27	727	2927	104	2823	26	0	26	813	9	804	2992	34	2958	33	1	32
5:45 PM	771	33	738	2831	97	2734	25	0	25	792	13	779	2791	31	2760	30	2	28
6:00 PM	713	26	687	2628	84	2544	25	0	25	721	8	713	2527	21	2506	31	2	29
6:15 PM	689	18	671	2352	75	2277	29	0	29	667	5	662	2317	16	2301	26	1	25
6:30 PM	658	20	638	2083	74	2009	30	0	30	611	5	606	2064	17	2047	28	1	27
6:45 PM	569	21	548	1797	66	1731	27	0	27	529	4	525	1867	13	1854	24	0	24
7:00 PM	436	16	420	1566	63	1503	23	0	23	511	3	508	1704	13	1691	25	0	25
7:15 PM	420	17	403	1475	68	1407	20	0	20	413	5	408	1531	12	1519	27	0	27
7:30 PM	373	12	361	1354	65	1289	16	0	16	415	2	413	1451	13	1438	22	0	22
7:45 PM	338	18	320	1286	60	1226	14	0	14	366	4	362	1350	13	1337	29	0	29
8:00 PM	346	22	324	1240	55	1185	17	0	17	338	2	336	1259	11	1248	29	0	29
8:15 PM	299	14	285	1155	44	1111	16	0	16	333	6	327	1240	10	1230	25	0	25
8:30 PM	305	8	297	1128	40	1088	17	0	17	314	2	312	1182	5	1177	28	0	28
8:45 PM	291	12	279	1090	39	1051	20	0	20	275	1	274	1107	3	1104	24	0	24
9:00 PM	261	11	250	1051	35	1016	21	0	21	319	1	318	1041	4	1037	22	0	22
9:15 PM	272	10	262	999	33	966	24	0	24	275	1	274	911	4	907	21	0	21
9:30 PM	267	6	261	914	27	887	23	0	23	240	1	239	797	5	792	19	0	19
9:45 PM	252	8	244	866	29	837	24	0	24	209	2	207	704	5	699	17	0	17
10:00 PM	209	9	200	785	29	756	20	0	20	188	1	187	623	3	620	17	0	17
10:15 PM	186	4	182	727	25	702	17	0	17	162	2	160	654	3	651	15	0	15
10:30 PM	219	8	211	665	24	641	16	0	16	146	0	146	633	3	630	16	0	16
10:45 PM	171	8	163	548	20	528	13	0	13	129	1	128	596	3	593	17	0	17
11:00 PM	153	6	147	470	12	458	16	0	16	219	1	218	548	3	545	16	0	16
11:15 PM	124	3	121	357	7	350	13	0	13	139	1	138	369	2	367	15	0	15
11:30 PM	102	4	98	271	4	267	11	0	11	110	1	109	261	1	260	11	0	11
11:45 PM	93	0	93	207	1	206	12	0	12	80	0	80	180	0	180	10	0	10
TOTAL	35983	1448	34535							36511	502	36009						

VCU ID: SCU1CZ

Setup Rating:

Classification Options

Vehicle: C / M / H

Study Type: ATR

Total Length: 47:59:37

Number of Trims: 1

Turnaround Time

Selected: 48 hours

Delivered: 46.4 hours

N

Show Approach Labels

VCU ID: n/a

Setup Rating:

Classification Options

Vehicle: C / M / H

Study Type: ATR

Total Length: 47:59:40

Number of Trims: 1

Turnaround Time

Selected: 48 hours

Delivered: 48.5 hours

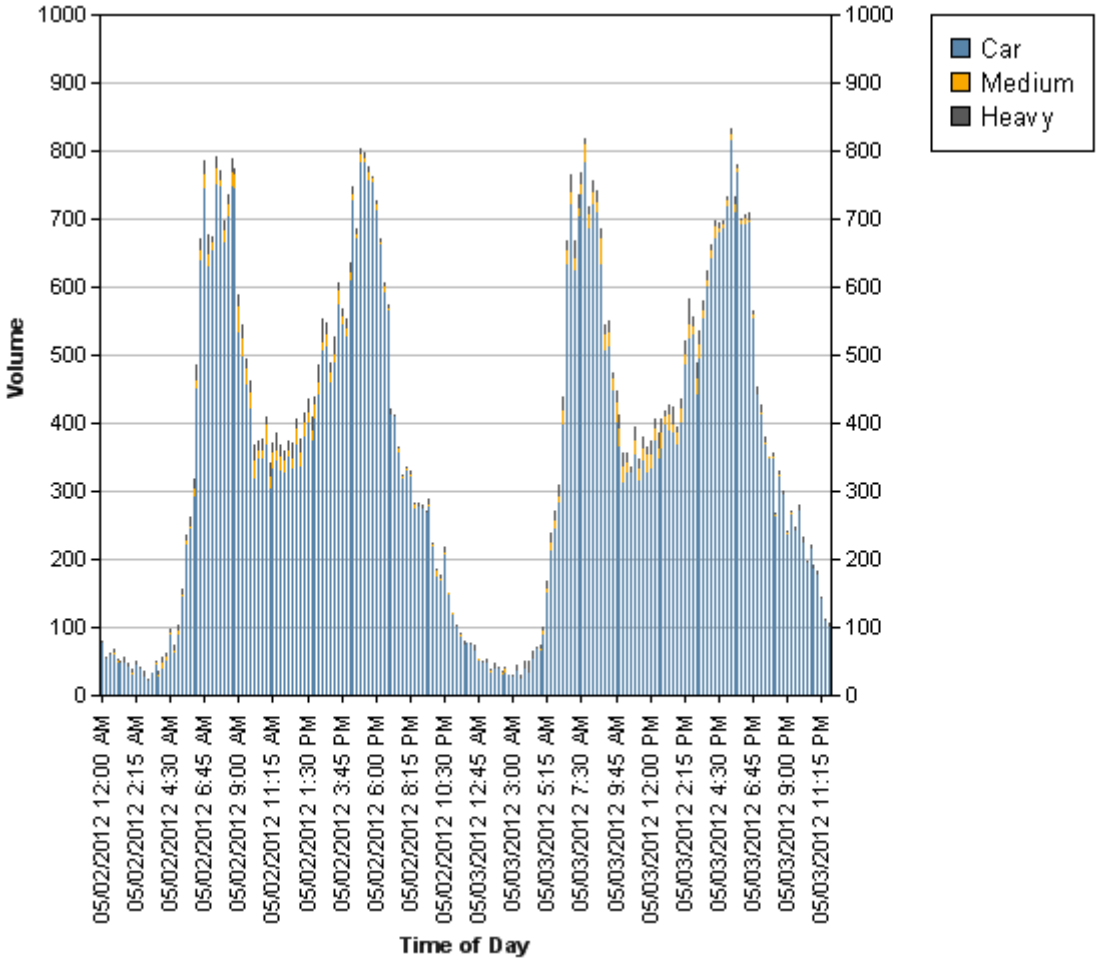
N

Show Approach Labels

Johnson, Mirmiran and Thompson
72 Loveton Circle

Sparks, Maryland, United States 21152
410-316-2278 mwolniak@jmt.com

Count Name: NB Route 1 @ Timber Ln - Langhorne, PA
Site Code:
Start Date: 05/02/2012



Johnson, Mirmiran and Thompson
72 Loveton Circle

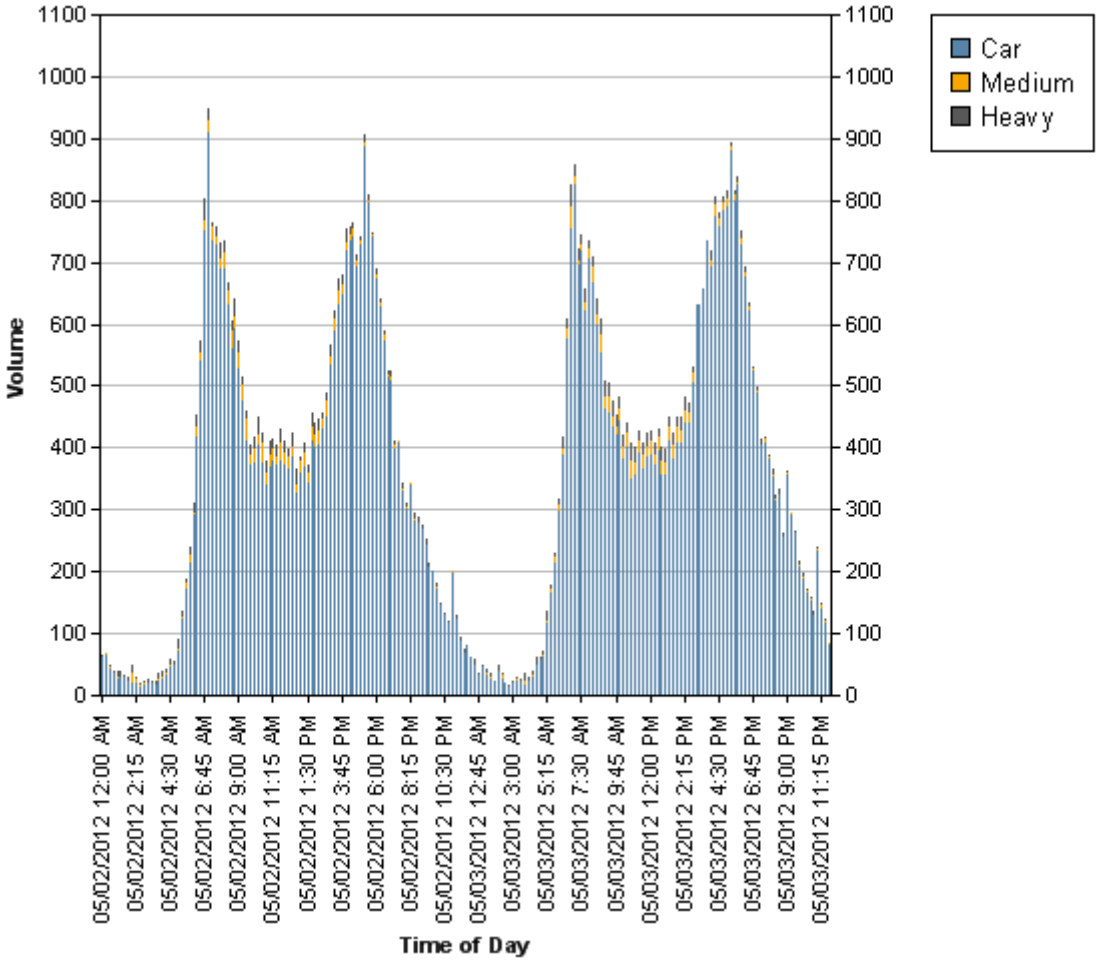
Sparks, Maryland, United States 21152
410-316-2278 mwolniak@jmt.com

Camera located on the median (east pole of the overhead sign structure) facing NB traffic. The count should be done only for the three (3) northbound lanes; two (2) main lanes on Route 1 and one (1) lane on the Frontage Road.

