2035 No Build 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	5254	12	-	0.943	1172	12.8	B
		Midday	2409	27	-	0.881	576	6.3	A
		PM	3254	13	-	0.939	730	8.0	A
1-Lane Segment	WB I-96 from WB I-96 (2-1 lane) merge to Gateway on-ramp	AM	1075	20	55	0.909	1245	22.6	C
		Midday	671	36	55	0.847	833	15.2	B
		PM	824	24	55	0.893	971	17.7	B
1-Lane Segment	EB I-96 from Gateway off-ramp to SB I-75	AM	773	29	55	0.873	932	16.9	B
		Midday	413	42	55	0.826	526	9.6	A
		PM	891	10	55	0.952	985	17.9	B

HCM Equations:

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

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

$D = 0.0109 * V_F$ (Major Diverge)

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

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Parsons

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Clark Exit/Clark Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5173	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1361	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	1457	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	1457	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	26.5	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/26/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Clark Ent/Grand Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5469	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1439	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	1232	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	1232	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	22.4	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Dearborn Exit/Springwells Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5019	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1321	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	1413	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	1413	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	25.7	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:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Dragoon Ent/Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5356	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1409	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	1508	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	1508	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

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

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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/26/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Grand Exit/WB I-96 Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5254	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1383	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	1172	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	1172	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	21.3	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:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Livernois Exit/Dragoon Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5177	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1362	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	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	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	1458	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	26.5	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:	8/152007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Springwells Ent/Livernois Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5316	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1399	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	1497	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	1497	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	27.2	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:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Springwells Exit/Spring. Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4762	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1253	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	1341	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	1341	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	24.4	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:	11/17/08
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 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4179	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1100	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	1155	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	1155	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	21.0	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:	11/17/08
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 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4179	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1100	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	1540	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	1540	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	28.0	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:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 NB
From/To:	Amb. Ent./C-D Road Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4932	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1298	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	1808	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	1808	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

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

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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Clark Exit/Clark Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2690	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	708	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	796	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	796	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	14.5	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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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/26/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Clark Ent/Grand Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3004	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	791	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	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	711	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	12.9	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Dearborn Exit/Springwells Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2522	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	664	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	747	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	747	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	13.6	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Dragoon Ent/Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2788	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	734	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	825	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	825	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	15.0	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/26/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Grand Exit/WB I-96 Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2409	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	634	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	571	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	571	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	10.4	pc/mi/ln

Level of service, LOS	A

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

HCS+: Basic Freeway Segments Release 5.2

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Livernois Exit/Dragoon Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2577	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	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	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	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	4	
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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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Springwells Ent/Livernois Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2701	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	711	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	800	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	800	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	14.5	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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E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Springwells Exit/Spring. Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2349	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	618	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	695	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	695	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	12.6	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:	11/17/08
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 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1738	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	457	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	510	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	510	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	9.3	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:	11/17/08
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 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1738	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	457	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	680	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	680	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	12.4	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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 NB
From/To:	Amb. Ent./C-D Road Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1912	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	503	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	741	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	741	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	13.5	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:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Clark Exit/Clark Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3481	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	916	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	1021	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	1021	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	18.6	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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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/26/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Clark Ent/Grand Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3923	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1032	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	917	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	917	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	16.7	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Dearborn Exit/Springwells Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3069	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	808	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	909	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	909	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	16.5	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Dragoon Ent/Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3582	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	943	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	1051	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	1051	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	19.1	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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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/26/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Grand Exit/WB I-96 Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3254	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	856	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	730	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	730	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

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

HCS+: Basic Freeway Segments Release 5.2

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Livernois Exit/Dragoon Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3144	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	827	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	927	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	927	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Springwells Ent/Livernois Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3284	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	864	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	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	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	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	4	
Density, D	17.5	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Springwells Exit/Spring. Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2868	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	755	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	849	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	849	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	15.4	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:	11/17/08
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 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2430	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	639	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	668	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	668	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	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:	11/17/08
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 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2430	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	639	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	891	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	891	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	16.2	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:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 NB
From/To:	Amb. Ent./C-D Road Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	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	955	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	955	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	17.4	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:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	C-D Road Ent. / Amb. Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2423	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	638	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	884	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	884	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	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:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Amb. Exit / EB I-96 Ent.
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2309	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	608	v
Trucks and buses	7	%
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	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	839	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	839	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	15.3	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:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	EB I-96 Ent. / Amb. Ent.
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3082	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	811	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	864	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	864	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	15.7	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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E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Clark Exit/Clark Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3274	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	862	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	935	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	935	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	17.0	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Clark Ent/Dragoon Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3335	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	878	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	952	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	952	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	17.3	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Dragoon Exit/Livernois Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3086	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	812	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	885	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	885	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.

