

2035 HCM Calculations

Analysis Type	Location	Peak Hour	V (veh/h)	% Trucks	Speed (mph)	f_{HV}	V_F (pc/h/ln)	D (pc/mi/ln)	LOS
Major Diverge	NB I-75 / WB I-96 Diverge	AM	5513	14	-	0.935	1242	13.5	B
		Midday	2135	28	-	0.877	512	5.6	A
		PM	2845	17	-	0.922	650	7.1	A
1-Lane Segment	WB I-96 from WB I-96 (2-1 lane) merge to Gateway on-ramp	AM	1802	20	55	0.909	2087	37.9	E
		Midday	546	52	55	0.794	724	13.2	B
		PM	955	26	55	0.885	1136	20.7	C
1-Lane Segment	EB I-96 from Gateway off-ramp to SB I-75	AM	1001	29	55	0.873	1206	21.9	C
		Midday	774	41	55	0.830	982	17.9	B
		PM	1375	10	55	0.952	1520	27.6	D

HCM Equations:

$$f_{HV} = \frac{1}{1 + P_T(E_T - 1)}$$

$$V_F = \frac{V}{PHF * N * f_{HV} * f_P}$$

$$D = 0.0109 * V_F \quad (\text{Major Diverge})$$

$$D = \frac{V_F}{S} \quad (\text{Freeway Segment})$$

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Dearborn Exit/Springwells Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5141	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1353	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.926	
Driver population factor, fp	1.00	
Flow rate, vp	1461	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1461	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.9	mi/h
Number of lanes, N	4	
Density, D	20.9	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Springwells Exit/Spring. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4739	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1247	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1353	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1353	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	19.3	pc/mi/ln

Level of service, LOS

C

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Springwells Ent./Plaza Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	5072	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1335	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1159	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	1159	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	16.6	pc/mi/ln

Level of service, LOS

B

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Exit/Livernois Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	4678	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1231	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	1299	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	1299	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	18.6	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Livernois Exit/Dragoon Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	4536	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1194	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1265	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1265	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	18.1	pc/mi/ln

Level of service, LOS

C

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-----Operational Analysis-----

Analyst: CH
Agency or Company:
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Dragoon Ent./Plaza Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	4665	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1228	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	1295	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1295	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	18.5	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Ent./Clark Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	5358	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1410	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1509	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	1509	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	27.4	pc/mi/ln

Level of service, LOS

D

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Clark Ent./Lafayette Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	5532	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1456	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1246	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	1246	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	22.7	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Lafayette Exit/I-96 WB Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	5513	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1451	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	1242	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	1242	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	22.6	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: I-96 WB Exit/I-75 NB S.D. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3710	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	976	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	1030	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1030	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	18.7	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: I-75 NB S.D. Exit/Amb. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3677	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	968	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	1361	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, FLW	0.0	mi/h
Lateral clearance adjustment, FLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1361	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	24.7	pc/mi/ln

Level of service, LOS

C

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Amb. Ent./C-D Road Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	4414	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1162	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1618	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1618	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	29.4	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Dearborn Exit/Springwells Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2751	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	724	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	814	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	814	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	11.6	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Springwells Exit/Spring. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2477	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	652	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	733	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	733	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	10.5	pc/mi/ln

Level of service, LOS

A

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Springwells Ent./Plaza Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2724	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	717	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	645	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	645	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	9.2	pc/mi/ln

Level of service, LOS

A

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Plaza Exit/Livernois Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	2016	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	531	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	597	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

----- LOS and Performance Measures -----

Flow rate, vp	597	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	8.5	pc/mi/ln

Level of service, LOS

A

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Livernois Exit/Dragoon Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1965	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	517	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	582	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	582	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	8.3	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company:
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Dragoon Ent./Plaza Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2048	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	539	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	606	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	606	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	8.7	pc/mi/ln

Level of service, LOS

A

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 Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Plaza Ent./Clark Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

 Flow Inputs and Adjustments

Volume, V	2202	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	579	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	652	pc/h/ln

 Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

 LOS and Performance Measures

Flow rate, vp	652	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	11.9	pc/mi/ln

Level of service, LOS

B

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Clark Ent./Lafayette Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	2379	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	626	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	563	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

----- LOS and Performance Measures -----

Flow rate, vp	563	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	10.2	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Lafayette Exit/I-96 WB Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2135	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	562	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	506	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	506	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	9.2	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: I-96 WB Exit/I-75 NB S.D. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1589	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	418	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	460	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFSS	55.0	mi/h
Lane width adjustment, flW	0.0	mi/h
Lateral clearance adjustment, flC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	460	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	8.4	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: I-75 NB S.D. Exit/Amb. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1567	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	412	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	605	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	605	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	11.0	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Amb. Ent./C-D Road Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1766	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	465	v
Trucks and buses	18	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.917	
Driver population factor, fp	1.00	
Flow rate, vp	675	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	675	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	12.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Dearborn Exit/Springwells Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3392	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	893	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	1004	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	1004	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	14.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Springwells Exit/Spring. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3116	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	820	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	923	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	923	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	13.2	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Springwells Ent./Plaza Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3243	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	853	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	768	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	768	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	11.0-	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Exit/Livernois Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2274	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	598	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	649	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	649	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	9.3	pc/mi/ln

Level of service, LOS

A

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Livernois Exit/Dragoon Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2213	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	582	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	632	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	632	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	9.0	pc/mi/ln

Level of service, LOS

A

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Operational Analysis

Analyst: CH
Agency or Company:
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Dragoon Ent./Plaza Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2615	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	688	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.926	
Driver population factor, fp	1.00	
Flow rate, vp	743	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	743	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	10.6	pc/mi/ln

Level of service, LOS

A

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HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Ent./Clark Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2737	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	720	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.913	
Driver population factor, fp	1.00	
Flow rate, vp	789	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	789	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	14.3	pc/mi/ln

Level of service, LOS

B

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Clark Ent./Lafayette Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3049	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	802	v
Trucks and buses	19	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.913	
Driver population factor, fp	1.00	
Flow rate, vp	703	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	703	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	12.8	pc/mi/ln

Level of service, LOS

B

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Lafayette Exit/I-96 WB Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2845	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	749	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	650	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	650	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	11.8	pc/mi/ln

Level of service, LOS

B

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: I-96 WB Exit/I-75 NB S.D. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1890	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	497	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	527	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	527	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	9.6	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: I-75 NB S.D. Exit/Amb. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1858	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	489	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	691	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	691	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	12.6	pc/mi/ln

Level of service, LOS

B

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Amb. Ent./C-D Road Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2071	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	545	v
Trucks and buses	11	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	767	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	767	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	13.9	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: C-D Road Ent. / Amb. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2361	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	621	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	866	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	866	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	15.7	pc/mi/ln

Level of service, LOS

B

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Amb. Exit / EB I-96 Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2295	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	604	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	837	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	837	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	15.2	pc/mi/ln

Level of service, LOS

B

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: EB I-96 Ent. / Amb. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3296	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	867	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	928	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	928	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	16.9	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Ambassador Ent./Grand Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3386	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	891	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	763	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	763	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	13.9	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Grand Ent./Clark Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3414	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	898	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	769	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	769	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	14.0	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Clark Exit/Plaza Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2833	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	746	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	647	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	647	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	11.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Exit/Junction Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2617	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	689	v
Trucks and buses	15	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	740	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	740	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	10.6	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Junction Ent./Dragoon Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2661	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	700	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	599	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	599	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	8.6	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Dragoon Exit/Plaza Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2342	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	616	v
Trucks and buses	16	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.926	
Driver population factor, fp	1.00	
Flow rate, vp	666	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	666	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	9.5	pc/mi/ln

Level of service, LOS

A

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Ent./Springwells Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3110	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	818	v
Trucks and buses	24	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.893	
Driver population factor, fp	1.00	
Flow rate, vp	611	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

-----LOS and Performance Measures-----

Flow rate, vp	611	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	6	
Density, D	8.7	pc/mi/ln

Level of service, LOS

A

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Springwells Exit/Spring. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	3030	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	797	v
Trucks and buses	24	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.893	
Driver population factor, fp	1.00	
Flow rate, vp	893	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