Johnson, Mirmiran and Thompson
72 Loveton Circle

Sparks, Maryland, United States 21152
410-316-2278 mwolniak@jmt.com

Count Name: SB Route 1 @ Timber Ln - Langhorne, PA
Site Code:
Start Date: 05/02/2012



Johnson, Mirmiran and Thompson
72 Loveton Circle

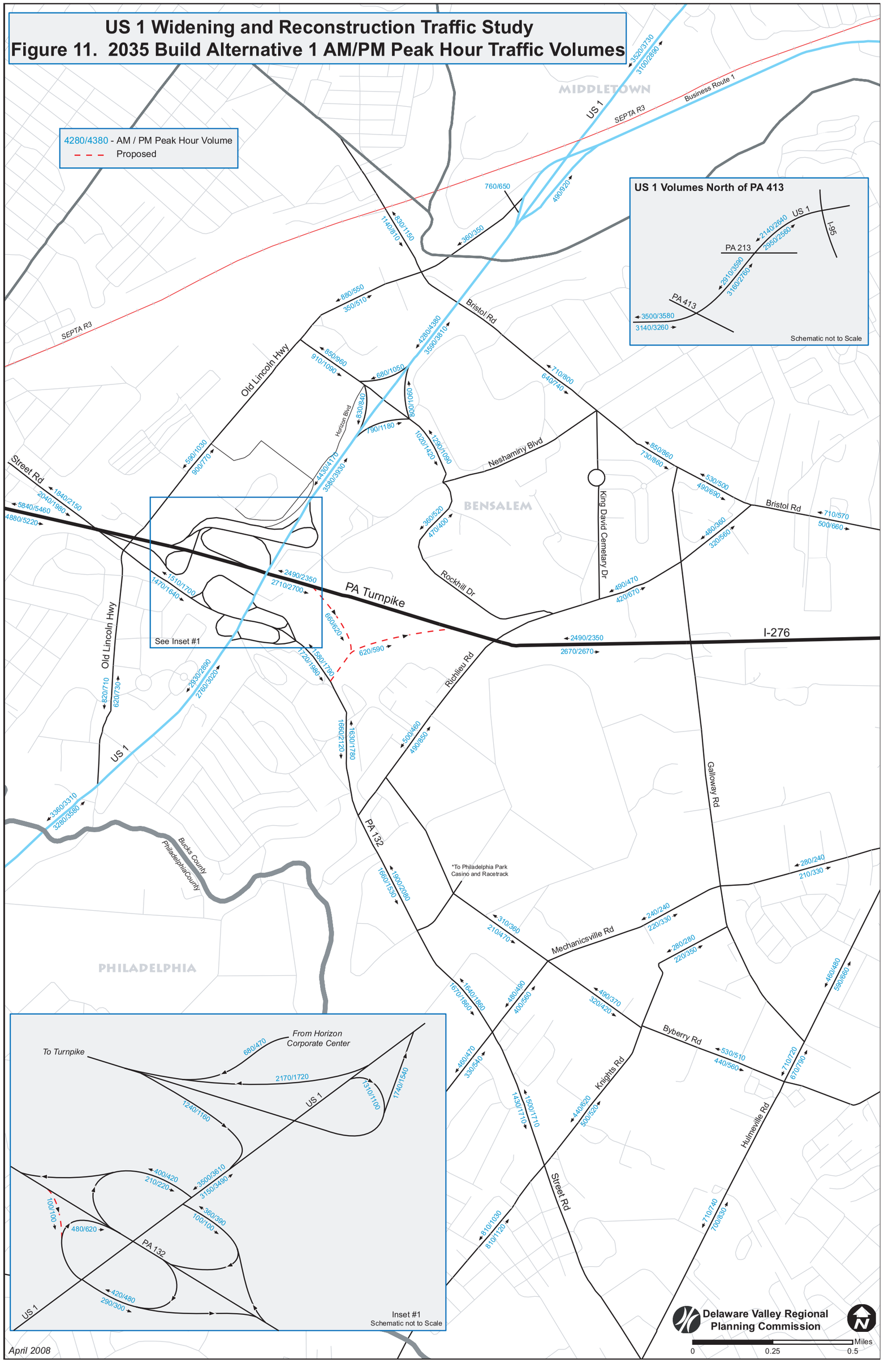
Sparks, Maryland, United States 21152
410-316-2278 mwolniak@jmt.com

Camera located on the median (west pole of the overhead sign structure) facing SB traffic. The count should be for the three (3) southbound lanes; two main lanes on Route 1 and one (1) lane on the Frontage Road.

Appendix B

DVRPC Traffic Forecasts

US 1 Widening and Reconstruction Traffic Study
Figure 11. 2035 Build Alternative 1 AM/PM Peak Hour Traffic Volumes



Appendix C

Existing Conditions Capacity Analyses Worksheets

Basic Freeway Sections

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3030*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1804*	pc/h/ln
S	*59.2*	mph
D = v_p / S	*30.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 150+00 - Sta. 192+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2925*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1742*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*29.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 192+00 - Sta. 232+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2990*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1781*	pc/h/ln
S	*59.4*	mph
D = v_p / S	*30.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 232+00 - Sta. 252+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2865*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1706*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 252+00 - Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2690*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1602*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*26.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Above Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3025*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1801*	pc/h/ln
S	*59.3*	mph
D = v_p / S	*30.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3110*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1699*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 150+00 - Sta. 192+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2990*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1634*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 192+00 - Sta. 232+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3075*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1680*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*28.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 232+00 - Sta. 252+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2965*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1620*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 252+00 - Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2725*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1489*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*24.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Above Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2915*	veh/h	Peak-Hour Factor, PHF	*0.97*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1593*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*26.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3345*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2015*	pc/h/ln
S	*56.9*	mph
D = v_p / S	*35.4*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 150+00 - Sta. 180+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3060*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1843*	pc/h/ln
S	*58.9*	mph
D = v_p / S	*31.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 180+00 - Sta. 230+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3100*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1867*	pc/h/ln
S	*58.7*	mph
D = v_p / S	*31.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 230+00 - Sta. 250+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3070*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1849*	pc/h/ln
S	*58.9*	mph
D = v_p / S	*31.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 250+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2690*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1620*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2885*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1738*	pc/h/ln
S	*59.7*	mph
D = v_p / S	*29.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3310*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1866*	pc/h/ln
S	*58.7*	mph
D = v_p / S	*31.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 150+00 - Sta. 180+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3160*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1782*	pc/h/ln
S	*59.4*	mph
D = v_p / S	*30.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 180+00 - Sta. 230+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3245*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1830*	pc/h/ln
S	*59.0*	mph
D = v_p / S	*31.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 230+00 - Sta. 250+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3200*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1804*	pc/h/ln
S	*59.2*	mph
D = v_p / S	*30.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 250+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2930*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1652*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2012*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3565*	veh/h	Peak-Hour Factor, PHF	*0.94*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2010*	pc/h/ln
S	*56.9*	mph
D = v_p / S	*35.3*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

Ramp Merge/Diverge

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp
☑ Yes	☐ On	Acceleration Lane Length, L_A	500	☐ Yes ☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No ☐ Off
L_{up} =	3200 ft	Freeway Volume, V_F	3060	L_{down} = ft
V_u =	40 veh/h	Ramp Volume, V_R	285	V_D = veh/h
		Freeway Free-Flow Speed, S_{FF}	60.0	
		Ramp Free-Flow Speed, S_{FR}	35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3060	0.89	Rolling	4	0	0.943	1.00	3644
Ramp	285	0.90	Rolling	0	0	1.000	1.00	317
UpStream	40	0.90	Rolling	0	0	1.000	1.00	44
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3644 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3961	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3961	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 33.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.491 (Exibit 13-11)

S_R = 51.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 51.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 182+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2012
Project Description	Frontage Road Analysis		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 3200 ft
V_u = veh/h	Freeway Volume, V_F: 3100	V_D = 285 veh/h
	Ramp Volume, V_R: 40	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3100	0.89	Rolling	4	0	0.943	1.00	3692
Ramp	40	0.90	Rolling	0	0	1.000	1.00	44
UpStream								
DownStream	285	0.90	Rolling	0	0	1.000	1.00	317

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3692 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3692	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3648	Exhibit 13-8	4600	No
V_R	44	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3692	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 31.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.432 (Exhibit 13-12)

S_R = 52.2 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	700
Deceleration Lane Length L_D	
Freeway Volume, V_F	3070
Ramp Volume, V_R	30
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{down} = 5000 ft
V_D = 40 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3070	0.89	Rolling	4	0	0.943	1.00	3656
Ramp	30	0.25	Rolling	0	0	1.000	1.00	120
UpStream								
DownStream	40	0.90	Rolling	0	0	1.000	1.00	44

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3656 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3776	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3776	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = 30.5 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.442 (Exibit 13-11)
S_R = 52.0 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 52.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 250+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 1500 ft
V_u = 195 veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	800
Deceleration Lane Length L_D	
Freeway Volume, V_F	2690
Ramp Volume, V_R	380
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2690	0.89	Rolling	4	0	0.943	1.00	3204
Ramp	380	0.81	Rolling	0	0	1.000	1.00	469
UpStream	195	0.94	Rolling	0	0	1.000	1.00	207
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3204 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3673	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3673	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.9 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.419 (Exibit 13-11)
S_R = 52.5 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 52.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 265+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1500 ft
V_u = veh/h	Freeway Volume, V_F: 2885	V_D = 380 veh/h
	Ramp Volume, V_R: 195	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2885	0.88	Rolling	4	0	0.943	1.00	3475
Ramp	195	0.94	Rolling	0	0	1.000	1.00	207
UpStream								
DownStream	380	0.81	Rolling	0	0	1.000	1.00	469

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3475 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3475	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3268	Exhibit 13-8	4600	No
V_R	207	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3475	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.447 (Exhibit 13-12)

S_R = 52.0 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 4200 ft
V_u = veh/h	Freeway Volume, V_F: 3110	V_D = 85 veh/h
	Ramp Volume, V_R: 120	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3110	0.93	Rolling	4	0	0.943	1.00	3545
Ramp	120	0.90	Rolling	0	0	1.000	1.00	133
UpStream								
DownStream	85	0.89	Rolling	0	0	1.000	1.00	96

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3545 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3545	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3412	Exhibit 13-8	4600	No
V_R	133	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3545	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.440 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 192+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	800
Deceleration Lane Length L_D	
Freeway Volume, V_F	2990
Ramp Volume, V_R	85
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{down} = 4000 ft
V_D = 110 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2990	0.93	Rolling	4	0	0.943	1.00	3408
Ramp	85	0.89	Rolling	0	0	1.000	1.00	96
UpStream								
DownStream	110	0.90	Rolling	0	0	1.000	1.00	122

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3408 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3504	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3504	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = 27.7 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.395 (Exibit 13-11)
S_R = 52.9 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 52.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2000 ft
V_u = veh/h	Freeway Volume, V_F: 3075	V_D = 240 veh/h
	Ramp Volume, V_R: 110	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3075	0.93	Rolling	4	0	0.943	1.00	3505
Ramp	110	0.90	Rolling	0	0	1.000	1.00	122
UpStream								
DownStream	240	0.89	Rolling	0	0	1.000	1.00	270

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3505 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3505	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3383	Exhibit 13-8	4600	No
V_R	122	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3505	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.439 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 252+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	500	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	2965	L_{down} =	1000 ft
V_u =	veh/h	Ramp Volume, V_R	240	V_D =	190 veh/h
		Freeway Free-Flow Speed, S_{FF}	60.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2965	0.93	Rolling	4	0	0.943	1.00	3379
Ramp	240	0.89	Rolling	0	0	1.000	1.00	270
UpStream								
DownStream	190	0.78	Rolling	0	0	1.000	1.00	244

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3379 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3379	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3109	Exhibit 13-8	4600	No
V_R	270	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3379	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.452 (Exhibit 13-12)

S_R = 51.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.9 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 262+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = 1000 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 240 veh/h	Freeway Volume, V_F: 2725	V_D = veh/h
	Ramp Volume, V_R: 190	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2725	0.93	Rolling	4	0	0.943	1.00	3106
Ramp	190	0.78	Rolling	0	0	1.000	1.00	244
UpStream	240	0.89	Rolling	0	0	1.000	1.00	270
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3106 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3350	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3350	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 28.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.397 (Exibit 13-11)

S_R = 52.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 52.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2012
Project Description	Frontage Road Analysis		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 4200 ft
V_u = veh/h	Freeway Volume, V_F: 3030	V_D = 65 veh/h
	Ramp Volume, V_R: 105	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3030	0.93	Rolling	4	0	0.943	1.00	3454
Ramp	105	0.90	Rolling	0	0	1.000	1.00	117
UpStream								
DownStream	65	0.89	Rolling	0	0	1.000	1.00	73