HCS+: Basic Freeway Segments Release 5.2

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	EB I-96 Ent/Grand Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3695	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	972	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	1045	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	1045	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	19.0	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Ent N. of Grand/Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3725	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	980	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	1054	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	1054	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	19.2	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Livernois Ent/Springwells Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3208	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	844	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	916	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	916	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	16.7	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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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Springwells Exit/Spring. Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2608	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	686	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	762	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	762	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	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Direction:	I-75 SB
From/To:	Springwells Ent/Dearborn Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2812	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	740	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	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	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	814	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	14.8	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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	C-D Road Ent. / Amb. Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2561	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	674	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	984	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	984	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	17.9	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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Amb. Exit / EB I-96 Ent.
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2167	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	570	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	840	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	840	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	15.3	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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	EB I-96 Ent. / Amb. Ent.
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2580	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	679	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	760	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	760	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	13.8	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:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Clark Exit/Clark Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)

Description: Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2693	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	709	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	797	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	797	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	14.5	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:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Clark Ent/Dragoon Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2854	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	751	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	845	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	845	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	15.4	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Dragoon Exit/Livernois Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2828	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	744	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	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	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	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	4	
Density, D	15.2	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	EB I-96 Ent/Grand Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2977	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	783	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	881	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	881	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	16.0	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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Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Ent N. of Grand/Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3021	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	795	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	894	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	894	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	16.3	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Livernois Ent/Springwells Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3130	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	824	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	927	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	927	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

Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Springwells Exit/Spring. Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	2719	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	716	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	805	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	805	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	14.6	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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-75 SB
From/To:	Springwells Ent/Dearborn Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	3025	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	796	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	896	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	896	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	16.3	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

PTG
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Phone: 248-936-1147 Fax: 248-936-1176
E-mail: catherine.hartner@parsons.com

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	C-D Road Ent. / Amb. Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4893	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1288	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	1794	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	1794	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	32.6	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:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Amb. Exit / EB I-96 Ent.
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	4238	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1115	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	1554	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	1554	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	28.3	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:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	EB I-96 Ent. / Amb. Ent.
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5129	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1350	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	1410	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	1410	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	25.6	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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E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Clark Exit/Clark Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5354	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1409	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	1493	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	1493	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	27.1	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:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Clark Ent/Dragoon Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5884	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1548	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	1634	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	1634	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	29.7	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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E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Dragoon Exit/Livernois Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5814	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1530	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	1614	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	1614	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	29.3	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:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	EB I-96 Ent/Grand Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5562	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1464	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	1544	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	1544	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	28.1	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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E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Ent N. of Grand/Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5801	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1527	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	1611	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	1611	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	29.3	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:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Livernois Ent/Springwells Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	6068	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1597	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	1685	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	1685	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	30.6	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:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Springwells Exit/Spring. Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	5810	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1529	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	1613	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	1613	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	29.3	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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E-mail:

Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Direction:	I-75 SB
From/To:	Springwells Ent/Dearborn Ent.
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	6313	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1661	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	1744	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	1744	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	31.7	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:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-96 WB
From/To:	I-75 Split/Amb. Ent. (2-lanes)
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1075	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	283	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	622	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	622	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	11.3	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

PTG
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Operational Analysis

Analyst:	CH
Agency or Company:	PARSONS
Date Performed:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-96 WB
From/To:	Amb. Ent. / Michigan Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1834	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	483	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	1067	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	1067	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	19.4	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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-96 WB
From/To:	I-75 Split/Amb. Ent. (2-lanes)
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	671	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	177	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	397	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	397	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	7.2	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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-96 WB
From/To:	Amb. Ent. / Michigan Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1071	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	282	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	634	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	634	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	11.5	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:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-96 WB
From/To:	I-75 Split/Amb. Ent. (2-lanes)
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	824	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	217	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	486	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	486	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	8.8	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:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-96 WB
From/To:	Amb. Ent. / Michigan Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1240	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	326	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	734	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	734	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	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:	11/17/08
Analysis Time Period:	AM Peak
Freeway/Direction:	I-96 EB
From/To:	Michigan Ent. / Amb. Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1120	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	295	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	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	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	2	
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:	11/17/08
Analysis Time Period:	Midday Peak
Freeway/Direction:	I-96 EB
From/To:	Michigan Ent. / Amb. Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	909	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	239	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	538	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	538	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	9.8	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:	11/17/08
Analysis Time Period:	PM Peak
Freeway/Direction:	I-96 EB
From/To:	Michigan Ent. / Amb. Exit
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
Description:	Detroit River International Crossing Project