----- LOS and Performance Measures -----

Flow rate, vp	893	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	12.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Springwells Ent./Dearborn Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3153	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	830	v
Trucks and buses	24	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.893	
Driver population factor, fp	1.00	
Flow rate, vp	929	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	929	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	13.3	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: C-D Road Ent. / Amb. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2519	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	663	v
Trucks and buses	21	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.905	
Driver population factor, fp	1.00	
Flow rate, vp	977	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	977	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	17.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Amb. Exit / EB I-96 Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2224	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	585	v
Trucks and buses	23	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.897	
Driver population factor, fp	1.00	
Flow rate, vp	870	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	870	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	15.8	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: EB I-96 Ent. / Amb. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2998	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	789	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	888	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	888	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	16.1	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Ambassador Ent./Grand Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	3048	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	802	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	722	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	722	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	13.1	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Grand Ent./Clark Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3089	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	813	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	732	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	732	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	13.3	pc/mi/ln

Level of service, LOS

B

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Clark Exit/Plaza Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2798	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	736	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	663	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	663	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	12.1	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Plaza Exit/Junction Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2403	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	632	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	711	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	711	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	10.2	pc/mi/ln

Level of service, LOS

A

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Junction Ent./Dragoon Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	2575	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	678	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	610	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

----- LOS and Performance Measures -----

Flow rate, vp	610	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	8.7	pc/mi/ln

Level of service, LOS

A

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Dragoon Exit/Plaza Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	2432	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	640	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	720	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

----- LOS and Performance Measures -----

Flow rate, vp	720	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	10.3	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Plaza Ent./Springwells Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2924	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	769	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	577	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, flW	0.0	mi/h
Lateral clearance adjustment, flC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	577	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	6	
Density, D	8.2	pc/mi/ln

Level of service, LOS

A

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Springwells Exit/Spring. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	2888	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	760	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	855	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

----- LOS and Performance Measures -----

Flow rate, vp	855	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	12.2	pc/mi/ln

Level of service, LOS

B

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----- Operational Analysis -----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Springwells Ent./Dearborn Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Flow Inputs and Adjustments -----

Volume, V	3169	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	834	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	938	pc/h/ln

----- Speed Inputs and Adjustments -----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

----- LOS and Performance Measures -----

Flow rate, vp	938	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	4	
Density, D	13.4	pc/mi/ln

Level of service, LOS

B

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: C-D Road Ent. / Amb. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	4953	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1303	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1807	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1807	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	32.9	pc/mi/ln

Level of service, LOS

D

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Amb. Exit / EB I-96 Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4554	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1198	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1670	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	3.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1670	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	30.4	pc/mi/ln

Level of service, LOS

D

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: EB I-96 Ent. / Amb. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	5929	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1560	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1630	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1630	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	29.6	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Grand Ent./Clark Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	6512	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1714	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1439	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1439	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	26.2	pc/mi/ln

Level of service, LOS

D

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Clark Exit/Plaza Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	6238	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1642	v
Trucks and buses	10	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.952	
Driver population factor, fp	1.00	
Flow rate, vp	1379	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1379	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	5	
Density, D	25.1	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Exit/Junction Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5301	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1395	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1458	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1458	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.9	mi/h
Number of lanes, N	4	
Density, D	20.9	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Junction Ent./Dragoon Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5586	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1470	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1229	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1229	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	5	
Density, D	17.6	pc/mi/ln

Level of service, LOS

B

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Dragoon Exit/Plaza Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5437	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1431	v
Trucks and buses	9	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1495	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1495	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.8	mi/h
Number of lanes, N	4	
Density, D	21.4	pc/mi/ln

Level of service, LOS

C

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Ent./Springwells Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5927	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1560	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.939	
Driver population factor, fp	1.00	
Flow rate, vp	1107	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1107	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	6	
Density, D	15.8	pc/mi/ln

Level of service, LOS

B

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Springwells Exit/Spring. Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5890	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1550	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1643	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h

Urban Freeway

LOS and Performance Measures

Flow rate, vp	1643	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.2	mi/h
Number of lanes, N	4	
Density, D	23.7	pc/mi/ln

Level of service, LOS

C

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Springwells Ent./Dearborn Ent.
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	6247	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1644	v
Trucks and buses	12	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1743	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1743	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.4	mi/h
Number of lanes, N	4	
Density, D	25.5	pc/mi/ln

Level of service, LOS

C

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-96 WB
From/To: I-75 Split / 1 Lane Merge
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1802	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	474	v
Trucks and buses	20	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.909	
Driver population factor, fp	1.00	
Flow rate, vp	1043	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1043	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	19.0	pc/mi/ln

Level of service, LOS

C

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-96 WB
From/To: Amb. Ent. / Michigan Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	2152	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	566	v
Trucks and buses	17	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.922	
Driver population factor, fp	1.00	
Flow rate, vp	1229	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	1229	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	22.3	pc/mi/ln

Level of service, LOS

C

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-96 WB
From/To: I-75 Split / 1 Lane Merge
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	546	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	144	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	323	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	323	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	5.9	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: Midday Peak
Freeway/Direction: I-96 WB
From/To: Amb. Ent. / Michigan Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	847	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	223	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	502	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	502	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	9.1	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-96 WB
From/To: I-75 Split / 1 Lane Merge
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	955	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	251	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	565	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	565	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	10.3	pc/mi/ln

Level of service, LOS

A

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-----Operational Analysis-----

Analyst: CH
 Agency or Company: PARSONS
 Date Performed: 10/2/08
 Analysis Time Period: PM Peak
 Freeway/Direction: I-96 WB
 From/To: Amb. Ent. / Michigan Exit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1177	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	310	v
Trucks and buses	22	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.901	
Driver population factor, fp	1.00	
Flow rate, vp	688	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	688	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	12.5	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

HCS+: Basic Freeway Segments Release 5.2

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-----Operational Analysis-----

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: AM Peak
Freeway/Direction: I-96 EB
From/To: Michigan Ent. / Amb. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1628	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	428	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	964	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	964	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln

Level of service, LOS

B

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-----Operational Analysis-----

Analyst: CH
 Agency or Company: PARSONS
 Date Performed: 10/2/08
 Analysis Time Period: Midday Peak
 Freeway/Direction: I-96 EB
 From/To: Michigan Ent. / Amb. Exit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Flow Inputs and Adjustments-----

Volume, V	1061	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	279	v
Trucks and buses	25	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.889	
Driver population factor, fp	1.00	
Flow rate, vp	628	pc/h/ln

-----Speed Inputs and Adjustments-----

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

-----LOS and Performance Measures-----

Flow rate, vp	628	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	11.4	pc/mi/ln

Level of service, LOS

B

Overall results are not computed when free-flow speed is less than 55 mph.

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Operational Analysis

Analyst: CH
Agency or Company: PARSONS
Date Performed: 10/2/08
Analysis Time Period: PM Peak
Freeway/Direction: I-96 EB
From/To: Michigan Ent. / Amb. Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2027	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	533	v
Trucks and buses	8	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.962	
Driver population factor, fp	1.00	
Flow rate, vp	1110	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFSS	55.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	2.5	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	55.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1110	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	2	
Density, D	20.2	pc/mi/ln

Level of service, LOS

C

Overall results are not computed when free-flow speed is less than 55 mph.