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3454 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3454	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3337	Exhibit 13-8	4600	No
V_R	117	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3454	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.5 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.439 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 192+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 800	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = 4000 ft
V_u = veh/h	Freeway Volume, V_F: 2925	V_D = 125 veh/h
	Ramp Volume, V_R: 65	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2925	0.93	Rolling	4	0	0.943	1.00	3334
Ramp	65	0.89	Rolling	0	0	1.000	1.00	73
UpStream								
DownStream	125	0.90	Rolling	0	0	1.000	1.00	139

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3334 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3407	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3407	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 27.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.383 (Exibit 13-11)

S_R = 53.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 53.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2000 ft
V_u = veh/h	Freeway Volume, V_F: 2990	V_D = 175 veh/h
	Ramp Volume, V_R: 125	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2990	0.93	Rolling	4	0	0.943	1.00	3408
Ramp	125	0.90	Rolling	0	0	1.000	1.00	139
UpStream								
DownStream	175	0.89	Rolling	0	0	1.000	1.00	197

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3408 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3408	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3269	Exhibit 13-8	4600	No
V_R	139	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3408	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.441 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 252+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1000 ft
V_u = veh/h	Freeway Volume, V_F: 2865	V_D = 335 veh/h
	Ramp Volume, V_R: 175	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2865	0.93	Rolling	4	0	0.943	1.00	3265
Ramp	175	0.89	Rolling	0	0	1.000	1.00	197
UpStream								
DownStream	335	0.78	Rolling	0	0	1.000	1.00	429

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3265 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3265	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3068	Exhibit 13-8	4600	No
V_R	197	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3265	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.8 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.446 (Exhibit 13-12)

S_R = 52.0 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 262+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = 1000 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 175 veh/h	Freeway Volume, V_F: 2690	V_D = veh/h
	Ramp Volume, V_R: 335	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2690	0.93	Rolling	4	0	0.943	1.00	3066
Ramp	335	0.78	Rolling	0	0	1.000	1.00	429
UpStream	175	0.89	Rolling	0	0	1.000	1.00	197
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3066 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3495	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3495	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 29.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.415 (Exibit 13-11)

S_R = 52.5 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 52.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp
☑ Yes	☐ On	Acceleration Lane Length, L_A	500	☐ Yes ☐ On
☐ No	☑ Off	Deceleration Lane Length L_D		☑ No ☐ Off
L_{up} =	3200 ft	Freeway Volume, V_F	3160	L_{down} = ft
V_u =	85 veh/h	Ramp Volume, V_R	150	V_D = veh/h
		Freeway Free-Flow Speed, S_{FF}	60.0	
		Ramp Free-Flow Speed, S_{FR}	35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3160	0.89	Rolling	4	0	0.943	1.00	3764
Ramp	150	0.90	Rolling	0	0	1.000	1.00	167
UpStream	85	0.90	Rolling	0	0	1.000	1.00	94
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3764 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3931	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3931	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.485 (Exibit 13-11)

S_R = 51.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 51.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 182+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 3200 ft
V_u = veh/h	Freeway Volume, V_F: 3245	V_D = 150 veh/h
	Ramp Volume, V_R: 85	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3245	0.89	Rolling	4	0	0.943	1.00	3865
Ramp	85	0.90	Rolling	0	0	1.000	1.00	94
UpStream								
DownStream	150	0.90	Rolling	0	0	1.000	1.00	167

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3865 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3865	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3771	Exhibit 13-8	4600	No
V_R	94	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3865	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.0 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.436 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☑ On	Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☐ Off	Acceleration Lane Length, L_A: 700	☑ No ☐ Off
L_{up} = 1800 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 270 veh/h	Freeway Volume, V_F: 3200	V_D = veh/h
	Ramp Volume, V_R: 45	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3200	0.89	Rolling	4	0	0.943	1.00	3811
Ramp	45	0.90	Rolling	0	0	1.000	1.00	50
UpStream	270	0.81	Rolling	0	0	1.000	1.00	333
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3811 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3861	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3861	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 31.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.457 (Exibit 13-11)

S_R = 51.8 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 51.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 250+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	800
Deceleration Lane Length L_D	
Freeway Volume, V_F	2930
Ramp Volume, V_R	270
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☑ On
☐ No ☐ Off
L_{down} = 1800 ft
V_D = 45 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2930	0.89	Rolling	4	0	0.943	1.00	3490
Ramp	270	0.81	Rolling	0	0	1.000	1.00	333
UpStream								
DownStream	45	0.25	Rolling	0	0	1.000	1.00	180

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3490 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3823	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3823	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = 30.1 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.443 (Exibit 13-11)
S_R = 52.0 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 52.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 265+00
Date Performed	6/25/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2012

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1500 ft
V_u = veh/h	Freeway Volume, V_F: 3565	V_D = 270 veh/h
	Ramp Volume, V_R: 635	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3565	0.88	Rolling	4	0	0.943	1.00	4294
Ramp	635	0.94	Rolling	0	0	1.000	1.00	676
UpStream								
DownStream	270	0.81	Rolling	0	0	1.000	1.00	333

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4294 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4294	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3618	Exhibit 13-8	4600	No
V_R	676	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4294	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 36.7 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.489 (Exhibit 13-12)

S_R = 51.2 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.2 mph (Exhibit 13-13)

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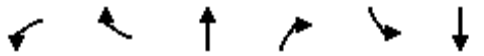
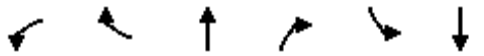
Frontage Road Intersections



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	3	39	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.97	0.25	1.00	1.00
Hourly flow rate (vph)	0	4	40	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	40	40			40	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	40	40			40	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	971	1031			1569	

Direction, Lane #	WB 1	NB 1
Volume Total	4	40
Volume Left	0	0
Volume Right	4	0
cSH	1031	1700
Volume to Capacity	0.00	0.02
Queue Length 95th (ft)	0	0
Control Delay (s)	8.5	0.0
Lane LOS	A	
Approach Delay (s)	8.5	0.0
Approach LOS	A	

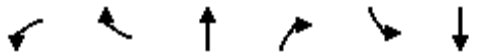
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	27	29	18	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.61	0.91	0.64	1.00	1.00
Hourly flow rate (vph)	0	44	32	28	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	46	46			60	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	46	46			60	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	96			100	
cM capacity (veh/h)	964	1024			1544	

Direction, Lane #	WB 1	NB 1
Volume Total	44	60
Volume Left	0	0
Volume Right	44	28
cSH	1024	1700
Volume to Capacity	0.04	0.04
Queue Length 95th (ft)	3	0
Control Delay (s)	8.7	0.0
Lane LOS	A	
Approach Delay (s)	8.7	0.0
Approach LOS	A	

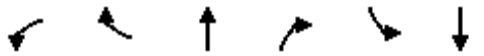
Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	155	51	12	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.78	0.78	0.50	1.00	1.00
Hourly flow rate (vph)	0	199	65	24	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	77	77			89	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	77	77			89	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			100	
cM capacity (veh/h)	926	983			1506	

Direction, Lane #	WB 1	NB 1
Volume Total	199	89
Volume Left	0	0
Volume Right	199	24
cSH	983	1700
Volume to Capacity	0.20	0.05
Queue Length 95th (ft)	19	0
Control Delay (s)	9.6	0.0
Lane LOS	A	
Approach Delay (s)	9.6	0.0
Approach LOS	A	

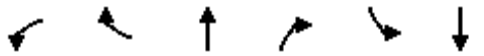
Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	8	318	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.67	0.82	1.00	1.00	1.00
Hourly flow rate (vph)	0	12	388	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	388	388			388	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	388	388			388	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	616	660			1171	

Direction, Lane #	WB 1	NB 1
Volume Total	12	388
Volume Left	0	0
Volume Right	12	0
cSH	660	1700
Volume to Capacity	0.02	0.23
Queue Length 95th (ft)	1	0
Control Delay (s)	10.6	0.0
Lane LOS	B	
Approach Delay (s)	10.6	0.0
Approach LOS	B	

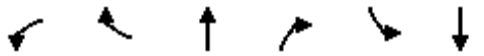
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	7	320	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.44	0.80	0.50	1.00	1.00
Hourly flow rate (vph)	0	16	400	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	410	410			420	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	410	410			420	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	598	642			1139	

Direction, Lane #	WB 1	NB 1
Volume Total	16	420
Volume Left	0	0
Volume Right	16	20
cSH	642	1700
Volume to Capacity	0.02	0.25
Queue Length 95th (ft)	2	0
Control Delay (s)	10.8	0.0
Lane LOS	B	
Approach Delay (s)	10.8	0.0
Approach LOS	B	

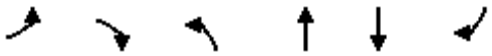
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	81	250	249	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.68	0.82	0.81	1.00	1.00
Hourly flow rate (vph)	0	119	305	307	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	459	459			612	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	459	459			612	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	80			100	
cM capacity (veh/h)	560	602			967	

Direction, Lane #	WB 1	NB 1
Volume Total	119	612
Volume Left	0	0
Volume Right	119	307
cSH	602	1700
Volume to Capacity	0.20	0.36
Queue Length 95th (ft)	18	0
Control Delay (s)	12.4	0.0
Lane LOS	B	
Approach Delay (s)	12.4	0.0
Approach LOS	B	

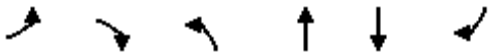
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	9	0	0	57	38
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.45	0.79
Hourly flow rate (vph)	0	12	0	0	127	48
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	151	151	175			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	151	151	175			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	841	896	1402			

Direction, Lane #	EB 1	SB 1
Volume Total	12	175
Volume Left	0	0
Volume Right	12	48
cSH	896	1700
Volume to Capacity	0.01	0.10
Queue Length 95th (ft)	1	0
Control Delay (s)	9.1	0.0
Lane LOS	A	
Approach Delay (s)	9.1	0.0
Approach LOS	A	

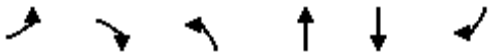
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	15.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.80	1.00	1.00	0.80	0.80
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

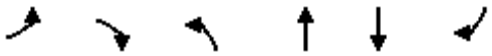
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	0.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	28	0	0	23	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.64	1.00	1.00	0.57	0.83
Hourly flow rate (vph)	0	44	0	0	40	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	58	58	76			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	58	58	76			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	100			
cM capacity (veh/h)	949	1007	1522			

Direction, Lane #	EB 1	SB 1
Volume Total	44	76
Volume Left	0	0
Volume Right	44	36
cSH	1007	1700
Volume to Capacity	0.04	0.04
Queue Length 95th (ft)	3	0
Control Delay (s)	8.7	0.0
Lane LOS	A	
Approach Delay (s)	8.7	0.0
Approach LOS	A	

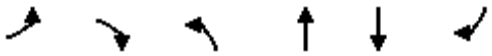
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	13	0	0	70	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.65	1.00	1.00	0.70	0.75
Hourly flow rate (vph)	0	20	0	0	100	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	120	120	140			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	120	120	140			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	876	931	1443			

Direction, Lane #	EB 1	SB 1
Volume Total	20	140
Volume Left	0	0
Volume Right	20	40
cSH	931	1700
Volume to Capacity	0.02	0.08
Queue Length 95th (ft)	2	0
Control Delay (s)	8.9	0.0
Lane LOS	A	
Approach Delay (s)	8.9	0.0
Approach LOS	A	

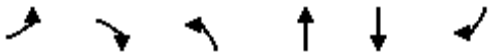
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	9	0	0	91	4
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.85	0.50
Hourly flow rate (vph)	0	12	0	0	107	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	111	111	115			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	111	111	115			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	886	942	1474			

Direction, Lane #	EB 1	SB 1
Volume Total	12	115
Volume Left	0	0
Volume Right	12	8
cSH	942	1700
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	1	0
Control Delay (s)	8.9	0.0
Lane LOS	A	
Approach Delay (s)	8.9	0.0
Approach LOS	A	

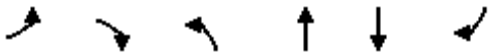
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	15.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	4	0	0	89	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.25	1.00	1.00	0.86	0.75
Hourly flow rate (vph)	0	16	0	0	103	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	105	105	107			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	105	105	107			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	892	949	1483			