Flow Inputs and Adjustments

Volume, V	1864	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	491	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	1055	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	1055	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	19.2	pc/mi/ln

Level of service, LOS	C

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

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Clark Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5173	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	297	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)	5173	297		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1361	78		v
Trucks and buses	14	19		%
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	0.913	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5826	342	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.295 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1717 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6168	9000	No
v_{R12}	2059	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 17.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.287	
Space mean speed in ramp influence area,	S_R = 51.3	mph
Space mean speed in outer lanes,	S_O = 49.4	mph
Space mean speed for all vehicles,	S = 50.0	mph

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Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Dragoon Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	5177	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	179	vph
Length of first accel/decel lane	830	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)	5177		179				vph
Peak-hour factor, PHF	0.95		0.95				
Peak 15-min volume, v15	1362		47				v
Trucks and buses	14		9				%
Recreational vehicles	0		0				%
Terrain type:	Level		Grade				
Grade		%	-2.00	%		%	
Length		mi	0.15	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	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5831	197	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.502 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 2925 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6028	9000	No
v_{R12}	3122	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 24.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.360	
Space mean speed in ramp influence area,	S_R = 50.3	mph
Space mean speed in outer lanes,	S_O = 51.6	mph
Space mean speed for all vehicles,	S = 50.9	mph

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Springwells Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	4762	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	554	vph
Length of first accel/decel lane	390	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)	4762		554			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1253		146			v
Trucks and buses	14		8			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade		%	-2.00	%		%
Length		mi	0.12	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	0.962	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5364	606	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.316 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1695 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5970	9000	No
v_{R12}	2301	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.340

Space mean speed in ramp influence area, S_R = 50.6 mph

Space mean speed in outer lanes, S_O = 50.2 mph

Space mean speed for all vehicles, S = 50.3 mph

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Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Clark Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	5173	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	183	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)	5173	183		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1361	48		v
Trucks and buses	14	7		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.00 %		%
Length	0.00 mi	0.17 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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5826	199	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2652 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5826	9000	No
v_{12}	2652	4400	No
$v_{FO} = v_F - v_R$	5627	9000	No
v_R	199	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 22.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.511	
Space mean speed in ramp influence area,	S_R = 48.4	mph
Space mean speed in outer lanes,	S_O = 58.0	mph
Space mean speed for all vehicles,	S = 53.2	mph