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp W of Dearborn
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5240	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	99	vph
Length of first accel/decel lane	120	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	5240	99	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1379	26	v
Trucks and buses	16	11	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.926	0.948	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5957	110	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2659$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5957	9600	No
v_{12}	2659	4400	No
$v_{FO} = v_F - v_R$	5847	9600	No
v_R	110	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 26.0$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	D = 0.438	
Space mean speed in ramp influence area,	S = 57.7	mph
Space mean speed in outer lanes,	S = 74.3	mph
Space mean speed for all vehicles,	S = 65.8	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp W of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5141	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	402	vph
Length of first accel/decel lane	350	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	5141	402	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1353	106	v
Trucks and buses	16	2	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.926	0.990	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5845	427	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2789$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5845	9600	No
v_{12}	2789	4400	No
$v_{FO} = v_F - v_R$	5418	9600	No
v_R	427	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 25.1$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	D = 0.466	
Space mean speed in ramp influence area,	S = 56.9	mph
Space mean speed in outer lanes,	S = 74.7	mph
Space mean speed for all vehicles,	S = 65.0	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4739	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	333	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	4739	333	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1247	88	v
Trucks and buses	17	10	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.922	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5412	368	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.650 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 3516 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v	5780	9600	No
FO			
v	3884	4600	No
R12			

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.2 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.406	
	S	
Space mean speed in ramp influence area,	S = 58.6	mph
	R	
Space mean speed in outer lanes,	S = 68.4	mph
	0	
Space mean speed for all vehicles,	S = 61.5	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Plaza Exit Ramp E of Waterman
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5072	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	394	vph
Length of first accel/decel lane	0	ft
Length of second accel/decel lane	200	ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5072	394		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1335	104		v
Trucks and buses	17	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5793	467	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.260 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1626$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4925	9600	No
v_{12}	1626	4400	No
$v_{FO} = v_F - v_R$	4458	9600	No
v_R	467	4100	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 16.4$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.340	
Space mean speed in ramp influence area,	S = 60.5	mph
Space mean speed in outer lanes,	S = 74.3	mph
Space mean speed for all vehicles,	S = 69.1	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp at Livernois
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4678	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	142	vph
Length of first accel/decel lane	687	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	4678	142	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1231	37	v
Trucks and buses	11	5	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.948	0.976	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5195	153	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2351$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5195	9600	No
v_{12}	2351	4400	No
$v_{FO} = v_F - v_R$	5042	9600	No
v_R	153	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 18.3$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.442	
Space mean speed in ramp influence area,	S = 57.6	mph
Space mean speed in outer lanes,	S = 75.1	mph
Space mean speed for all vehicles,	S = 66.1	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Dragoon
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4536	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	129	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	4536	129	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1194	34	v
Trucks and buses	12	5	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.976	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5061	139	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.392 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1982 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v	5200	9600	No
FO			
v	2121	4600	No
R12			

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 18.2 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.312	
	S	
Space mean speed in ramp influence area,	S = 61.3	mph
	R	
Space mean speed in outer lanes,	S = 66.3	mph
	0	
Space mean speed for all vehicles,	S = 64.1	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Plaza Ent. Ramp E of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4665	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	693	vph
Length of first accel/decel lane	790	ft
Length of second accel/decel lane	1500	ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	4665	693	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1228	182	v
Trucks and buses	11	25	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.948	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5181	821	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.209 Using Equation 0
FM
 $v_{12} = v_F (P_{FM}) = 1083 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	6002	9600	No
v R12	1904	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 0.6 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	M = 0.070	
Space mean speed in ramp influence area,	S = 68.0	mph
Space mean speed in outer lanes,	S = 64.4	mph
Space mean speed for all vehicles,	S = 65.5	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Clark
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge		
Number of lanes in freeway	4		
Free-flow speed on freeway	55.0	mph	
Volume on freeway	5358	vph	

-----On Ramp Data-----

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	35.0	mph	
Volume on ramp	174	vph	
Length of first accel/decel lane	590	ft	
Length of second accel/decel lane		ft	

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No		
Volume on adjacent Ramp		vph	
Position of adjacent Ramp			
Type of adjacent Ramp			
Distance to adjacent Ramp		ft	

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5358	174		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1410	46		v
Trucks and buses	14	23		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	0.897	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6035	204	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.380 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 2295$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	6239	9000	No
v R12	2499	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.2$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.327	
Space mean speed in ramp influence area,	S _R = 50.7	mph
Space mean speed in outer lanes,	S ₀ = 50.1	mph
Space mean speed for all vehicles,	S = 50.3	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp Eof Grand(Lafayette)
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	55.0	mph
Volume on freeway	5532	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	20	vph
Length of first accel/decel lane	235	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	5532	20	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1456	5	v
Trucks and buses	14	25	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.935	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6231	24	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.436 Using Equation 8
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2323$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5297	9000	No
v_{12}	2323	4400	No
$v_{FO} = v_F - v_R$	5273	9000	No
v_R	24	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 22.1$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	D = 0.430	
Space mean speed in ramp influence area,	S = 49.4	mph
Space mean speed in outer lanes,	S = 58.4	mph
Space mean speed for all vehicles,	S = 54.1	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp to NB I-75 S.D.
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3710	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	33	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3710	33		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	976	9		v
Trucks and buses	11	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.948	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4120	36	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.655 Using Equation 5
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2712$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4120	6750	No
v_{12}	2712	4400	No
$v_{FO} = v_F - v_R$	4084	6750	No
v_R	36	2200	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 18.6$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable, $D = 0.171$
S
Space mean speed in ramp influence area, $S = 52.8$ mph
R
Space mean speed in outer lanes, $S = 58.7$ mph
0
Space mean speed for all vehicles, $S = 54.7$ mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp from Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3677	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	737	vph
Length of first accel/decel lane	870	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3677	737	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	968	194	v
Trucks and buses	11	0	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.948	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4083	776	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.602 Using Equation 1
 FM
 $v_{12} = v_F (P_{FM}) = 2457 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v _{FO}	4859	6750	No
v _{R12}	3233	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 24.9 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.359	
	S	
Space mean speed in ramp influence area,	S = 50.3	mph
	R	
Space mean speed in outer lanes,	S = 50.9	mph
	0	
Space mean speed for all vehicles,	S = 50.5	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp W of Dearborn
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2795	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	44	vph
Length of first accel/decel lane	120	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2795	44	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	736	12	v
Trucks and buses	25	7	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.889	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3310	48	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P = 1470$ pc/h
FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3310	9600	No
v_{12}	1470	4400	No
$v_{FO} = v_F - v_R$	3262	9600	No
v_R	48	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 15.8$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.432	
Space mean speed in ramp influence area,	S = 57.9	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 67.1	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp W of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2751	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	273	vph
Length of first accel/decel lane	350	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2751	273		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	724	72		v
Trucks and buses	25	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3258	302	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P = 1591$ pc/h
FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3258	9600	No
v_{12}	1591	4400	No
$v_{FO} = v_F - v_R$	2956	9600	No
v_R	302	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 14.8$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.455	
Space mean speed in ramp influence area,	S = 57.3	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 65.8	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2477	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	248	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2477	248	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	652	65	v
Trucks and buses	25	18	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.889	0.917	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2933	285	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.660 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1936 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3218	9600	No
v R12	2221	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.3 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.252	
Space mean speed in ramp influence area,	S _R = 62.9	mph
Space mean speed in outer lanes,	S ₀ = 70.0	mph
Space mean speed for all vehicles,	S = 65.0	mph

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-----Diverge Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Plaza Exit Ramp E of Waterman
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2724	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	708	vph
Length of first accel/decel lane	0	ft
Length of second accel/decel lane	200	ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2724	708		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	717	186		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3226	838	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.260 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1459$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3226	9600	No
v_{12}	1459	4400	No
$v_{FO} = v_F - v_R$	2388	9600	No
v_R	838	4100	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 15.0$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.373	
Space mean speed in ramp influence area,	S = 59.5	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 67.9	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp at Livernois
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2016	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	51	vph
Length of first accel/decel lane	687	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2016	51		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	531	13		v
Trucks and buses	25	18		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.917	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2387	59	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P = 1074$ pc/h
FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2387	9600	No
v_{12}	1074	4400	No
$v_{FO} = v_F - v_R$	2328	9600	No
v_R	59	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 7.3$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.433	
Space mean speed in ramp influence area,	S = 57.9	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 66.9	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Dragoon
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	1965	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	82	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	1965	82	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	517	22	v
Trucks and buses	25	12	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.889	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2327	91	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.398 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 925$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v _{FO}	2418	9600	No
v _{R12}	1016	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 9.6$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	M = 0.290	
Space mean speed in ramp influence area,	S _R = 61.9	mph
Space mean speed in outer lanes,	S ₀ = 69.3	mph
Space mean speed for all vehicles,	S = 66.0	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Plaza Ent. Ramp E of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2048	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	154	vph
Length of first accel/decel lane	790	ft
Length of second accel/decel lane	1500	ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2048	154	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	539	41	v
Trucks and buses	25	25	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2425	182	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.209 Using Equation 0
FM
 $v_{12} = v_F (P_{FM}) = 507 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	2607	9600	No
v R12	689	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = -8.5 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	M = 0.052	
Space mean speed in ramp influence area,	S = 68.6	mph
Space mean speed in outer lanes,	S = 68.3	mph
Space mean speed for all vehicles,	S = 68.4	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Clark
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2202	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	177	vph
Length of first accel/decel lane	590	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2202	177		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	579	47		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2608	210	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.380 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 990$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v _{FO}	2818	9000	No
v _{R12}	1200	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.0$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.293	
Space mean speed in ramp influence area,	S _R = 51.2	mph
Space mean speed in outer lanes,	S ₀ = 53.9	mph
Space mean speed for all vehicles,	S = 52.7	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp Eof Grand(Lafayette)
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2379	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	244	vph
Length of first accel/decel lane	235	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2379	244		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	626	64		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2817	289	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.436 Using Equation 8
 FD
 $v_{12} = v_R + (v_F - v_R) P = 1391$ pc/h
 FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2817	9000	No
v_{12}	1391	4400	No
$v_{FO} = v_F - v_R$	2528	9000	No
v_R	289	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 14.1$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.454	
Space mean speed in ramp influence area,	S = 49.1	mph
Space mean speed in outer lanes,	S = 60.3	mph
Space mean speed for all vehicles,	S = 54.2	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp to NB I-75 S.D.
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1589	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	22	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1589	22		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	418	6		v
Trucks and buses	20	18		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.909	0.917	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1840	25	pcph