Direction, Lane #	EB 1	SB 1
Volume Total	16	107
Volume Left	0	0
Volume Right	16	4
cSH	949	1700
Volume to Capacity	0.02	0.06
Queue Length 95th (ft)	1	0
Control Delay (s)	8.9	0.0
Lane LOS	A	
Approach Delay (s)	8.9	0.0
Approach LOS	A	

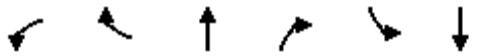
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	14.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	376	0	0	98	97
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.77	1.00	1.00	0.80	0.83
Hourly flow rate (vph)	0	488	0	0	122	117
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	181	181	239			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	181	181	239			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	43	100			
cM capacity (veh/h)	809	862	1327			

Direction, Lane #	EB 1	SB 1
Volume Total	488	239
Volume Left	0	0
Volume Right	488	117
cSH	862	1700
Volume to Capacity	0.57	0.14
Queue Length 95th (ft)	91	0
Control Delay (s)	14.5	0.0
Lane LOS	B	
Approach Delay (s)	14.5	0.0
Approach LOS	B	

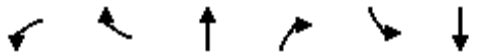
Intersection Summary			
Average Delay	9.7		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	2	31	6	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.50	0.78	0.38	1.00	1.00
Hourly flow rate (vph)	0	4	40	16	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	48	48			56	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	48	48			56	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	962	1021			1549	

Direction, Lane #	WB 1	NB 1
Volume Total	4	56
Volume Left	0	0
Volume Right	4	16
cSH	1021	1700
Volume to Capacity	0.00	0.03
Queue Length 95th (ft)	0	0
Control Delay (s)	8.5	0.0
Lane LOS	A	
Approach Delay (s)	8.5	0.0
Approach LOS	A	

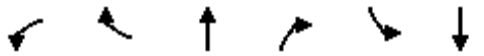
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	13.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	22	18	11	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.69	0.64	0.92	1.00	1.00
Hourly flow rate (vph)	0	32	28	12	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	34	34			40	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	34	34			40	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	979	1039			1570	

Direction, Lane #	WB 1	NB 1
Volume Total	32	40
Volume Left	0	0
Volume Right	32	12
cSH	1039	1700
Volume to Capacity	0.03	0.02
Queue Length 95th (ft)	2	0
Control Delay (s)	8.6	0.0
Lane LOS	A	
Approach Delay (s)	8.6	0.0
Approach LOS	A	

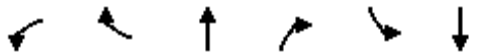
Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	79	115	35	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.82	0.75	0.88	1.00	1.00
Hourly flow rate (vph)	0	96	153	40	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	173	173			193	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	173	173			193	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	817	870			1380	

Direction, Lane #	WB 1	NB 1
Volume Total	96	193
Volume Left	0	0
Volume Right	96	40
cSH	870	1700
Volume to Capacity	0.11	0.11
Queue Length 95th (ft)	9	0
Control Delay (s)	9.7	0.0
Lane LOS	A	
Approach Delay (s)	9.7	0.0
Approach LOS	A	

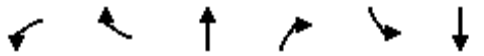
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	6	184	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.95	0.75	1.00	1.00
Hourly flow rate (vph)	0	8	194	13	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	200	200			207	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	200	200			207	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	788	841			1364	

Direction, Lane #	WB 1	NB 1
Volume Total	8	207
Volume Left	0	0
Volume Right	8	13
cSH	841	1700
Volume to Capacity	0.01	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	9.3	0.0
Lane LOS	A	
Approach Delay (s)	9.3	0.0
Approach LOS	A	

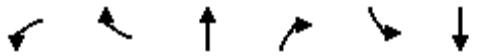
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	6	175	15	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.50	0.95	0.75	1.00	1.00
Hourly flow rate (vph)	0	12	184	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	194	194			204	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	194	194			204	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	795	847			1367	

Direction, Lane #	WB 1	NB 1
Volume Total	12	204
Volume Left	0	0
Volume Right	12	20
cSH	847	1700
Volume to Capacity	0.01	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	9.3	0.0
Lane LOS	A	
Approach Delay (s)	9.3	0.0
Approach LOS	A	

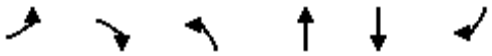
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	20.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	65	125	300	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.95	0.94	1.00	1.00
Hourly flow rate (vph)	0	87	132	319	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	291	291			451	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	291	291			451	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	88			100	
cM capacity (veh/h)	700	748			1110	

Direction, Lane #	WB 1	NB 1
Volume Total	87	451
Volume Left	0	0
Volume Right	87	319
cSH	748	1700
Volume to Capacity	0.12	0.27
Queue Length 95th (ft)	10	0
Control Delay (s)	10.4	0.0
Lane LOS	B	
Approach Delay (s)	10.4	0.0
Approach LOS	B	

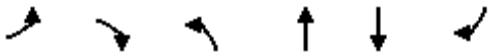
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	6	0	0	14	106
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.50	1.00	1.00	0.50	0.86
Hourly flow rate (vph)	0	12	0	0	28	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	90	90	151			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90	90	151			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	911	968	1430			

Direction, Lane #	EB 1	SB 1
Volume Total	12	151
Volume Left	0	0
Volume Right	12	123
cSH	968	1700
Volume to Capacity	0.01	0.09
Queue Length 95th (ft)	1	0
Control Delay (s)	8.8	0.0
Lane LOS	A	
Approach Delay (s)	8.8	0.0
Approach LOS	A	

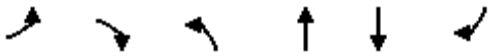
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	17.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	35	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.80	1.00	1.00	0.80	0.80
Hourly flow rate (vph)	0	0	0	0	44	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	63	63	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	63	63	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	943	1001	1515			

Direction, Lane #	EB 1	SB 1
Volume Total	0	82
Volume Left	0	0
Volume Right	0	39
cSH	1700	1700
Volume to Capacity	0.00	0.05
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

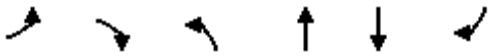
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	7.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	8	0	0	61	115
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.50	1.00	1.00	0.95	0.85
Hourly flow rate (vph)	0	16	0	0	64	135
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	132	132	200			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	132	132	200			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	862	918	1373			

Direction, Lane #	EB 1	SB 1
Volume Total	16	200
Volume Left	0	0
Volume Right	16	135
cSH	918	1700
Volume to Capacity	0.02	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	9.0	0.0
Lane LOS	A	
Approach Delay (s)	9.0	0.0
Approach LOS	A	

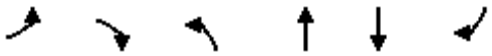
Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	20.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	3	0	0	215	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.95	0.85
Hourly flow rate (vph)	0	4	0	0	226	124
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	288	288	350			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	288	288	350			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	702	751	1209			

Direction, Lane #	EB 1	SB 1
Volume Total	4	350
Volume Left	0	0
Volume Right	4	124
cSH	751	1700
Volume to Capacity	0.01	0.21
Queue Length 95th (ft)	0	0
Control Delay (s)	9.8	0.0
Lane LOS	A	
Approach Delay (s)	9.8	0.0
Approach LOS	A	

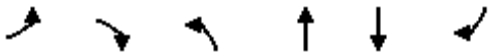
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	27.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	4	0	0	316	14
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.92	1.00	1.00	0.95	0.58
Hourly flow rate (vph)	0	4	0	0	333	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	345	345	357			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	345	345	357			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	652	698	1202			

Direction, Lane #	EB 1	SB 1
Volume Total	4	357
Volume Left	0	0
Volume Right	4	24
cSH	698	1700
Volume to Capacity	0.01	0.21
Queue Length 95th (ft)	0	0
Control Delay (s)	10.2	0.0
Lane LOS	B	
Approach Delay (s)	10.2	0.0
Approach LOS	B	

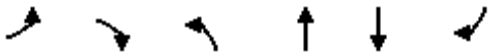
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	3	0	0	327	13
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.83	0.46
Hourly flow rate (vph)	0	4	0	0	394	28
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	408	408	422			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	408	422			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	599	643	1137			

Direction, Lane #	EB 1	SB 1
Volume Total	4	422
Volume Left	0	0
Volume Right	4	28
cSH	643	1700
Volume to Capacity	0.01	0.25
Queue Length 95th (ft)	0	0
Control Delay (s)	10.6	0.0
Lane LOS	B	
Approach Delay (s)	10.6	0.0
Approach LOS	B	

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	240	0	0	370	265
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.85	1.00	1.00	0.86	0.81
Hourly flow rate (vph)	0	282	0	0	430	327
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	594	594	757			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	594	594	757			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	44	100			
cM capacity (veh/h)	468	505	854			

Direction, Lane #	EB 1	SB 1
Volume Total	282	757
Volume Left	0	0
Volume Right	282	327
cSH	505	1700
Volume to Capacity	0.56	0.45
Queue Length 95th (ft)	85	0
Control Delay (s)	20.8	0.0
Lane LOS	C	
Approach Delay (s)	20.8	0.0
Approach LOS	C	

Intersection Summary			
Average Delay	5.6		
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix D

Year 2035 No-Build Conditions Capacity Analyses Worksheets

Basic Freeway Sections

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3520*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2120*	pc/h/ln
S	*55.1*	mph
D = v_p / S	*38.5*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 150+00 - Sta. 180+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3165*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1906*	pc/h/ln
S	*58.3*	mph
D = v_p / S	*32.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 180+00 - Sta. 230+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3290*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1981*	pc/h/ln
S	*57.4*	mph
D = v_p / S	*34.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 230+00 - Sta. 250+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3175*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1912*	pc/h/ln
S	*58.2*	mph
D = v_p / S	*32.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 250+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2700*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1626*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2910*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1753*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*29.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2890*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1721*	pc/h/ln
S	*59.7*	mph
D = v_p / S	*28.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 150+00 - Sta. 192+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2785*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1658*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*27.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 192+00 - Sta. 232+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2870*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1709*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 232+00 - Sta. 252+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2775*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1653*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*27.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 252+00 - Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2565*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1527*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Above Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2760*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1644*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3100*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1846*	pc/h/ln
S	*58.9*	mph
D = v_p / S	*31.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 150+00 - Sta. 192+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3010*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1792*	pc/h/ln
S	*59.3*	mph
D = v_p / S	*30.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 192+00 - Sta. 232+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3080*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1834*	pc/h/ln
S	*59.0*	mph
D = v_p / S	*31.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 232+00 - Sta. 252+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2970*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1769*	pc/h/ln
S	*59.5*	mph
D = v_p / S	*29.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 252+00 - Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2820*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1679*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*28.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Above Sta. 262+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3160*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1882*	pc/h/ln
S	*58.6*	mph
D = v_p / S	*32.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3730*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2246*	pc/h/ln
S	*52.4*	mph
D = v_p / S	*42.8*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 150+00 - Sta. 180+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3430*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2066*	pc/h/ln
S	*56.1*	mph
D = v_p / S	*36.9*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 180+00 - Sta. 230+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3525*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2123*	pc/h/ln
S	*55.0*	mph
D = v_p / S	*38.6*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 230+00 - Sta. 250+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3435*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2069*	pc/h/ln
S	*56.0*	mph
D = v_p / S	*36.9*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 250+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2895*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1744*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*29.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/26/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 - No Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3590*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2162*	pc/h/ln
S	*54.3*	mph
D = v_p / S	*39.8*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

Ramp Merge/Diverge

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = 3200 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 45 veh/h	Freeway Volume, V_F: 3165	V_D = veh/h
	Ramp Volume, V_R: 355	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3165	0.89	Rolling	4	0	0.943	1.00	3770
Ramp	355	0.90	Rolling	0	0	1.000	1.00	394
UpStream	45	0.90	Rolling	0	0	1.000	1.00	50
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3770 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4164	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4164	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 34.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.537 (Exibit 13-11)