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Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Dearborn Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5019	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	103	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)	5019	103		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1321	27		v
Trucks and buses	14	12		%
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	0.935	0.943	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5653	115	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.613 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3512 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5653	6750	No
v_{12}	3512	4400	No
$v_{FO} = v_F - v_R$	5538	6750	No
v_R	115	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 33.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.503	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_O = 55.9	mph
Space mean speed for all vehicles,	S = 51.0	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Grand Blvd Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5254	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	216	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)	5254		216			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1383		57			v
Trucks and buses	12		25			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	2.94	%	%	
Length	0.00	mi	0.13	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	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5862	256	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2317 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4983	9000	No
v_{12}	2317	4400	No
$v_{FO} = v_F - v_R$	4727	9000	No
v_R	256	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 22.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.516	
Space mean speed in ramp influence area,	S_R = 48.3	mph
Space mean speed in outer lanes,	S_O = 59.0	mph
Space mean speed for all vehicles,	S = 53.5	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Livernois Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5177	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	138	vph
Length of first accel/decel lane	300	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)	5177		138			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1362		36			v
Trucks and buses	14		0			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	2.60	%		%
Length	0.00	mi	0.16	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	5831	145	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2624 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5831	9000	No
v_{12}	2624	4400	No
$v_{FO} = v_F - v_R$	5686	9000	No
v_R	145	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 24.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.506	
Space mean speed in ramp influence area,	S_R = 48.4	mph
Space mean speed in outer lanes,	S_O = 58.0	mph
Space mean speed for all vehicles,	S = 53.3	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Springwells Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	4762	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	257	vph
Length of first accel/decel lane	250	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)	4762	257		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1253	68		v
Trucks and buses	14	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	-3.31 %		%
Length	0.00 mi	0.14 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	0.990	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5364	273	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2493 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5364	9000	No
v_{12}	2493	4400	No
$v_{FO} = v_F - v_R$	5091	9000	No
v_R	273	1900	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 23.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.583	
Space mean speed in ramp influence area,	S_R = 47.4	mph
Space mean speed in outer lanes,	S_O = 58.6	mph
Space mean speed for all vehicles,	S = 52.8	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
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 No Build
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	4179	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	0	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)	4179	0		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1100	0		v
Trucks and buses	10	0		%
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	0.952	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4619	0	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.645 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2977 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4619	6750	No
v_{12}	2977	4400	No
$v_{FO} = v_F - v_R$	4619	6750	No
v_R	0	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 20.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.428	
Space mean speed in ramp influence area,	S_R = 49.4	mph
Space mean speed in outer lanes,	S_0 = 57.8	mph
Space mean speed for all vehicles,	S = 52.1	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Entrance Ramp from Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	4179	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	753	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)	4179	753		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1100	198		v
Trucks and buses	10	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	0.952	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4619	793	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.602 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2780 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5412	6750	No
v_{R12}	3573	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 27.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.399	
Space mean speed in ramp influence area,	S_R = 49.8	mph
Space mean speed in outer lanes,	S_0 = 50.2	mph
Space mean speed for all vehicles,	S = 49.9	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Clark Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2690	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	314	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)	2690	314		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	708	83		v
Trucks and buses	25	22		%
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	0.901	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3186	367	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.292 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 929 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3553	9000	No
v_{R12}	1296	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 11.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.270	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_O = 52.7	mph
Space mean speed for all vehicles,	S = 52.3	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Dragoon Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2577	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	212	vph
Length of first accel/decel lane	830	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)	2577	212		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	678	56		v
Trucks and buses	25	16		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-2.00 %		%
Length	mi	0.15 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	0.926	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3052	241	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.496 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1514 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3293	9000	No
v_{R12}	1755	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 13.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.294	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_O = 54.0	mph
Space mean speed for all vehicles,	S = 52.5	mph

Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Springwells Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2349	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	352	vph
Length of first accel/decel lane	390	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)	2349		352				vph
Peak-hour factor, PHF	0.95		0.95				
Peak 15-min volume, v15	618		93				v
Trucks and buses	25		15				%
Recreational vehicles	0		0				%
Terrain type:	Level		Grade				
Grade		%	-2.00	%		%	
Length		mi	0.12	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	2782	398	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.342 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 951 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3180	9000	No
v_{R12}	1349	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 13.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.317