----- Estimation of V12 Diverge Areas -----

$$L = \text{(Equation 25-8 or 25-9)}$$

$$EQ$$

$$P = 0.713 \text{ Using Equation 5}$$

$$FD$$

$$v_{12R} = v_{FR} + (v_{FR} - v_{FD}) P = 1319 \text{ pc/h}$$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_{FR}$	1840	6750	No
v_{12}	1319	4400	No
$v_{FO} = v_{FR} - v_{R}$	1815	6750	No
v_{R}	25	2200	No

----- Level of Service Determination (if not F) -----

$$\text{Density, } D = 4.252 + 0.0086 v_{12} - 0.009 L = 6.6 \text{ pc/mi/ln}$$

Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.170	
	S	
Space mean speed in ramp influence area,	S = 52.8	mph
	R	
Space mean speed in outer lanes,	S = 60.3	mph
	0	
Space mean speed for all vehicles,	S = 54.7	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp from Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1567	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	199	vph
Length of first accel/decel lane	870	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	1567	199	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	412	52	v
Trucks and buses	20	0	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.909	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1814	209	pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.602 Using Equation 1
 FM
 $v_{12} = v_F (P_{FM}) = 1092 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	2023	6750	No
v _{R12}	1301	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 10.1 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M = 0.274	
	S	
Space mean speed in ramp influence area,	S = 51.4	mph
	R	
Space mean speed in outer lanes,	S = 54.2	mph
	0	
Space mean speed for all vehicles,	S = 52.4	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp W of Dearborn
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3422	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	29	vph
Length of first accel/decel lane	120	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3422	29		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	901	8		v
Trucks and buses	25	7		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4052	32	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1785$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4052	9600	No
v_{12}	1785	4400	No
$v_{FO} = v_F - v_R$	4020	9600	No
v_R	32	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 18.5$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.431	
Space mean speed in ramp influence area,	S = 57.9	mph
Space mean speed in outer lanes,	S = 76.3	mph
Space mean speed for all vehicles,	S = 66.9	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp W of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3392	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	277	vph
Length of first accel/decel lane	350	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3392	277		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	893	73		v
Trucks and buses	25	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4017	293	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.436 Using Equation 8
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1917$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4017	9600	No
v_{12}	1917	4400	No
$v_{FO} = v_F - v_R$	3724	9600	No
v_R	293	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 17.6$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.454	
Space mean speed in ramp influence area,	S = 57.3	mph
Space mean speed in outer lanes,	S = 76.6	mph
Space mean speed for all vehicles,	S = 66.0	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3116	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	127	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3116	127		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	820	33		v
Trucks and buses	25	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3690	140	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.678 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 2502 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v _{FO}	3830	9600	No
v _{R12}	2642	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 16.6 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.271	
Space mean speed in ramp influence area,	S _R = 62.4	mph
Space mean speed in outer lanes,	S ₀ = 69.7	mph
Space mean speed for all vehicles,	S = 64.5	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Plaza Exit Ramp E of Waterman
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3243	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	969	vph
Length of first accel/decel lane	0	ft
Length of second accel/decel lane	200	ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3243	969		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	853	255		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3840	1148	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.260 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1848$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3840	9600	No
v_{12}	1848	4400	No
$v_{FO} = v_F - v_R$	2692	9600	No
v_R	1148	4100	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 18.3$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.401	
Space mean speed in ramp influence area,	S = 58.8	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 66.9	mph

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----- Diverge Analysis -----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp at Livernois
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2274	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	61	vph
Length of first accel/decel lane	687	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2274	61		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	598	16		v
Trucks and buses	17	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2597	69	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1171$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2597	9600	No
v_{12}	1171	4400	No
$v_{FO} = v_F - v_R$	2528	9600	No
v_R	69	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 8.1$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.434	
Space mean speed in ramp influence area,	S = 57.8	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 66.9	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Dragoon
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2213	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	402	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2213	402		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	582	106		v
Trucks and buses	17	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade			%	%
Length			mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.922	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2527	449	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.353 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 892 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	2976	9600	No
v R12	1341	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.0 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.294	
Space mean speed in ramp influence area,	S = 61.8	mph
Space mean speed in outer lanes,	S = 68.9	mph
Space mean speed for all vehicles,	S = 65.5	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Plaza Ent. Ramp E of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2615	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	45.0	mph
Volume on ramp	122	vph
Length of first accel/decel lane	790	ft
Length of second accel/decel lane	1500	ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2615	122		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	688	32		v
Trucks and buses	16	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.926	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2973	144	pcph

Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
EQ
P = 0.209 Using Equation 0
FM
 $v_{12} = v_F (P_{FM}) = 621 \text{ pc/h}$

Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	3117	9600	No
v _{R12}	765	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = -7.9 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M = 0.052	
Space mean speed in ramp influence area,	S _R = 68.5	mph
Space mean speed in outer lanes,	S ₀ = 67.6	mph
Space mean speed for all vehicles,	S = 67.8	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp E of Clark
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2737	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	312	vph
Length of first accel/decel lane	590	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2737	312		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	720	82		v
Trucks and buses	19	16		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.913	0.926	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3155	355	pcph

 Estimation of V12 Merge Areas

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.361 Using Equation 4
 FM
 $v_{12} = v_F (P_{FM}) = 1140 \text{ pc/h}$

 Capacity Checks

	Actual	Maximum	LOS F?
v _{FO}	3510	9000	No
v _{R12}	1495	4600	No

 Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.3 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

 Speed Estimation

Intermediate speed variable,	M = 0.297	
Space mean speed in ramp influence area,	S _R = 51.1	mph
Space mean speed in outer lanes,	S ₀ = 53.2	mph
Space mean speed for all vehicles,	S = 52.3	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp Eof Grand(Lafayette)
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3049	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	204	vph
Length of first accel/decel lane	235	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3049	204		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	802	54		v
Trucks and buses	19	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.913	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3514	242	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1669$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3514	9000	No
v_{12}	1669	4400	No
$v_{FO} = v_F - v_R$	3272	9000	No
v_R	242	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 16.5$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.450	
Space mean speed in ramp influence area,	S = 49.2	mph
Space mean speed in outer lanes,	S = 60.3	mph
Space mean speed for all vehicles,	S = 54.5	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Exit Ramp to NB I-75 S.D.
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1890	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	55.0	mph
Volume on ramp	32	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1890		32			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	497		8			v
Trucks and buses	12		22			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%		%
Length	0.00	mi	0.00	mi		mi
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			