S_R = 50.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 50.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 182+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - No Build
Project Description	Frontage Road Analysis		

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☑ Yes	☑ On
☑ No	☐ Off	Deceleration Lane Length L_D	500	☐ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	3290	L_{down} =	3200 ft
V_u =	veh/h	Ramp Volume, V_R	45	V_D =	355 veh/h
		Freeway Free-Flow Speed, S_{FF}	60.0		
		Ramp Free-Flow Speed, S_{FR}	35.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3290	0.89	Rolling	4	0	0.943	1.00	3918
Ramp	45	0.90	Rolling	0	0	1.000	1.00	50
UpStream								
DownStream	355	0.90	Rolling	0	0	1.000	1.00	394

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3918 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3918	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3868	Exhibit 13-8	4600	No
V_R	50	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3918	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 33.4 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.433 (Exhibit 13-12)

S_R = 52.2 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	700
Deceleration Lane Length L_D	
Freeway Volume, V_F	3175
Ramp Volume, V_R	35
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{down} = 5000 ft
V_D = 45 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3175	0.89	Rolling	4	0	0.943	1.00	3781
Ramp	35	0.90	Rolling	0	0	1.000	1.00	39
UpStream								
DownStream	45	0.90	Rolling	0	0	1.000	1.00	50

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3781 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3820	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3820	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = 30.9 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.450 (Exibit 13-11)
S_R = 51.9 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 51.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 250+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 800	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = 1800 ft
V_u = veh/h	Freeway Volume, V_F: 2700	V_D = 35 veh/h
	Ramp Volume, V_R: 475	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2700	0.89	Rolling	4	0	0.943	1.00	3216
Ramp	475	0.81	Rolling	0	0	1.000	1.00	586
UpStream								
DownStream	35	0.90	Rolling	0	0	1.000	1.00	39

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3216 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3802	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3802	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 29.8 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.440 (Exibit 13-11)

S_R = 52.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 52.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 265+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1500 ft
V_u = veh/h	Freeway Volume, V_F: 2910	V_D = 475 veh/h
	Ramp Volume, V_R: 210	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2910	0.88	Rolling	4	0	0.943	1.00	3505
Ramp	210	0.94	Rolling	0	0	1.000	1.00	223
UpStream								
DownStream	475	0.81	Rolling	0	0	1.000	1.00	586

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3505 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3505	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3282	Exhibit 13-8	4600	No
V_R	223	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3505	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.448 (Exhibit 13-12)

S_R = 51.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.9 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 4200 ft
V_u = veh/h	Freeway Volume, V_F: 2890	V_D = 85 veh/h
	Ramp Volume, V_R: 105	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2890	0.93	Rolling	4	0	0.943	1.00	3294
Ramp	105	0.90	Rolling	0	0	1.000	1.00	117
UpStream								
DownStream	85	0.89	Rolling	0	0	1.000	1.00	96

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3294 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3294	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3177	Exhibit 13-8	4600	No
V_R	117	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3294	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.439 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 192+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 800	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = 4000 ft
V_u = veh/h	Freeway Volume, V_F: 2785	V_D = 95 veh/h
	Ramp Volume, V_R: 85	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2785	0.93	Rolling	4	0	0.943	1.00	3174
Ramp	85	0.89	Rolling	0	0	1.000	1.00	96
UpStream								
DownStream	95	0.90	Rolling	0	0	1.000	1.00	106

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3174 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3270	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3270	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 25.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.368 (Exibit 13-11)

S_R = 53.4 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 53.4 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2000 ft
V_u = veh/h	Freeway Volume, V_F: 2870	V_D = 210 veh/h
	Ramp Volume, V_R: 110	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2870	0.93	Rolling	4	0	0.943	1.00	3271
Ramp	110	0.90	Rolling	0	0	1.000	1.00	122
UpStream								
DownStream	210	0.90	Rolling	0	0	1.000	1.00	233

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3271 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3271	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3149	Exhibit 13-8	4600	No
V_R	122	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3271	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.9 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.439 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 252+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1000 ft
V_u = veh/h	Freeway Volume, V_F: 2775	V_D = 195 veh/h
	Ramp Volume, V_R: 210	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2775	0.93	Rolling	4	0	0.943	1.00	3163
Ramp	210	0.89	Rolling	0	0	1.000	1.00	236
UpStream								
DownStream	195	0.90	Rolling	0	0	1.000	1.00	217

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3163 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3163	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	2927	Exhibit 13-8	4600	No
V_R	236	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3163	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 27.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

D_s = 0.449 (Exhibit 13-12)

S_R = 51.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.9 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 262+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = 1000 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 210 veh/h	Freeway Volume, V_F: 2565	V_D = veh/h
	Ramp Volume, V_R: 195	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2565	0.93	Rolling	4	0	0.943	1.00	2924
Ramp	195	0.78	Rolling	0	0	1.000	1.00	250
UpStream	210	0.89	Rolling	0	0	1.000	1.00	236
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 2924 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3174	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3174	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 27.0 (pc/mi/ln)

LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.379 (Exibit 13-11)

S_R = 53.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 53.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 4200 ft
V_u = veh/h	Freeway Volume, V_F: 3100	V_D = 70 veh/h
	Ramp Volume, V_R: 90	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3100	0.93	Rolling	4	0	0.943	1.00	3533
Ramp	90	0.90	Rolling	0	0	1.000	1.00	100
UpStream								
DownStream	70	0.89	Rolling	0	0	1.000	1.00	79

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3533 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3533	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3433	Exhibit 13-8	4600	No
V_R	100	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3533	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.437 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 192+00
Date Performed	6/25/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	800
Deceleration Lane Length L_D	
Freeway Volume, V_F	3010
Ramp Volume, V_R	70
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{down} = 4000 ft
V_D = 110 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3010	0.93	Rolling	4	0	0.943	1.00	3431
Ramp	70	0.89	Rolling	0	0	1.000	1.00	79
UpStream								
DownStream	110	0.90	Rolling	0	0	1.000	1.00	122

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3431 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3510	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3510	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = 27.8 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.395 (Exibit 13-11)
S_R = 52.9 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 52.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 2000 ft
V_u = veh/h	Freeway Volume, V_F: 3080	V_D = 150 veh/h
	Ramp Volume, V_R: 110	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3080	0.93	Rolling	4	0	0.943	1.00	3511
Ramp	110	0.90	Rolling	0	0	1.000	1.00	122
UpStream								
DownStream	150	0.90	Rolling	0	0	1.000	1.00	167

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3511 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3511	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3389	Exhibit 13-8	4600	No
V_R	122	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3511	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.439 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 252+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1000 ft
V_u = veh/h	Freeway Volume, V_F: 2970	V_D = 340 veh/h
	Ramp Volume, V_R: 150	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2970	0.93	Rolling	4	0	0.943	1.00	3385
Ramp	150	0.89	Rolling	0	0	1.000	1.00	169
UpStream								
DownStream	340	0.90	Rolling	0	0	1.000	1.00	378

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3385 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3385	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3216	Exhibit 13-8	4600	No
V_R	169	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3385	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.443 (Exhibit 13-12)

S_R = 52.0 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.0 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 262+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☑ Yes ☐ On
☐ No ☑ Off
L_{up} = 1000 ft
V_u = 150 veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	500
Deceleration Lane Length L_D	
Freeway Volume, V_F	2820
Ramp Volume, V_R	340
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2820	0.93	Rolling	4	0	0.943	1.00	3214
Ramp	340	0.78	Rolling	0	0	1.000	1.00	436
UpStream	150	0.89	Rolling	0	0	1.000	1.00	169
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3214 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3650	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3650	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 30.6 (pc/mi/ln)
LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.436 (Exibit 13-11)
S_R = 52.2 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 52.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☑ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☐ No ☑ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = 3200 ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = 95 veh/h	Freeway Volume, V_F: 3430	V_D = veh/h
	Ramp Volume, V_R: 300	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3430	0.89	Rolling	4	0	0.943	1.00	4085
Ramp	300	0.90	Rolling	0	0	1.000	1.00	333
UpStream	95	0.90	Rolling	0	0	1.000	1.00	106
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 4085 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4418	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4418	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 36.6 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.609 (Exibit 13-11)

S_R = 49.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 49.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 182+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 3200 ft
V_u = veh/h	Freeway Volume, V_F: 3525	V_D = 300 veh/h
	Ramp Volume, V_R: 95	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	3525	0.89	Rolling	4	0	0.943	1.00	4198
Ramp	95	0.90	Rolling	0	0	1.000	1.00	106
UpStream								
DownStream	300	0.90	Rolling	0	0	1.000	1.00	333

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4198 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4198	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	4092	Exhibit 13-8	4600	No
V_R	106	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4198	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 35.9 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.438 (Exhibit 13-12)

S_R = 52.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.1 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 232+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 700	☐ No ☑ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = 5000 ft
V_u = veh/h	Freeway Volume, V_F: 3435	V_D = 95 veh/h
	Ramp Volume, V_R: 90	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3435	0.89	Rolling	4	0	0.943	1.00	4091
Ramp	90	0.90	Rolling	0	0	1.000	1.00	100
UpStream								
DownStream	95	0.90	Rolling	0	0	1.000	1.00	106

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 4091 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4191	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4191	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 33.7 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.530 (Exibit 13-11)

S_R = 50.5 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 50.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 250+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 800	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = 1800 ft
V_u = veh/h	Freeway Volume, V_F: 2895	V_D = 90 veh/h
	Ramp Volume, V_R: 540	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2895	0.89	Rolling	4	0	0.943	1.00	3448
Ramp	540	0.81	Rolling	0	0	1.000	1.00	667
UpStream								
DownStream	90	0.90	Rolling	0	0	1.000	1.00	100

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3448 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4115	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4115	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 32.2 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.504 (Exibit 13-11)

S_R = 50.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 50.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 265+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2035 - No Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☑ Yes ☑ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☐ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = 1500 ft
V_u = veh/h	Freeway Volume, V_F: 3590	V_D = 540 veh/h
	Ramp Volume, V_R: 695	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3590	0.88	Rolling	4	0	0.943	1.00	4324
Ramp	695	0.94	Rolling	0	0	1.000	1.00	739
UpStream								
DownStream	540	0.81	Rolling	0	0	1.000	1.00	667

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4324 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4324	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3585	Exhibit 13-8	4600	No
V_R	739	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4324	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 36.9 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

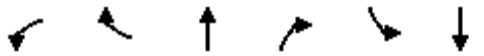
D_s = 0.495 (Exhibit 13-12)

S_R = 51.1 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.1 mph (Exhibit 13-13)

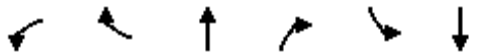
Frontage Road Intersections



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	20	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.97	0.25	1.00	1.00
Hourly flow rate (vph)	0	7	21	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	21	21			21	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	21	21			21	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	996	1057			1595	

Direction, Lane #	WB 1	NB 1
Volume Total	7	21
Volume Left	0	0
Volume Right	7	0
cSH	1057	1700
Volume to Capacity	0.01	0.01
Queue Length 95th (ft)	0	0
Control Delay (s)	8.4	0.0
Lane LOS	A	
Approach Delay (s)	8.4	0.0
Approach LOS	A	

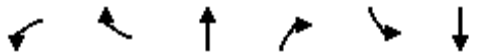
Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	10	15	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.61	0.91	0.64	1.00	1.00
Hourly flow rate (vph)	0	8	11	23	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	23	23			34	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	23	23			34	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	994	1054			1577	

Direction, Lane #	WB 1	NB 1
Volume Total	8	34
Volume Left	0	0
Volume Right	8	23
cSH	1054	1700
Volume to Capacity	0.01	0.02
Queue Length 95th (ft)	1	0
Control Delay (s)	8.4	0.0
Lane LOS	A	
Approach Delay (s)	8.4	0.0
Approach LOS	A	

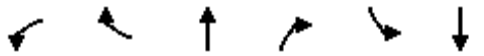
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	155	115	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.78	0.78	0.50	1.00	1.00
Hourly flow rate (vph)	0	199	147	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	157	157			167	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	157	157			167	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	78			100	
cM capacity (veh/h)	834	888			1410	