Space mean speed in ramp influence area, S_R = 50.9 mph

Space mean speed in outer lanes, S_O = 53.5 mph

Space mean speed for all vehicles, S = 52.4 mph

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E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Clark Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	2690	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	97	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)	2690		97			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	708		26			v
Trucks and buses	25		14			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	1.00	%		%
Length	0.00	mi	0.17	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	0.935	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3186	109	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1451 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3186	9000	No
v_{12}	1451	4400	No
$v_{FO} = v_F - v_R$	3077	9000	No
v_R	109	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 12.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.503	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 54.3	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Dearborn Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2522	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	50	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)	2522	50		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	664	13		v
Trucks and buses	25	8		%
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	0.889	0.962	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2987	55	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.683 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2057 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2987	6750	No
v_{12}	2057	4400	No
$v_{FO} = v_F - v_R$	2932	6750	No
v_R	55	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 20.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.498	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 51.7	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Grand Blvd Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2409	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	595	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)	2409		595			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	634		157			v
Trucks and buses	25		25			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	2.94	%		%
Length	0.00	mi	0.13	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	2853	705	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1642 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2853	9000	No
v_{12}	1642	4400	No
$v_{FO} = v_F - v_R$	2148	9000	No
v_R	705	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.556	
Space mean speed in ramp influence area,	S_R = 47.8	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 52.4	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Livernois Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2577	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	124	vph
Length of first accel/decel lane	300	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)	2577		124			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	678		33			v
Trucks and buses	25		17			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	2.60	%		%
Length	0.00	mi	0.16	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	0.922	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3052	142	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1411 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3052	9000	No
v_{12}	1411	4400	No
$v_{FO} = v_F - v_R$	2910	9000	No
v_R	142	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.506	
Space mean speed in ramp influence area,	S_R = 48.4	mph
Space mean speed in outer lanes,	S_O = 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:	8/15/2007
Analysis time period:	MD Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Springwells Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2349	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	173	vph
Length of first accel/decel lane	250	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)	2349		173			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	618		46			v
Trucks and buses	25		7			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	-3.31	%		%
Length	0.00	mi	0.14	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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2782	188	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1319 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2782	9000	No
v_{12}	1319	4400	No
$v_{FO} = v_F - v_R$	2594	9000	No
v_R	188	1900	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.575	
Space mean speed in ramp influence area,	S_R = 47.5	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 53.5	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
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 No Build
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	1738	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	0	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)	1738	0		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	457	0		v
Trucks and buses	23	0		%
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	0.897	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2040	0	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.709 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1446 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2040	6750	No
v_{12}	1446	4400	No
$v_{FO} = v_F - v_R$	2040	6750	No
v_R	0	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 7.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.428	
Space mean speed in ramp influence area,	S_R = 49.4	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:	11/17/08
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Entrance Ramp from Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 NoBuild
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	1738	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	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)	1738	174		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	457	46		v
Trucks and buses	23	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	0.897	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2040	183	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.602 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 1228 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2223	6750	No
v_{R12}	1411	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 10.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.276	
Space mean speed in ramp influence area,	S_R = 51.4	mph
Space mean speed in outer lanes,	S_0 = 53.9	mph
Space mean speed for all vehicles,	S = 52.3	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Clark Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3481	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	442	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)	3481	442		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	916	116		v
Trucks and buses	23	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	0.897	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4086	500	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.275 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1123 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4586	9000	No
v_{R12}	1623	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 14.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.276	
Space mean speed in ramp influence area,	S_R = 51.4	mph
Space mean speed in outer lanes,	S_O = 51.5	mph
Space mean speed for all vehicles,	S = 51.4	mph

Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Dragoon Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3144	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	439	vph
Length of first accel/decel lane	830	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)	3144	439		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	827	116		v
Trucks and buses	24	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-2.00 %		%
Length	mi	0.15 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	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3707	483	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.466 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1727 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4190	9000	No
v_{R12}	2210	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 17.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.307	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_O = 53.2	mph
Space mean speed for all vehicles,	S = 52.0	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Springwells Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2868	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	25.0	mph
Volume on ramp	415	vph
Length of first accel/decel lane	390	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)	2868	415		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	755	109		v
Trucks and buses	25	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-2.00 %		%
Length	mi	0.12 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	0.990	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3396	441	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.337 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1143 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3837	9000	No
v_{R12}	1584	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 15.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.321	
Space mean speed in ramp influence area,	S_R = 50.8	mph
Space mean speed in outer lanes,	S_O = 52.7	mph
Space mean speed for all vehicles,	S = 51.9	mph

HCS+: Ramps and Ramp Junctions Release 5.2

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Clark Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	3481	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	101	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)	3481		101			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	916		27			v
Trucks and buses	23		17			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	1.00	%		%
Length	0.00	mi	0.17	mi		mi
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			

Heavy vehicle adjustment, fHV		0.897	0.922
Driver population factor, fP		1.00	1.00
Flow rate, vp		4086	115 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1846 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4086	9000	No
v_{12}	1846	4400	No
$v_{FO} = v_F - v_R$	3971	9000	No
v_R	115	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 15.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.503	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_O = 59.9	mph
Space mean speed for all vehicles,	S = 54.1	mph

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Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Dearborn Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	3069	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	35	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)	3069	35		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	808	9		v
Trucks and buses	25	6		%
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	0.889	0.971	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3634	38	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.667 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2438 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3634	6750	No
v_{12}	2438	4400	No
$v_{FO} = v_F - v_R$	3596	6750	No
v_R	38	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 24.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.496	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_O = 59.6	mph
Space mean speed for all vehicles,	S = 51.7	mph

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Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Grand Blvd Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	3254	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	669	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)	3254		669			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	856		176			v
Trucks and buses	13		25			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	2.94	%		%
Length	0.00	mi	0.13	mi		mi
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			