Heavy vehicle adjustment, fHV	0.943	0.901	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2109	37	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.706 Using Equation 5
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1499$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2109	6750	No
v_{12}	1499	4400	No
$v_{FO} = v_F - v_R$	2072	6750	No
v_R	37	2200	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 8.1$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.171	
Space mean speed in ramp influence area,	S = 52.8	mph
Space mean speed in outer lanes,	S = 60.3	mph
Space mean speed for all vehicles,	S = 54.8	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Junction: Entrance Ramp from Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1858	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	213	vph
Length of first accel/decel lane	870	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	1858	213	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	489	56	v
Trucks and buses	12	0	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2073	224	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
 EQ
 P = 0.602 Using Equation 1
 FM
 $v_{12} = v_{F} (P_{FM}) = 1248 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v _{FO}	2297	6750	No
v _{R12}	1472	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 11.4 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.277	
Space mean speed in ramp influence area,	S _S = 51.4	mph
Space mean speed in outer lanes,	S _R = 53.8	mph
Space mean speed for all vehicles,	S ₀ = 52.2	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp to Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2361	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	67	vph
Length of first accel/decel lane	785	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2361	67	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	621	18	v
Trucks and buses	9	25	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.957	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2597	79	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.691 Using Equation 5
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1820 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2597	6750	No
v_{12}	1820	4400	No
$v_{FO} = v_F - v_R$	2518	6750	No
v_R	79	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 12.8 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.435	
Space mean speed in ramp influence area,	S _R = 49.3	mph
Space mean speed in outer lanes,	S ₀ = 60.3	mph
Space mean speed for all vehicles,	S = 52.2	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Service Dr Ent Ramp E of Grand
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge		
Number of lanes in freeway	4		
Free-flow speed on freeway	55.0	mph	
Volume on freeway	3386	vph	

-----On Ramp Data-----

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	35.0	mph	
Volume on ramp	23	vph	
Length of first accel/decel lane	590	ft	
Length of second accel/decel lane		ft	

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No		
Volume on adjacent Ramp		vph	
Position of adjacent Ramp			
Type of adjacent Ramp			
Distance to adjacent Ramp		ft	

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3386	23		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	891	6		v
Trucks and buses	14	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.935	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3814	24	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.403 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1536$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3838	9000	No
v R12	1560	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.9$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.298	
Space mean speed in ramp influence area,	S = 51.1	mph
Space mean speed in outer lanes,	S = 52.7	mph
Space mean speed for all vehicles,	S = 52.0	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp E of Clark
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3414	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	581	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3414	581	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	898	153	v
Trucks and buses	14	0	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.935	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3845	612	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2022$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3845	9000	No
v_{12}	2022	4400	No
$v_{FO} = v_F - v_R$	3233	9000	No
v_R	612	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 8.1$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.483	
Space mean speed in ramp influence area,	S = 48.7	mph
Space mean speed in outer lanes,	S = 60.3	mph
Space mean speed for all vehicles,	S = 53.6	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Plaza Exit Ramp E of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2833	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	216	vph
Length of first accel/decel lane	1475	ft
Length of second accel/decel lane	200	ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2833	216	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	746	57	v
Trucks and buses	17	25	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.922	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3236	256	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.260 Using Equation 0
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1031$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3236	9600	No
v_{12}	1031	4400	No
$v_{FO} = v_F - v_R$	2980	9600	No
v_R	256	4100	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = -15.2$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.321	
Space mean speed in ramp influence area,	S = 61.0	mph
Space mean speed in outer lanes,	S = 76.4	mph
Space mean speed for all vehicles,	S = 70.7	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Ent. Ramp W of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2617	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	44	vph
Length of first accel/decel lane	1140	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2617	44	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	689	12	v
Trucks and buses	15	7	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.930	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2961	48	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.575 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1702 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3009	9600	No
v R12	1750	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.0 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.264	
Space mean speed in ramp influence area,	S = 62.6	mph
Space mean speed in outer lanes,	S = 69.5	mph
Space mean speed for all vehicles,	S = 65.3	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp at Dragoon
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2661	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	319	vph
Length of first accel/decel lane	1140	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	2661	319	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	700	84	v
Trucks and buses	14	1	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.935	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2997	337	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1497$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2997	9600	No
v_{12}	1497	4400	No
$v_{FO} = v_F - v_R$	2660	9600	No
v_R	337	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 6.9$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.458	
Space mean speed in ramp influence area,	S = 57.2	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 65.6	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp E of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3110	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	80	vph
Length of first accel/decel lane	1600	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3110	80	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	818	21	v
Trucks and buses	24	1	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.893	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3667	85	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1647$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3667	9600	No
v_{12}	1647	4400	No
$v_{FO} = v_F - v_R$	3582	9600	No
v_R	85	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 4.0$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.436	
Space mean speed in ramp influence area,	S = 57.8	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 66.9	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Entrance Ramp W of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3030	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	124	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3030	124	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	797	33	v
Trucks and buses	24	4	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.893	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3572	133	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.392 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1401$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3705	9600	No
v R12	1534	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.6$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.297	
Space mean speed in ramp influence area,	S = 61.7	mph
Space mean speed in outer lanes,	S = 67.9	mph
Space mean speed for all vehicles,	S = 65.2	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Entrance Ramp W of Dearborn
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3153	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	59	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3153	59	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	830	16	v
Trucks and buses	24	25	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length	mi		mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.893	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3717	70	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.368 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1369$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3787	9600	No
v R12	1439	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.5$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.302	
Space mean speed in ramp influence area,	S = 61.5	mph
Space mean speed in outer lanes,	S = 67.6	mph
Space mean speed for all vehicles,	S = 65.1	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp to Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2519	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	295	vph
Length of first accel/decel lane	785	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2519	295		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	663	78		v
Trucks and buses	21	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.905	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2930	317	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.672 Using Equation 5
 FD
 $v_{12} = v_R + (v_F - v_R) P = 2073$ pc/h
 FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2930	6750	No
v_{12}	2073	4400	No
$v_{FO} = v_F - v_R$	2613	6750	No
v_R	317	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L = 15.0$ pc/mi/ln
 R D
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.457	
	S	
Space mean speed in ramp influence area,	S = 49.1	mph
	R	
Space mean speed in outer lanes,	S = 60.3	mph
	0	
Space mean speed for all vehicles,	S = 51.9	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Service Dr Ent Ramp E of Grand
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3048	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	39	vph
Length of first accel/decel lane	590	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3048	39		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	802	10		v
Trucks and buses	25	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3609	44	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.400 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1445 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3653	9000	No
v R12	1489	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.4 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.297	
Space mean speed in ramp influence area,	S = 51.1	mph
Space mean speed in outer lanes,	S = 52.9	mph
Space mean speed for all vehicles,	S = 52.2	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp E of Clark
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	3089	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	291	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3089	291		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	813	77		v
Trucks and buses	25	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3658	312	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P = 1771$ pc/h
FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3658	9000	No
v_{12}	1771	4400	No
$v_{FO} = v_F - v_R$	3346	9000	No
v_R	312	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 6.0$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.456	
Space mean speed in ramp influence area,	S = 49.1	mph
Space mean speed in outer lanes,	S = 60.3	mph
Space mean speed for all vehicles,	S = 54.3	mph

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----- Diverge Analysis -----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Plaza Exit Ramp E of Junction
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2798	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	395	vph
Length of first accel/decel lane	1475	ft
Length of second accel/decel lane	200	ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2798	395	vph	
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	736	104	v	
Trucks and buses	25	25	%	
Recreational vehicles	0	0	%	
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3313	468	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.260 Using Equation 0
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1208$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3313	9600	No
v_{12}	1208	4400	No
$v_{FO} = v_F - v_R$	2845	9600	No
v_R	468	4100	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = -13.7$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.340	
Space mean speed in ramp influence area,	S = 60.5	mph
Space mean speed in outer lanes,	S = 76.6	mph
Space mean speed for all vehicles,	S = 69.8	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Ent. Ramp W of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2403	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	172	vph
Length of first accel/decel lane	1140	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2403	172		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	632	45		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2846	204	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.555 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1581 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	3050	9600	No
v R12	1785	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 12.2 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.264	
Space mean speed in ramp influence area,	S = 62.6	mph
Space mean speed in outer lanes,	S = 69.5	mph
Space mean speed for all vehicles,	S = 65.3	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp at Dragoon
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2575	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	143	vph
Length of first accel/decel lane	1140	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2575	143		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	678	38		v
Trucks and buses	25	11		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.948	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3049	159	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1419$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3049	9600	No
v_{12}	1419	4400	No
$v_{FO} = v_F - v_R$	2890	9600	No
v_R	159	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 6.2$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.442	
Space mean speed in ramp influence area,	S = 57.6	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 66.5	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp E of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2924	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	36	vph
Length of first accel/decel lane	1600	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2924	36		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	769	9		v
Trucks and buses	25	11		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.948	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3463	40	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P = 1532$ pc/h
FD