Direction, Lane #	WB 1	NB 1
Volume Total	199	167
Volume Left	0	0
Volume Right	199	20
cSH	888	1700
Volume to Capacity	0.22	0.10
Queue Length 95th (ft)	21	0
Control Delay (s)	10.2	0.0
Lane LOS	B	
Approach Delay (s)	10.2	0.0
Approach LOS	B	

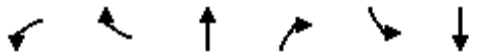
Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	10	270	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.67	0.82	1.00	1.00	1.00
Hourly flow rate (vph)	0	15	329	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	329	329			329	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	329	329			329	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	665	712			1230	

Direction, Lane #	WB 1	NB 1
Volume Total	15	329
Volume Left	0	0
Volume Right	15	0
cSH	712	1700
Volume to Capacity	0.02	0.19
Queue Length 95th (ft)	2	0
Control Delay (s)	10.2	0.0
Lane LOS	B	
Approach Delay (s)	10.2	0.0
Approach LOS	B	

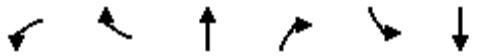
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	24.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	270	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.44	0.80	0.50	1.00	1.00
Hourly flow rate (vph)	0	11	338	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	348	348			358	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	348	348			358	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	649	696			1201	

Direction, Lane #	WB 1	NB 1
Volume Total	11	358
Volume Left	0	0
Volume Right	11	20
cSH	696	1700
Volume to Capacity	0.02	0.21
Queue Length 95th (ft)	1	0
Control Delay (s)	10.3	0.0
Lane LOS	B	
Approach Delay (s)	10.3	0.0
Approach LOS	B	

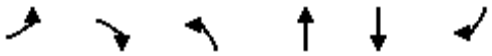
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	80	260	165	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.68	0.82	0.81	1.00	1.00
Hourly flow rate (vph)	0	118	317	204	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	419	419			521	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	419	419			521	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	81			100	
cM capacity (veh/h)	591	634			1045	

Direction, Lane #	WB 1	NB 1
Volume Total	118	521
Volume Left	0	0
Volume Right	118	204
cSH	634	1700
Volume to Capacity	0.19	0.31
Queue Length 95th (ft)	17	0
Control Delay (s)	12.0	0.0
Lane LOS	B	
Approach Delay (s)	12.0	0.0
Approach LOS	B	

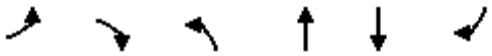
Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	35.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.45	0.79
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

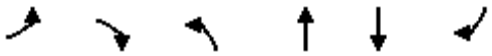
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.80	1.00	1.00	0.80	0.80
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

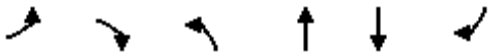
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	0.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	30	0	0	25	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.64	1.00	1.00	0.57	0.83
Hourly flow rate (vph)	0	47	0	0	44	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	62	62	80			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62	62	80			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	100			
cM capacity (veh/h)	944	1003	1518			

Direction, Lane #	EB 1	SB 1
Volume Total	47	80
Volume Left	0	0
Volume Right	47	36
cSH	1003	1700
Volume to Capacity	0.05	0.05
Queue Length 95th (ft)	4	0
Control Delay (s)	8.8	0.0
Lane LOS	A	
Approach Delay (s)	8.8	0.0
Approach LOS	A	

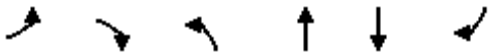
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	15	0	0	75	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.65	1.00	1.00	0.70	0.75
Hourly flow rate (vph)	0	23	0	0	107	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	127	127	147			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	127	127	147			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	100			
cM capacity (veh/h)	867	923	1435			

Direction, Lane #	EB 1	SB 1
Volume Total	23	147
Volume Left	0	0
Volume Right	23	40
cSH	923	1700
Volume to Capacity	0.03	0.09
Queue Length 95th (ft)	2	0
Control Delay (s)	9.0	0.0
Lane LOS	A	
Approach Delay (s)	9.0	0.0
Approach LOS	A	

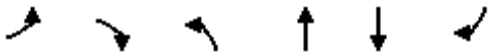
Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	15.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	10	0	0	95	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.85	0.50
Hourly flow rate (vph)	0	13	0	0	112	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	117	117	122			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	117	117	122			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	879	935	1466			

Direction, Lane #	EB 1	SB 1
Volume Total	13	122
Volume Left	0	0
Volume Right	13	10
cSH	935	1700
Volume to Capacity	0.01	0.07
Queue Length 95th (ft)	1	0
Control Delay (s)	8.9	0.0
Lane LOS	A	
Approach Delay (s)	8.9	0.0
Approach LOS	A	

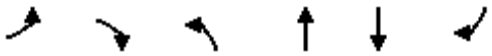
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	15.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	0	0	95	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.25	1.00	1.00	0.86	0.75
Hourly flow rate (vph)	0	20	0	0	110	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	114	114	117			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	114	114	117			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	98	100			
cM capacity (veh/h)	883	939	1471			

Direction, Lane #	EB 1	SB 1
Volume Total	20	117
Volume Left	0	0
Volume Right	20	7
cSH	939	1700
Volume to Capacity	0.02	0.07
Queue Length 95th (ft)	2	0
Control Delay (s)	8.9	0.0
Lane LOS	A	
Approach Delay (s)	8.9	0.0
Approach LOS	A	

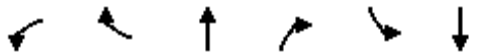
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	15.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	550	0	0	100	110
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.77	1.00	1.00	0.80	0.83
Hourly flow rate (vph)	0	714	0	0	125	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	191	191	258			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	191	258			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	16	100			
cM capacity (veh/h)	798	850	1307			

Direction, Lane #	EB 1	SB 1
Volume Total	714	258
Volume Left	0	0
Volume Right	714	133
cSH	850	1700
Volume to Capacity	0.84	0.15
Queue Length 95th (ft)	248	0
Control Delay (s)	27.0	0.0
Lane LOS	D	
Approach Delay (s)	27.0	0.0
Approach LOS	D	

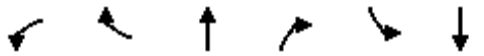
Intersection Summary			
Average Delay	19.9		
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	15	5	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.50	0.78	0.38	1.00	1.00
Hourly flow rate (vph)	0	0	19	13	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	26	26			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	26	26			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	990	1050			1580	

Direction, Lane #	WB 1	NB 1
Volume Total	0	32
Volume Left	0	0
Volume Right	0	13
cSH	1700	1700
Volume to Capacity	0.00	0.02
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

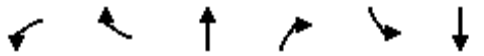
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	25	10	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.69	0.64	0.92	1.00	1.00
Hourly flow rate (vph)	0	36	16	11	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	21	21			26	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	21	21			26	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	996	1056			1587	

Direction, Lane #	WB 1	NB 1
Volume Total	36	26
Volume Left	0	0
Volume Right	36	11
cSH	1056	1700
Volume to Capacity	0.03	0.02
Queue Length 95th (ft)	3	0
Control Delay (s)	8.5	0.0
Lane LOS	A	
Approach Delay (s)	8.5	0.0
Approach LOS	A	

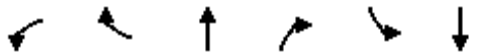
Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	80	95	35	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.82	0.75	0.88	1.00	1.00
Hourly flow rate (vph)	0	98	127	40	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	147	147			166	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	147	147			166	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	89			100	
cM capacity (veh/h)	846	900			1412	

Direction, Lane #	WB 1	NB 1
Volume Total	98	166
Volume Left	0	0
Volume Right	98	40
cSH	900	1700
Volume to Capacity	0.11	0.10
Queue Length 95th (ft)	9	0
Control Delay (s)	9.5	0.0
Lane LOS	A	
Approach Delay (s)	9.5	0.0
Approach LOS	A	

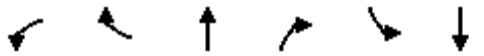
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	10	175	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.95	0.75	1.00	1.00
Hourly flow rate (vph)	0	13	184	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	184	184			184	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	184	184			184	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	805	858			1391	

Direction, Lane #	WB 1	NB 1
Volume Total	13	184
Volume Left	0	0
Volume Right	13	0
cSH	858	1700
Volume to Capacity	0.02	0.11
Queue Length 95th (ft)	1	0
Control Delay (s)	9.3	0.0
Lane LOS	A	
Approach Delay (s)	9.3	0.0
Approach LOS	A	

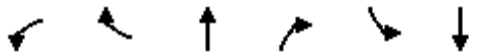
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	175	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.50	0.95	0.75	1.00	1.00
Hourly flow rate (vph)	0	10	184	13	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	191	191			198	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	191	191			198	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	798	851			1375	

Direction, Lane #	WB 1	NB 1
Volume Total	10	198
Volume Left	0	0
Volume Right	10	13
cSH	851	1700
Volume to Capacity	0.01	0.12
Queue Length 95th (ft)	1	0
Control Delay (s)	9.3	0.0
Lane LOS	A	
Approach Delay (s)	9.3	0.0
Approach LOS	A	

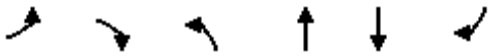
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	70	125	265	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.95	0.94	1.00	1.00
Hourly flow rate (vph)	0	93	132	282	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	273	273			413	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	273	273			413	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	88			100	
cM capacity (veh/h)	717	766			1145	

Direction, Lane #	WB 1	NB 1
Volume Total	93	413
Volume Left	0	0
Volume Right	93	282
cSH	766	1700
Volume to Capacity	0.12	0.24
Queue Length 95th (ft)	10	0
Control Delay (s)	10.3	0.0
Lane LOS	B	
Approach Delay (s)	10.3	0.0
Approach LOS	B	

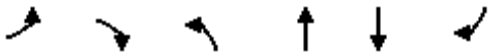
Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.50	1.00	1.00	0.50	0.86
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

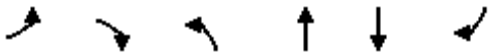
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.80	1.00	1.00	0.80	0.80
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

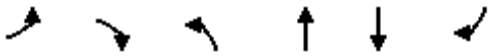
Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	0.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	100	0	0	60	140
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.50	1.00	1.00	0.95	0.85
Hourly flow rate (vph)	0	200	0	0	63	165
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	146	146	228			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	146	146	228			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	78	100			
cM capacity (veh/h)	847	902	1340			

Direction, Lane #	EB 1	SB 1
Volume Total	200	228
Volume Left	0	0
Volume Right	200	165
cSH	902	1700
Volume to Capacity	0.22	0.13
Queue Length 95th (ft)	21	0
Control Delay (s)	10.1	0.0
Lane LOS	B	
Approach Delay (s)	10.1	0.0
Approach LOS	B	

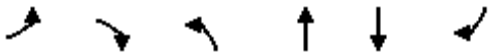
Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	50	0	0	240	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.95	0.85
Hourly flow rate (vph)	0	67	0	0	253	124
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	314	314	376			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	314	314	376			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	91	100			
cM capacity (veh/h)	678	726	1182			

Direction, Lane #	EB 1	SB 1
Volume Total	67	376
Volume Left	0	0
Volume Right	67	124
cSH	726	1700
Volume to Capacity	0.09	0.22
Queue Length 95th (ft)	8	0
Control Delay (s)	10.5	0.0
Lane LOS	B	
Approach Delay (s)	10.5	0.0
Approach LOS	B	

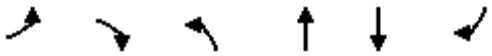
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	29.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	0	0	340	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.92	1.00	1.00	0.95	0.58
Hourly flow rate (vph)	0	5	0	0	358	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	371	371	384			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	371	371	384			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	630	675	1175			