Heavy vehicle adjustment, fHV	0.939	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3648	792	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2037 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3648	9000	No
v_{12}	2037	4400	No
$v_{FO} = v_F - v_R$	2856	9000	No
v_R	792	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.564	
Space mean speed in ramp influence area,	S_R = 47.7	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 52.5	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Livernois Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3144	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	140	vph
Length of first accel/decel lane	300	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)	3144		140			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	827		37			v
Trucks and buses	24		0			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	2.60	%		%
Length	0.00	mi	0.16	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	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3707	147	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1699 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3707	9000	No
v_{12}	1699	4400	No
$v_{FO} = v_F - v_R$	3560	9000	No
v_R	147	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.506	
Space mean speed in ramp influence area,	S_R = 48.4	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 54.2	mph

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E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/15/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Springwells Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2868	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	202	vph
Length of first accel/decel lane	250	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)	2868		202			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	755		53			v
Trucks and buses	25		1			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	-3.31	%		%
Length	0.00	mi	0.14	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	0.995	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3396	214	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1601 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3396	9000	No
v_{12}	1601	4400	No
$v_{FO} = v_F - v_R$	3182	9000	No
v_R	214	1900	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 15.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.577	
Space mean speed in ramp influence area,	S_R = 47.5	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 53.5	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
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 No Build
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	2430	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	0	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)	2430	0		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	639	0		v
Trucks and buses	9	0		%
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	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2673	0	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.693 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1853 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2673	6750	No
v_{12}	1853	4400	No
$v_{FO} = v_F - v_R$	2673	6750	No
v_R	0	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 11.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.428	
Space mean speed in ramp influence area,	S_R = 49.4	mph
Space mean speed in outer lanes,	S_0 = 60.3	mph
Space mean speed for all vehicles,	S = 52.3	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Junction:	Entrance Ramp from Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	2430	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	187	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)	2430	187		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	639	49		v
Trucks and buses	9	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	0.957	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2673	197	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.602 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 1609 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	2870	6750	No
v_{R12}	1806	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 14.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.284

Space mean speed in ramp influence area, S_R = 51.3 mph

Space mean speed in outer lanes, S_0 = 53.0 mph

Space mean speed for all vehicles, S = 51.9 mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Exit Ramp to Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	1120	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	349	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)	1120	349		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	295	92		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	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	1326	400	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.708 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1056 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1326	6750	No
v_{12}	1056	4400	No
$v_{FO} = v_F - v_R$	926	6750	No
v_R	400	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 6.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.464	
Space mean speed in ramp influence area,	S_R = 49.0	mph
Space mean speed in outer lanes,	S_0 = 60.3	mph
Space mean speed for all vehicles,	S = 50.9	mph

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Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Clark Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3274	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	61	vph
Length of first accel/decel lane	775	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)	3274		61				vph
Peak-hour factor, PHF	0.95		0.95				
Peak 15-min volume, v15	862		16				v
Trucks and buses	17		13				%
Recreational vehicles	0		0				%
Terrain type:	Level		Grade				
Grade		%	3.81	%		%	
Length		mi	0.13	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	0.939	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3739	68	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.366 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1370 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3807	9000	No
v_{R12}	1438	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 11.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.252

Space mean speed in ramp influence area, S_R = 51.7 mph

Space mean speed in outer lanes, S_O = 52.5 mph

Space mean speed for all vehicles, S = 52.2 mph

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Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Dearborn Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2812	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	56	vph
Length of first accel/decel lane	400	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)	2812	56		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	740	15		v
Trucks and buses	20	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	0.909	0.889	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3256	66	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.291 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 946 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3322	9000	No
v_{R12}	1012	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 10.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.288	
Space mean speed in ramp influence area,	S_R = 51.3	mph
Space mean speed in outer lanes,	S_O = 52.6	mph
Space mean speed for all vehicles,	S = 52.2	mph

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Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Livernois Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3086	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	122	vph
Length of first accel/decel lane	375	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)	3086		122				vph
Peak-hour factor, PHF	0.95		0.95				
Peak 15-min volume, v15	812		32				v
Trucks and buses	18		0				%
Recreational vehicles	0		0				%
Terrain type:	Level		Grade				
Grade		%	0.60	%		%	
Length		mi	0.11	mi		mi	
Trucks and buses PCE, ET	1.5		1.5				
Recreational vehicle PCE, ER	1.2		1.2				

Heavy vehicle adjustment, fHV	0.917	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3541	128	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.341 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1208 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3669	9000	No
v_{R12}	1336	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 13.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.313	
Space mean speed in ramp influence area,	S_R = 50.9	mph
Space mean speed in outer lanes,	S_O = 52.6	mph
Space mean speed for all vehicles,	S = 52.0	mph