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3463	9600	No
v_{12}	1532	4400	No
$v_{FO} = v_F - v_R$	3423	9600	No
v_R	40	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 3.0$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.432	
Space mean speed in ramp influence area,	S = 57.9	mph
Space mean speed in outer lanes,	S = 76.8	mph
Space mean speed for all vehicles,	S = 67.1	mph

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-----Merge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Entrance Ramp W of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge		
Number of lanes in freeway	4		
Free-flow speed on freeway	70.0	mph	
Volume on freeway	2888	vph	

-----On Ramp Data-----

Side of freeway	Right		
Number of lanes in ramp	1		
Free-flow speed on ramp	35.0	mph	
Volume on ramp	281	vph	
Length of first accel/decel lane	600	ft	
Length of second accel/decel lane		ft	

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No		
Volume on adjacent Ramp		vph	
Position of adjacent Ramp			
Type of adjacent Ramp			
Distance to adjacent Ramp		ft	

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2888	281		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	760	74		v
Trucks and buses	25	20		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.909	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3420	325	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.368 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1260 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v	3745	9600	No
FO			
v	1585	4600	No
R12			

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.9 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.298	
	S	
Space mean speed in ramp influence area,	S = 61.7	mph
	R	
Space mean speed in outer lanes,	S = 67.9	mph
	0	
Space mean speed for all vehicles,	S = 65.1	mph

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-----Merge Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Dearborn
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3169	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	42	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	3169	42	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	834	11	v
Trucks and buses	25	24	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.889	0.893	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3753	50	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.371 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 1392 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v	3803	9600	No
FO			
v	1442	4600	No
R12			

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 13.6 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	M = 0.302	
	S	
Space mean speed in ramp influence area,	S = 61.5	mph
	R	
Space mean speed in outer lanes,	S = 67.6	mph
	0	
Space mean speed for all vehicles,	S = 65.1	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp to Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	55.0	mph
Volume on freeway	4953	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	398	vph
Length of first accel/decel lane	785	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4953	398		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1303	105		v
Trucks and buses	8	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.962	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5422	427	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.605 Using Equation 5
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3448$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5422	6750	No
v_{12}	3448	4400	No
$v_{FO} = v_F - v_R$	4995	6750	No
v_R	427	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 26.8$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	D = 0.466	
	S	
Space mean speed in ramp influence area,	S = 48.9	mph
	R	
Space mean speed in outer lanes,	S = 56.5	mph
	0	
Space mean speed for all vehicles,	S = 51.5	mph

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-----Merge Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Service Dr Ent Ramp E of Grand
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	6041	vph

-----On Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	469	vph
Length of first accel/decel lane	590	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	6041	469	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1590	123	v
Trucks and buses	9	21	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade		%	%
Length		mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.957	0.905	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6645	546	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.338 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 2243$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	7191	9000	No
v R12	2789	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.3$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.343	
Space mean speed in ramp influence area,	S _R = 50.5	mph
Space mean speed in outer lanes,	S ₀ = 48.9	mph
Space mean speed for all vehicles,	S = 49.5	mph

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----- Diverge Analysis -----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp E of Clark
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	55.0	mph
Volume on freeway	6512	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	274	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	6512	274	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1714	72	v
Trucks and buses	10	8	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.962	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7197	300	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.436 Using Equation 8
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 3307$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7197	9000	No
v_{12}	3307	4400	No
$v_{FO} = v_F - v_R$	6897	9000	No
v_R	300	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 19.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.455	
Space mean speed in ramp influence area,	S = 49.1	mph
Space mean speed in outer lanes,	S = 56.6	mph
Space mean speed for all vehicles,	S = 52.9	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Plaza Exit Ramp E of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6238	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	45.0	mph
Volume on ramp	937	vph
Length of first accel/decel lane	1475	ft
Length of second accel/decel lane	200	ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	6238	937	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1642	247	v
Trucks and buses	10	16	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00	%	0.00 %
Length	0.00	mi	0.00 mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.952	0.926	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6895	1065	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.260 Using Equation 0
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2581$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6895	9600	No
v_{12}	2581	4400	No
$v_{FO} = v_F - v_R$	5830	9600	No
v_R	1065	4100	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = -1.9$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.394	
Space mean speed in ramp influence area,	S = 59.0	mph
Space mean speed in outer lanes,	S = 72.3	mph
Space mean speed for all vehicles,	S = 66.6	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Ent. Ramp W of Junction
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5301	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	285	vph
Length of first accel/decel lane	1140	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5301	285		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1395	75		v
Trucks and buses	9	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	%
Length	mi	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.957	0.952	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5831	315	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.542 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 3158 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	6146	9600	No
v R12	3473	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.3 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.367	
Space mean speed in ramp influence area,	S = 59.7	mph
Space mean speed in outer lanes,	S = 67.0	mph
Space mean speed for all vehicles,	S = 62.7	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp at Dragoon
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5586	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	149	vph
Length of first accel/decel lane	1140	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5586	149		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1470	39		v
Trucks and buses	9	24		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.957	0.893	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6145	176	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 0.436 Using Equation 8
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2778$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6145	9600	No
v_{12}	2778	4400	No
$v_{FO} = v_F - v_R$	5969	9600	No
v_R	176	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 17.9$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.444	
Space mean speed in ramp influence area,	S = 57.6	mph
Space mean speed in outer lanes,	S = 74.1	mph
Space mean speed for all vehicles,	S = 65.6	mph

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----- Diverge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Exit Ramp E of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5927	vph

----- Off Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	37	vph
Length of first accel/decel lane	1600	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5927	37		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1560	10		v
Trucks and buses	13	24		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.939	0.893	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6644	44	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 0.436 Using Equation 8
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2487$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5648	9600	No
v_{12}	2487	4400	No
$v_{FO} = v_F - v_R$	5604	9600	No
v_R	44	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 11.2$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.432	
Space mean speed in ramp influence area,	S = 57.9	mph
Space mean speed in outer lanes,	S = 74.5	mph
Space mean speed for all vehicles,	S = 66.2	mph

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----- Merge Analysis -----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 8/15/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Junction: Entrance Ramp W of Springwells
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	5890	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	356	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp
Volume, V (vph)	5890	356	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1550	94	v
Trucks and buses	12	8	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	%	%	%
Length	mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	

Heavy vehicle adjustment, fHV	0.943	0.962	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6572	390	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.360 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 2367$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	6962	9600	No
v R12	2757	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.0$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.340	
Space mean speed in ramp influence area,	S = 60.5	mph
Space mean speed in outer lanes,	S = 64.2	mph
Space mean speed for all vehicles,	S = 62.7	mph

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----- Merge Analysis -----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 8/15/08
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Dearborn
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

----- Freeway Data -----

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6247	vph

----- On Ramp Data -----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	35.0	mph
Volume on ramp	82	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

----- Adjacent Ramp Data (if one exists) -----

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

----- Conversion to pc/h Under Base Conditions -----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6247	82		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1644	22		v
Trucks and buses	12	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.943	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6970	88	pcph

----- Estimation of V12 Merge Areas -----

L = (Equation 25-2 or 25-3)
EQ
P = 0.366 Using Equation 4
FM
 $v_{12} = v_F (P_{FM}) = 2552 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
v FO	7058	9600	No
v R12	2640	4600	No

----- Level of Service Determination (if not F) -----

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 22.9 \text{ pc/mi/ln}$
Level of service for ramp-freeway junction areas of influence C

----- Speed Estimation -----

Intermediate speed variable,	M = 0.341	
Space mean speed in ramp influence area,	S = 60.5	mph
Space mean speed in outer lanes,	S = 63.8	mph
Space mean speed for all vehicles,	S = 62.5	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: AM Peak
 Freeway/Dir of Travel: I-96 EB
 Junction: Exit Ramp to Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1628	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	629	vph
Length of first accel/decel lane	770	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1628	629		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	428	166		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1928	745	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
EQ
P = 1.000 Using Equation 0
FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1928$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1928	4500	No
v_{12}	1928	4400	No
$v_{FO} = v_F - v_R$	1183	4500	No
v_R	745	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 13.9$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.495	
	S	
Space mean speed in ramp influence area,	S = 48.6	mph
	R	
Space mean speed in outer lanes,	S = N/A	mph
	0	
Space mean speed for all vehicles,	S = 48.6	mph