Direction, Lane #	EB 1	SB 1
Volume Total	5	384
Volume Left	0	0
Volume Right	5	26
cSH	675	1700
Volume to Capacity	0.01	0.23
Queue Length 95th (ft)	1	0
Control Delay (s)	10.4	0.0
Lane LOS	B	
Approach Delay (s)	10.4	0.0
Approach LOS	B	

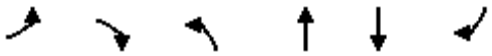
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	0	0	350	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.83	0.46
Hourly flow rate (vph)	0	7	0	0	422	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	438	438	454			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	438	438	454			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	576	619	1106			

Direction, Lane #	EB 1	SB 1
Volume Total	7	454
Volume Left	0	0
Volume Right	7	33
cSH	619	1700
Volume to Capacity	0.01	0.27
Queue Length 95th (ft)	1	0
Control Delay (s)	10.9	0.0
Lane LOS	B	
Approach Delay (s)	10.9	0.0
Approach LOS	B	

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	29.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	510	0	0	395	300
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.85	1.00	1.00	0.86	0.81
Hourly flow rate (vph)	0	600	0	0	459	370
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	644	644	830			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	644	644	830			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	437	473	802			

Direction, Lane #	EB 1	SB 1
Volume Total	600	830
Volume Left	0	0
Volume Right	600	370
cSH	473	1700
Volume to Capacity	1.27	0.49
Queue Length 95th (ft)	624	0
Control Delay (s)	162.9	0.0
Lane LOS	F	
Approach Delay (s)	162.9	0.0
Approach LOS	F	

Intersection Summary			
Average Delay	68.4		
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

Appendix E

Year 2035 Proposed Build Conditions Capacity Analyses Worksheets

Basic Freeway Sections

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3520*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2120*	pc/h/ln
S	*55.1*	mph
D = v_p / S	*38.5*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 150+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2655*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1599*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*26.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2910*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1753*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*29.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2890*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1721*	pc/h/ln
S	*59.7*	mph
D = v_p / S	*28.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 150+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2480*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1477*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*24.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2760*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1644*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3100*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1846*	pc/h/ln
S	*58.9*	mph
D = v_p / S	*31.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Sta. 150+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2750*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1638*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*AM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Northbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3160*	veh/h	Peak-Hour Factor, PHF	*0.89*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1882*	pc/h/ln
S	*58.6*	mph
D = v_p / S	*32.1*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Below Sta. 150+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3730*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2246*	pc/h/ln
S	*52.4*	mph
D = v_p / S	*42.8*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Sta. 150+00 - Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*2800*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1686*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*28.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*DFD*
Agency or Company	*JMT*
Date Performed	*6/25/2012*
Analysis Time Period	*PM*

Site Information

Highway/Direction of Travel	*SR 0001-RC3 Southbound*
From/To	*Above Sta. 265+00*
Jurisdiction	*Middletown Twp.*
Analysis Year	*2035 Build*

Project Description *Frontage Road Analysis*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3590*	veh/h	Peak-Hour Factor, PHF	*0.88*
AADT		veh/day	%Trucks and Buses, P_T	*4*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Rolling*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*2.0*
E_T	*2.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*2*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2162*	pc/h/ln
S	*54.3*	mph
D = v_p / S	*39.8*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

Ramp Merge/Diverge

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2655	V_D = veh/h
	Ramp Volume, V_R: 865	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2655	0.89	Rolling	4	0	0.943	1.00	3162
Ramp	865	0.90	Rolling	0	0	1.000	1.00	961
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3162 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4123	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4123	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, V_{12} - 0.00627\, L_A$

D_R = 34.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.527 (Exibit 13-11)

S_R = 50.5 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 50.5 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\, V_{12} - 0.009\, L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 265+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	AM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2910	V_D = veh/h
	Ramp Volume, V_R: 255	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2910	0.88	Rolling	4	0	0.943	1.00	3505
Ramp	255	0.94	Rolling	0	0	1.000	1.00	271
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3505 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3505	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3234	Exhibit 13-8	4600	No
V_R	271	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3505	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 29.9 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.452 (Exhibit 13-12)

S_R = 51.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.9 mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2890	V_D = veh/h
	Ramp Volume, V_R: 410	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2890	0.93	Rolling	4	0	0.943	1.00	3294
Ramp	410	0.90	Rolling	0	0	1.000	1.00	456
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3294 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3294	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	2838	Exhibit 13-8	4600	No
V_R	456	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3294	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 28.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.469 (Exhibit 13-12)

S_R = 51.6 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 262+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	500
Deceleration Lane Length L_D	
Freeway Volume, V_F	2480
Ramp Volume, V_R	280
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2480	0.93	Rolling	4	0	0.943	1.00	2827
Ramp	280	0.78	Rolling	0	0	1.000	1.00	359
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 2827 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3186	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3186	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 27.0 (pc/mi/ln)
LOS = C (Exhibit 13-2)

Speed Determination

M_S = 0.380 (Exibit 13-11)
S_R = 53.2 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 53.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 3100	V_D = veh/h
	Ramp Volume, V_R: 350	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3100	0.93	Rolling	4	0	0.943	1.00	3533
Ramp	350	0.90	Rolling	0	0	1.000	1.00	389
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 3533 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	3533	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3144	Exhibit 13-8	4600	No
V_R	389	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	3533	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 30.1 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

D_s = 0.463 (Exhibit 13-12)

S_R = 51.7 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 51.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Northbound
Agency or Company	JMT	Junction	Sta. 262+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	AM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 500	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 2750	V_D = veh/h
	Ramp Volume, V_R: 410	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	2750	0.93	Rolling	4	0	0.943	1.00	3134
Ramp	410	0.78	Rolling	0	0	1.000	1.00	526
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 3134 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	3660	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	3660	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 30.6 (pc/mi/ln)

LOS = D (Exhibit 13-2)

Speed Determination

M_S = 0.438 (Exibit 13-11)

S_R = 52.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 52.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 150+00
Date Performed	6/26/2012	Jurisdiction	Middletown Twp.
Analysis Time Period	PM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	500
Deceleration Lane Length L_D	
Freeway Volume, V_F	2800
Ramp Volume, V_R	930
Freeway Free-Flow Speed, S_{FF}	60.0
Ramp Free-Flow Speed, S_{FR}	35.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	2800	0.89	Rolling	4	0	0.943	1.00	3335
Ramp	930	0.90	Rolling	0	0	1.000	1.00	1033
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = 1.000 using Equation (Exhibit 13-6)
V_{12} = 3335 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	4368	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	4368	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 V_{12} - 0.00627 L_A$

D_R = 35.9 (pc/mi/ln)
LOS = E (Exhibit 13-2)

Speed Determination

M_S = 0.594 (Exibit 13-11)
S_R = 49.3 mph (Exhibit 13-11)
S_0 = N/A mph (Exhibit 13-11)
S = 49.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = using Equation (Exhibit 13-7)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086 V_{12} - 0.009 L_D$

D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)
S_R = mph (Exhibit 13-12)
S_0 = mph (Exhibit 13-12)
S = mph (Exhibit 13-13)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	DFD	Freeway/Dir of Travel	SR 0001-RC3 Southbound
Agency or Company	JMT	Junction	Sta. 265+00
Date Performed	6/26/2012	Jurisdiction	Langhorne Manor Bor.
Analysis Time Period	PM	Analysis Year	2035 - Build

Project Description Frontage Road Analysis

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 500	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 3590	V_D = veh/h
	Ramp Volume, V_R: 790	
	Freeway Free-Flow Speed, S_{FF}: 60.0	
	Ramp Free-Flow Speed, S_{FR}: 35.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	$v = V/PHF \times f_{HV} \times f_p$
Freeway	3590	0.88	Rolling	4	0	0.943	1.00	4324
Ramp	790	0.94	Rolling	0	0	1.000	1.00	840
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 4324 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	4324	Exhibit 13-8	4600	No
$V_{FO} = V_F - V_R$	3484	Exhibit 13-8	4600	No
V_R	840	Exhibit 13-10	2000	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	4324	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 36.9 (pc/mi/ln)

LOS = E (Exhibit 13-2)

Speed Determination

D_s = 0.504 (Exhibit 13-12)

S_R = 50.9 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 50.9 mph (Exhibit 13-13)

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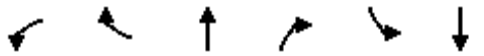
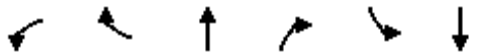
Frontage Road Intersection



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	350	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.97	0.25	1.00	1.00
Hourly flow rate (vph)	0	7	361	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	361	361			361	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	361	361			361	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	638	684			1198	

Direction, Lane #	WB 1	NB 1
Volume Total	7	361
Volume Left	0	0
Volume Right	7	0
cSH	684	1700
Volume to Capacity	0.01	0.21
Queue Length 95th (ft)	1	0
Control Delay (s)	10.3	0.0
Lane LOS	B	
Approach Delay (s)	10.3	0.0
Approach LOS	B	

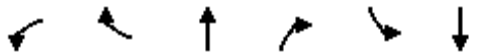
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	340	15	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.61	0.91	0.64	1.00	1.00
Hourly flow rate (vph)	0	8	374	23	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	385	385			397	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	385	385			397	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	99			100	
cM capacity (veh/h)	618	662			1162	

Direction, Lane #	WB 1	NB 1
Volume Total	8	397
Volume Left	0	0
Volume Right	8	23
cSH	662	1700
Volume to Capacity	0.01	0.23
Queue Length 95th (ft)	1	0
Control Delay (s)	10.5	0.0
Lane LOS	B	
Approach Delay (s)	10.5	0.0
Approach LOS	B	

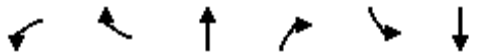
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	28.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	155	335	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.78	0.78	0.50	1.00	1.00
Hourly flow rate (vph)	0	199	429	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	439	439			449	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	439	439			449	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	68			100	
cM capacity (veh/h)	575	618			1111	

Direction, Lane #	WB 1	NB 1
Volume Total	199	449
Volume Left	0	0
Volume Right	199	20
cSH	618	1700
Volume to Capacity	0.32	0.26
Queue Length 95th (ft)	35	0
Control Delay (s)	13.6	0.0
Lane LOS	B	
Approach Delay (s)	13.6	0.0
Approach LOS	B	

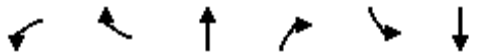
Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	10	490	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.67	0.82	1.00	1.00	1.00
Hourly flow rate (vph)	0	15	598	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	598	598			598	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	598	598			598	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	465	503			979	

Direction, Lane #	WB 1	NB 1
Volume Total	15	598
Volume Left	0	0
Volume Right	15	0
cSH	503	1700
Volume to Capacity	0.03	0.35
Queue Length 95th (ft)	2	0
Control Delay (s)	12.4	0.0
Lane LOS	B	
Approach Delay (s)	12.4	0.0
Approach LOS	B	

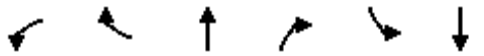
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	490	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.44	0.80	0.50	1.00	1.00
Hourly flow rate (vph)	0	11	612	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	622	622			632	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	622	622			632	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	450	486			950	

Direction, Lane #	WB 1	NB 1
Volume Total	11	632
Volume Left	0	0
Volume Right	11	20
cSH	486	1700
Volume to Capacity	0.02	0.37
Queue Length 95th (ft)	2	0
Control Delay (s)	12.6	0.0
Lane LOS	B	
Approach Delay (s)	12.6	0.0
Approach LOS	B	

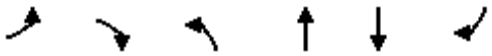
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	80	330	165	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.68	0.82	0.81	1.00	1.00
Hourly flow rate (vph)	0	118	402	204	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	504	504			606	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	504	504			606	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	79			100	
cM capacity (veh/h)	527	568			972	

Direction, Lane #	WB 1	NB 1
Volume Total	118	606
Volume Left	0	0
Volume Right	118	204
cSH	568	1700
Volume to Capacity	0.21	0.36
Queue Length 95th (ft)	19	0
Control Delay (s)	13.0	0.0
Lane LOS	B	
Approach Delay (s)	13.0	0.0
Approach LOS	B	