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-----Diverge Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date performed: 10/2/08
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-96 EB
Junction: Exit Ramp to Ambassador
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	1061	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	286	vph
Length of first accel/decel lane	770	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1061	286		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	279	75		v
Trucks and buses	25	13		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.889	0.939	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	1256	321	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 1.000 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 1256 \text{ pc/h}$

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1256	4500	No
v_{12}	1256	4400	No
$v_{FO} = v_F - v_R$	935	4500	No
v_R	321	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 8.1 \text{ pc/mi/ln}$
 Level of service for ramp-freeway junction areas of influence A

----- Speed Estimation -----

Intermediate speed variable,	D = 0.457	
Space mean speed in ramp influence area,	S = 49.1	mph
Space mean speed in outer lanes,	S = N/A	mph
Space mean speed for all vehicles,	S = 49.1	mph

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-----Diverge Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date performed: 10/2/08
 Analysis time period: PM Peak
 Freeway/Dir of Travel: I-96 EB
 Junction: Exit Ramp to Ambassador
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Freeway Data-----

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	55.0	mph
Volume on freeway	2027	vph

-----Off Ramp Data-----

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	651	vph
Length of first accel/decel lane	770	ft
Length of second accel/decel lane		ft

-----Adjacent Ramp Data (if one exists)-----

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

-----Conversion to pc/h Under Base Conditions-----

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2027	651		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	533	171		v
Trucks and buses	8	6		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00	%	0.00	%
Length	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.962	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2219	706	pcph

----- Estimation of V12 Diverge Areas -----

L = (Equation 25-8 or 25-9)
 EQ
 P = 1.000 Using Equation 0
 FD
 $v_{12} = v_R + (v_F - v_R) P_{FD} = 2219$ pc/h

----- Capacity Checks -----

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2219	4500	No
v_{12}	2219	4400	No
$v_{FO} = v_F - v_R$	1513	4500	No
v_R	706	2000	No

----- Level of Service Determination (if not F) -----

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L_D = 16.4$ pc/mi/ln
 Level of service for ramp-freeway junction areas of influence B

----- Speed Estimation -----

Intermediate speed variable,	D = 0.492	
Space mean speed in ramp influence area,	S = 48.6	mph
Space mean speed in outer lanes,	S = N/A	mph
Space mean speed for all vehicles,	S = 48.6	mph

HCS+: Freeway Weaving Release 5.2

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Operational Analysis

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Springwells Ent/PlazaExit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1850	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.15	
Weaving ratio, R	0.44	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	4345	0	394	333	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1143	0	104	88	v
Trucks and buses	11	0	25	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.948	1.000	0.889	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4825	0	466	368	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.45	0.20
Weaving and non-weaving speeds, Si	56.30	64.97
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.23
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

-----Weaving Segment Speed, Density, Level of Service and Capacity-----

Weaving segment speed, S	63.53	mph
Weaving segment density, D	17.81	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	11419	pc/h
Capacity as a 15-minute flow rate, c	10824	pc/h
Capacity as a full-hour volume, ch	10283	pc/h

-----Limitations on Weaving Segments-----

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	834	2800	a
Average flow rate (pcphpl)	1131	2400	b
Volume ratio, VR	0.15	0.20	c
Weaving ratio, R	0.44	N/A	d
Weaving length (ft)	1850	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Clark Ent. to Grand Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1100	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.04	
Weaving ratio, R	0.10	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	5339	0	20	174	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1405	0	5	46	v
Trucks and buses	13	0	25	23	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.939	1.000	0.889	0.897	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5985	0	23	204	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.60	0.22
Weaving and non-weaving speeds, Si	43.11	51.80
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	0.55
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

-----Weaving Segment Speed, Density, Level of Service and Capacity-----

Weaving segment speed, S	51.42	mph
Weaving segment density, D	24.16	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	9484	pc/h
Capacity as a 15-minute flow rate, c	8905	pc/h
Capacity as a full-hour volume, ch	8460	pc/h

-----Limitations on Weaving Segments-----

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	227	2800	a
Average flow rate (pcphpl)	1242	2250	b
Volume ratio, VR	0.04	0.20	c
Weaving ratio, R	0.10	N/A	d
Weaving length (ft)	1100	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date Performed: 8/15/08
 Analysis Time Period: Midday Peak
 Freeway/Dir of Travel: I-75 NB
 Weaving Location: From Springwells Ent/PlazaExit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1850	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.35	
Weaving ratio, R	0.25	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	1768	0	708	248	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	465	0	186	65	v
Trucks and buses	25	0	25	18	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.889	0.917	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2093	0	838	284	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.87	0.11
Weaving and non-weaving speeds, Si	47.06	69.30
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.98
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Constrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	59.49	mph
Weaving segment density, D	10.81	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	11131	pc/h
Capacity as a 15-minute flow rate, c	9894	pc/h
Capacity as a full-hour volume, ch	9399	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	1122	2800	a
Average flow rate (pcphpl)	643	2400	b
Volume ratio, VR	0.35	0.20	c
Weaving ratio, R	0.25	N/A	d
Weaving length (ft)	1850	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

HCS+: Freeway Weaving Release 5.2

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Operational Analysis

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Clark Ent. to Grand Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1100	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.18	
Weaving ratio, R	0.42	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	1958	0	244	177	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	515	0	64	47	v
Trucks and buses	25	0	25	25	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.889	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2318	0	288	209	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.37	0.13
Weaving and non-weaving speeds, Si	47.89	54.75
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.30
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

----- Weaving Segment Speed, Density, Level of Service and Capacity -----

Weaving segment speed, S	53.40	mph
Weaving segment density, D	10.54	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9040	pc/h
Capacity as a 15-minute flow rate, c	8036	pc/h
Capacity as a full-hour volume, ch	7634	pc/h

----- Limitations on Weaving Segments -----

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	497	2800	a
Average flow rate (pcphpl)	563	2250	b
Volume ratio, VR	0.18	0.20	c
Weaving ratio, R	0.42	N/A	d
Weaving length (ft)	1100	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date Performed: 8/15/08
 Analysis Time Period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Weaving Location: From Springwells Ent/PlazaExit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1850	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.34	
Weaving ratio, R	0.11	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2147	0	969	127	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	565	0	255	33	v
Trucks and buses	18	0	25	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.917	1.000	0.889	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2463	0	1147	140	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	1.00	0.13
Weaving and non-weaving speeds, Si	44.96	68.28
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.99
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Constrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	57.96	mph
Weaving segment density, D	12.94	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	11131	pc/h
Capacity as a 15-minute flow rate, c	10212	pc/h
Capacity as a full-hour volume, ch	9701	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	1287	2800	a
Average flow rate (pcphpl)	750	2400	b
Volume ratio, VR	0.34	0.20	c
Weaving ratio, R	0.11	N/A	d
Weaving length (ft)	1850	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date Performed: 8/15/08
 Analysis Time Period: PM Peak
 Freeway/Dir of Travel: I-75 NB
 Weaving Location: From Clark Ent. to Grand Exit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1100	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.17	
Weaving ratio, R	0.41	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2533	0	204	312	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	667	0	54	82	v
Trucks and buses	17	0	25	16	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.922	1.000	0.889	0.926	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2892	0	241	354	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.45	0.17
Weaving and non-weaving speeds, Si	46.07	53.43
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.30
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	52.01	mph
Weaving segment density, D	13.41	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9074	pc/h
Capacity as a 15-minute flow rate, c	8363	pc/h
Capacity as a full-hour volume, ch	7945	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	595	2800	a
Average flow rate (pcphpl)	697	2250	b
Volume ratio, VR	0.17	0.20	c
Weaving ratio, R	0.41	N/A	d
Weaving length (ft)	1100	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Amb. Ent. to Clark Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1316	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.19	
Weaving ratio, R	0.17	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2718	0	581	115	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	715	0	153	30	v
Trucks and buses	17	0	0	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.922	1.000	1.000	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3104	0	611	121	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	1.03	0.10
Weaving and non-weaving speeds, Si	37.14	55.78
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.44
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Constrained