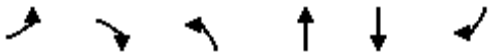
Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.45	0.79
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

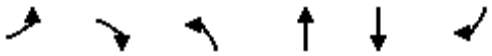
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.80	1.00	1.00	0.80	0.80
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

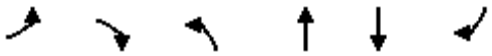
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	30	0	0	655	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.64	1.00	1.00	0.57	0.83
Hourly flow rate (vph)	0	47	0	0	1149	36
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1167	1167	1185			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1167	1167	1185			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	80	100			
cM capacity (veh/h)	214	236	589			

Direction, Lane #	EB 1	SB 1
Volume Total	47	1185
Volume Left	0	0
Volume Right	47	36
cSH	236	1700
Volume to Capacity	0.20	0.70
Queue Length 95th (ft)	18	0
Control Delay (s)	24.0	0.0
Lane LOS	C	
Approach Delay (s)	24.0	0.0
Approach LOS	C	

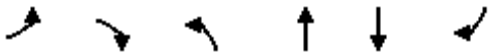
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	15	0	0	670	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.65	1.00	1.00	0.70	0.75
Hourly flow rate (vph)	0	23	0	0	957	40
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	977	977	997			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	977	977	997			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	100			
cM capacity (veh/h)	278	304	694			

Direction, Lane #	EB 1	SB 1
Volume Total	23	997
Volume Left	0	0
Volume Right	23	40
cSH	304	1700
Volume to Capacity	0.08	0.59
Queue Length 95th (ft)	6	0
Control Delay (s)	17.8	0.0
Lane LOS	C	
Approach Delay (s)	17.8	0.0
Approach LOS	C	

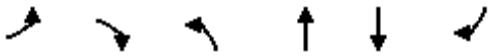
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	10	0	0	690	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.85	0.50
Hourly flow rate (vph)	0	13	0	0	812	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	817	817	822			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	817	817	822			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	100			
cM capacity (veh/h)	346	377	808			

Direction, Lane #	EB 1	SB 1
Volume Total	13	822
Volume Left	0	0
Volume Right	13	10
cSH	377	1700
Volume to Capacity	0.04	0.48
Queue Length 95th (ft)	3	0
Control Delay (s)	14.9	0.0
Lane LOS	B	
Approach Delay (s)	14.9	0.0
Approach LOS	B	

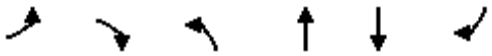
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	0	0	690	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.25	1.00	1.00	0.86	0.75
Hourly flow rate (vph)	0	20	0	0	802	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	806	806	809			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	806	806	809			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	100			
cM capacity (veh/h)	351	382	817			

Direction, Lane #	EB 1	SB 1
Volume Total	20	809
Volume Left	0	0
Volume Right	20	7
cSH	382	1700
Volume to Capacity	0.05	0.48
Queue Length 95th (ft)	4	0
Control Delay (s)	14.9	0.0
Lane LOS	B	
Approach Delay (s)	14.9	0.0
Approach LOS	B	

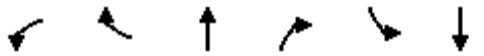
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	550	0	0	145	110
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.77	1.00	1.00	0.80	0.83
Hourly flow rate (vph)	0	714	0	0	181	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	248	248	314			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	248	248	314			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	10	100			
cM capacity (veh/h)	741	791	1246			

Direction, Lane #	EB 1	SB 1
Volume Total	714	314
Volume Left	0	0
Volume Right	714	133
cSH	791	1700
Volume to Capacity	0.90	0.18
Queue Length 95th (ft)	306	0
Control Delay (s)	35.9	0.0
Lane LOS	E	
Approach Delay (s)	35.9	0.0
Approach LOS	E	

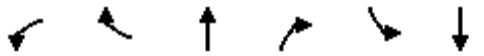
Intersection Summary			
Average Delay	25.0		
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	0	405	5	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.75	0.97	0.25	1.00	1.00
Hourly flow rate (vph)	0	0	418	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	428	428			438	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	428			438	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	584	627			1122	

Direction, Lane #	WB 1	NB 1
Volume Total	0	438
Volume Left	0	0
Volume Right	0	20
cSH	1700	1700
Volume to Capacity	0.00	0.26
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

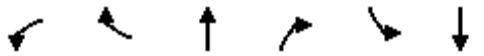
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	25	400	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.61	0.91	0.64	1.00	1.00
Hourly flow rate (vph)	0	41	440	16	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	447	447			455	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	447	447			455	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	93			100	
cM capacity (veh/h)	569	611			1106	

Direction, Lane #	WB 1	NB 1
Volume Total	41	455
Volume Left	0	0
Volume Right	41	16
cSH	611	1700
Volume to Capacity	0.07	0.27
Queue Length 95th (ft)	5	0
Control Delay (s)	11.3	0.0
Lane LOS	B	
Approach Delay (s)	11.3	0.0
Approach LOS	B	

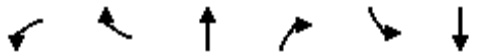
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	80	390	35	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.78	0.78	0.50	1.00	1.00
Hourly flow rate (vph)	0	103	500	70	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	535	535			570	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	535	535			570	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	81			100	
cM capacity (veh/h)	506	545			1002	

Direction, Lane #	WB 1	NB 1
Volume Total	103	570
Volume Left	0	0
Volume Right	103	70
cSH	545	1700
Volume to Capacity	0.19	0.34
Queue Length 95th (ft)	17	0
Control Delay (s)	13.1	0.0
Lane LOS	B	
Approach Delay (s)	13.1	0.0
Approach LOS	B	

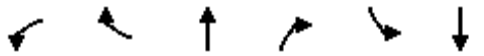
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	34.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	10	470	0	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.67	0.82	1.00	1.00	1.00
Hourly flow rate (vph)	0	15	573	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	573	573			573	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	573	573			573	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	481	519			1000	

Direction, Lane #	WB 1	NB 1
Volume Total	15	573
Volume Left	0	0
Volume Right	15	0
cSH	519	1700
Volume to Capacity	0.03	0.34
Queue Length 95th (ft)	2	0
Control Delay (s)	12.1	0.0
Lane LOS	B	
Approach Delay (s)	12.1	0.0
Approach LOS	B	

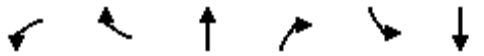
Intersection Summary				
Average Delay		0.3		
Intersection Capacity Utilization		34.7%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	5	470	10	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.44	0.80	0.50	1.00	1.00
Hourly flow rate (vph)	0	11	588	20	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	598	598			608	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	598	598			608	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	465	503			971	

Direction, Lane #	WB 1	NB 1
Volume Total	11	608
Volume Left	0	0
Volume Right	11	20
cSH	503	1700
Volume to Capacity	0.02	0.36
Queue Length 95th (ft)	2	0
Control Delay (s)	12.3	0.0
Lane LOS	B	
Approach Delay (s)	12.3	0.0
Approach LOS	B	

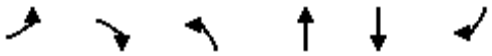
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	0	70	210	265	0	0
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	0.68	0.82	0.81	1.00	1.00
Hourly flow rate (vph)	0	103	256	327	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	420	420			583	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	420	420			583	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	84			100	
cM capacity (veh/h)	590	634			991	

Direction, Lane #	WB 1	NB 1
Volume Total	103	583
Volume Left	0	0
Volume Right	103	327
cSH	634	1700
Volume to Capacity	0.16	0.34
Queue Length 95th (ft)	14	0
Control Delay (s)	11.8	0.0
Lane LOS	B	
Approach Delay (s)	11.8	0.0
Approach LOS	B	

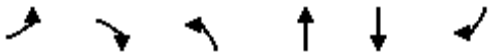
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	38.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.45	0.79
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

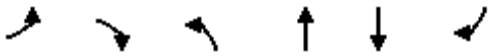
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	0	0	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.80	1.00	1.00	0.80	0.80
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0	0	0			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0	0	0			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1023	1085	1623			

Direction, Lane #	EB 1	SB 1
Volume Total	0	0
Volume Left	0	0
Volume Right	0	0
cSH	1700	1700
Volume to Capacity	0.00	0.00
Queue Length 95th (ft)	0	0
Control Delay (s)	0.0	0.0
Lane LOS	A	
Approach Delay (s)	0.0	0.0
Approach LOS	A	

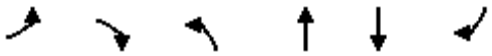
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	100	0	0	785	140
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.64	1.00	1.00	0.57	0.83
Hourly flow rate (vph)	0	156	0	0	1377	169
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1462	1462	1546			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1462	1462	1546			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	1	100			
cM capacity (veh/h)	142	158	429			

Direction, Lane #	EB 1	SB 1
Volume Total	156	1546
Volume Left	0	0
Volume Right	156	169
cSH	158	1700
Volume to Capacity	0.99	0.91
Queue Length 95th (ft)	189	0
Control Delay (s)	125.8	0.0
Lane LOS	F	
Approach Delay (s)	125.8	0.0
Approach LOS	F	

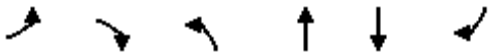
Intersection Summary			
Average Delay	11.6		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	50	0	0	875	105
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.65	1.00	1.00	0.70	0.75
Hourly flow rate (vph)	0	77	0	0	1250	140
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1320	1320	1390			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1320	1320	1390			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	60	100			
cM capacity (veh/h)	173	192	492			

Direction, Lane #	EB 1	SB 1
Volume Total	77	1390
Volume Left	0	0
Volume Right	77	140
cSH	192	1700
Volume to Capacity	0.40	0.82
Queue Length 95th (ft)	45	0
Control Delay (s)	35.8	0.0
Lane LOS	E	
Approach Delay (s)	35.8	0.0
Approach LOS	E	

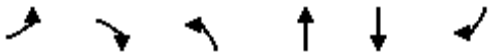
Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	0	0	975	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.75	1.00	1.00	0.85	0.50
Hourly flow rate (vph)	0	7	0	0	1147	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1162	1162	1177			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1162	1162	1177			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	97	100			
cM capacity (veh/h)	216	237	593			

Direction, Lane #	EB 1	SB 1
Volume Total	7	1177
Volume Left	0	0
Volume Right	7	30
cSH	237	1700
Volume to Capacity	0.03	0.69
Queue Length 95th (ft)	2	0
Control Delay (s)	20.6	0.0
Lane LOS	C	
Approach Delay (s)	20.6	0.0
Approach LOS	C	

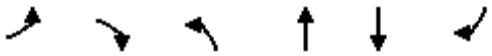
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	0	0	985	15
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.25	1.00	1.00	0.86	0.75
Hourly flow rate (vph)	0	20	0	0	1145	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1155	1155	1165			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1155	1155	1165			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	92	100			
cM capacity (veh/h)	218	240	599			

Direction, Lane #	EB 1	SB 1
Volume Total	20	1165
Volume Left	0	0
Volume Right	20	20
cSH	240	1700
Volume to Capacity	0.08	0.69
Queue Length 95th (ft)	7	0
Control Delay (s)	21.4	0.0
Lane LOS	C	
Approach Delay (s)	21.4	0.0
Approach LOS	C	

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	510	0	0	490	300
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	0.77	1.00	1.00	0.80	0.83
Hourly flow rate (vph)	0	662	0	0	612	361
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	793	793	974			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	793	793	974			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	0	100			
cM capacity (veh/h)	357	388	708			

Direction, Lane #	EB 1	SB 1
Volume Total	662	974
Volume Left	0	0
Volume Right	662	361
cSH	388	1700
Volume to Capacity	1.71	0.57
Queue Length 95th (ft)	1010	0
Control Delay (s)	352.6	0.0
Lane LOS	F	
Approach Delay (s)	352.6	0.0
Approach LOS	F	

Intersection Summary			
Average Delay	142.7		
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		