-----Weaving Segment Speed, Density, Level of Service and Capacity-----

Weaving segment speed, S	50.90	mph
Weaving segment density, D	15.07	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9182	pc/h
Capacity as a 15-minute flow rate, c	8463	pc/h
Capacity as a full-hour volume, ch	8040	pc/h

-----Limitations on Weaving Segments-----

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	732	2800	a
Average flow rate (pcphpl)	767	2250	b
Volume ratio, VR	0.19	0.20	c
Weaving ratio, R	0.17	N/A	d
Weaving length (ft)	1316	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From JunctionEnt. to Drag.Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1140	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.13	
Weaving ratio, R	0.12	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2298	0	319	44	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	605	0	84	12	v
Trucks and buses	16	0	1	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.926	1.000	0.995	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2612	0	337	47	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.35	0.12
Weaving and non-weaving speeds, Si	59.55	68.67
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	0.99
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	67.35	mph
Weaving segment density, D	8.90	pc/mi/ln
Level of service, LOS	A	
Capacity of base condition, cb	10840	pc/h
Capacity as a 15-minute flow rate, c	10037	pc/h
Capacity as a full-hour volume, ch	9535	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	384	2800	a
Average flow rate (pcphpl)	599	2400	b
Volume ratio, VR	0.13	0.20	c
Weaving ratio, R	0.12	N/A	d
Weaving length (ft)	1140	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

HCS+: Freeway Weaving Release 5.2

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Operational Analysis

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Plaza Ent. to Spring.Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1600	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.28	
Weaving ratio, R	0.08	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2262	0	80	768	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	595	0	21	202	v
Trucks and buses	17	0	1	25	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.922	1.000	0.995	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2583	0	84	909	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.96	0.11
Weaving and non-weaving speeds, Si	45.56	69.14
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.70
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Constrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S	60.45	mph
Weaving segment density, D	11.83	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	10891	pc/h
Capacity as a 15-minute flow rate, c	10038	pc/h
Capacity as a full-hour volume, ch	9536	pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	993	2800	a
Average flow rate (pcphpl)	715	2400	b
Volume ratio, VR	0.28	0.20	c
Weaving ratio, R	0.08	N/A	d
Weaving length (ft)	1600	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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Operational Analysis

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Amb. Ent. to Clark Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1316	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.11	
Weaving ratio, R	0.24	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2709	0	291	89	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	713	0	77	23	v
Trucks and buses	25	0	0	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	1.000	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3208	0	306	96	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.36	0.13
Weaving and non-weaving speeds, Si	48.13	54.93
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.04
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S	54.07	mph
Weaving segment density, D	13.35	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9643	pc/h
Capacity as a 15-minute flow rate, c	8572	pc/h
Capacity as a full-hour volume, ch	8143	pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	402	2800	a
Average flow rate (pcphpl)	722	2250	b
Volume ratio, VR	0.11	0.20	c
Weaving ratio, R	0.24	N/A	d
Weaving length (ft)	1316	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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Operational Analysis

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From JunctionEnt. to Drag.Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1140	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.12	
Weaving ratio, R	0.44	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2260	0	143	172	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	595	0	38	45	v
Trucks and buses	25	0	11	25	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.948	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2676	0	158	203	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.35	0.12
Weaving and non-weaving speeds, Si	59.61	68.76
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	0.95
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S	67.52	mph
Weaving segment density, D	9.00	pc/mi/ln
Level of service, LOS	A	
Capacity of base condition, cb	10909	pc/h
Capacity as a 15-minute flow rate, c	9697	pc/h
Capacity as a full-hour volume, ch	9212	pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	361	2800	a
Average flow rate (pcphpl)	607	2400	b
Volume ratio, VR	0.12	0.20	c
Weaving ratio, R	0.44	N/A	d
Weaving length (ft)	1140	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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-----Operational Analysis-----

Analyst: CH
 Agency/Co.: PARSONS
 Date Performed: 8/15/08
 Analysis Time Period: Midday Peak
 Freeway/Dir of Travel: I-75 SB
 Weaving Location: From Plaza Ent. to Spring.Exit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

-----Inputs-----

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1600	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.18	
Weaving ratio, R	0.06	

-----Conversion to pc/h Under Base Conditions-----

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2396	0	36	492	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	631	0	9	129	v
Trucks and buses	25	0	11	25	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.948	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2837	0	39	582	pc/h

-----Weaving and Non-Weaving Speeds-----

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.34	0.13
Weaving and non-weaving speeds, Si	59.94	68.02
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.30
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	66.41	mph
Weaving segment density, D	10.41	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	11029	pc/h
Capacity as a 15-minute flow rate, c	9804	pc/h
Capacity as a full-hour volume, ch	9314	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	621	2800	a
Average flow rate (pcphpl)	691	2400	b
Volume ratio, VR	0.18	0.20	c
Weaving ratio, R	0.06	N/A	d
Weaving length (ft)	1600	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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Operational Analysis

Analyst: CH
 Agency/Co.: PARSONS
 Date Performed: 8/15
 Analysis Time Period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Weaving Location: From Amb. Ent. to Clark Exit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1316	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.14	
Weaving ratio, R	0.31	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	5658	0	274	580	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1489	0	72	153	v
Trucks and buses	9	0	8	22	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	1.000	0.962	0.901	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6223	0	299	677	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.73	0.34
Weaving and non-weaving speeds, Si	40.95	48.59
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.25
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____ Weaving Segment Speed, Density, Level of Service and Capacity _____

Weaving segment speed, S	47.39	mph
Weaving segment density, D	30.38	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb	9502	pc/h
Capacity as a 15-minute flow rate, c	9093	pc/h
Capacity as a full-hour volume, ch	8638	pc/h

_____ Limitations on Weaving Segments _____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	976	2800	a
Average flow rate (pcphpl)	1439	2250	b
Volume ratio, VR	0.14	0.20	c
Weaving ratio, R	0.31	N/A	d
Weaving length (ft)	1316	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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Operational Analysis

Analyst: CH
Agency/Co.: PARSONS
Date Performed: 8/15/08
Analysis Time Period: PM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From JunctionEnt. to Drag.Exit
Jurisdiction: MDOT
Analysis Year: 2035 Hybrid
Description: Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1140	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.08	
Weaving ratio, R	0.36	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	5152	0	149	285	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1356	0	39	75	v
Trucks and buses	9	0	24	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	1.000	0.893	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5667	0	175	315	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.63	0.25
Weaving and non-weaving speeds, Si	51.74	62.91
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	0.80
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	61.85	mph
Weaving segment density, D	19.91	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	11048	pc/h
Capacity as a 15-minute flow rate, c	10572	pc/h
Capacity as a full-hour volume, ch	10043	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	490	2800	a
Average flow rate (pcphpl)	1231	2400	b
Volume ratio, VR	0.08	0.20	c
Weaving ratio, R	0.36	N/A	d
Weaving length (ft)	1140	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

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 Operational Analysis

Analyst: CH
 Agency/Co.: PARSONS
 Date Performed: 8/15/08
 Analysis Time Period: PM Peak
 Freeway/Dir of Travel: I-75 SB
 Weaving Location: From Plaza Ent. to Spring.Exit
 Jurisdiction: MDOT
 Analysis Year: 2035 Hybrid
 Description: Detroit River International Crossing Project

 Inputs

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1600	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.09	
Weaving ratio, R	0.07	

 Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	5400	0	37	490	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1421	0	10	129	v
Trucks and buses	9	0	24	25	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	1.000	0.893	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5940	0	43	580	pc/h

 Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.53	0.22
Weaving and non-weaving speeds, Si	54.22	63.98
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	0.94
Maximum number of lanes, Nw (max) (Exhibit 24-7)	1.40
Type of operation is	Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S	62.91	mph
Weaving segment density, D	20.87	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	11565	pc/h
Capacity as a 15-minute flow rate, c	11067	pc/h
Capacity as a full-hour volume, ch	10514	pc/h

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded	See Note
		Maximum	Note
Weaving flow rate, Vw	623	2800	a
Average flow rate (pcphpl)	1312	2400	b
Volume ratio, VR	0.09	0.20	c
Weaving ratio, R	0.07	N/A	d
Weaving length (ft)	1600	2500	e

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.