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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/13/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Service Dr Ent Ramp N of Grand
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3695	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	30	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)	3695	30		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	972	8		v
Trucks and buses	15	17		%
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	0.930	0.922	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4181	34	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.333 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1393 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4215	9000	No
v_{R12}	1427	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 12.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.272	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_O = 51.8	mph
Space mean speed for all vehicles,	S = 51.7	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Springwells Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2608	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	205	vph
Length of first accel/decel lane	370	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)	2608	205		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	686	54		v
Trucks and buses	22	3		%
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	0.901	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3047	219	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.265 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 809 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3266	9000	No
v_{R12}	1028	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 11.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.291	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_O = 52.8	mph
Space mean speed for all vehicles,	S = 52.3	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Clark Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3274	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	451	vph
Length of first accel/decel lane	140	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)	3274	451		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	862	119		v
Trucks and buses	17	0		%
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	0.922	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3739	475	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1898 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3739	9000	No
v_{12}	1898	4400	No
$v_{FO} = v_F - v_R$	3264	9000	No
v_R	475	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 19.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.536	
Space mean speed in ramp influence area,	S_R = 48.0	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 53.4	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Dragoon Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3086	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	249	vph
Length of first accel/decel lane	260	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)	3086	249		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	812	66		v
Trucks and buses	18	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	-4.00 %		%
Length	0.00 mi	0.17 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.917	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3541	266	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1694 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3541	9000	No
v_{12}	1694	4400	No
$v_{FO} = v_F - v_R$	3275	9000	No
v_R	266	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.517	
Space mean speed in ramp influence area,	S_R = 48.3	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 53.9	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Springwells Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2608	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	600	vph
Length of first accel/decel lane	535	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)	2608	600		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	686	158		v
Trucks and buses	22	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	-1.20 %		%
Length	0.00 mi	0.13 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

Heavy vehicle adjustment, fHV	0.901	1.000	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3047	632	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1685 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3047	9000	No
v_{12}	1685	4400	No
$v_{FO} = v_F - v_R$	2415	9000	No
v_R	632	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.550	
Space mean speed in ramp influence area,	S_R = 47.9	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 52.7	mph

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PTG
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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Exit Ramp to Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	2561	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	495	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)	2561	495		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	674	130		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		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	2952	586	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.659 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2146 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2952	6750	No
v_{12}	2146	4400	No
$v_{FO} = v_F - v_R$	2366	6750	No
v_R	586	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 15.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.481	
Space mean speed in ramp influence area,	S_R = 48.8	mph
Space mean speed in outer lanes,	S_0 = 60.3	mph
Space mean speed for all vehicles,	S = 51.4	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Clark Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2693	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	161	vph
Length of first accel/decel lane	775	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)	2693		161			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	709		42			v
Trucks and buses	25		12			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade		%	3.81	%		%
Length		mi	0.13	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	3189	180	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.352 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1124 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3369	9000	No
v_{R12}	1304	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 10.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.250	
Space mean speed in ramp influence area,	S_R = 51.7	mph
Space mean speed in outer lanes,	S_O = 53.1	mph
Space mean speed for all vehicles,	S = 52.6	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Dearborn Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	3025	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	34	vph
Length of first accel/decel lane	400	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)	3025	34		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	796	9		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	3582	40	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.294 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1053 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3622	9000	No
v_{R12}	1093	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 11.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.289	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_O = 52.2	mph
Space mean speed for all vehicles,	S = 51.9	mph

HCS+: Ramps and Ramp Junctions Release 5.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Livernois Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2828	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	303	vph
Length of first accel/decel lane	375	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)	2828		303			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	744		80			v
Trucks and buses	25		25			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade		%	0.60	%		%
Length		mi	0.11	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	3349	359	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.312 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1046 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3708	9000	No
v_{R12}	1405	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 13.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.314	
Space mean speed in ramp influence area,	S_R = 50.9	mph
Space mean speed in outer lanes,	S_O = 52.7	mph
Space mean speed for all vehicles,	S = 52.0	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Off Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Service Dr Ent Ramp N of Grand
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2977	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	43	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)	2977	43		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	783	11		v
Trucks and buses	25	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	0.889	0.926	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3525	49	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.331 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1168 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3574	9000	No
v_{R12}	1217	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 11.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.269	
Space mean speed in ramp influence area,	S_R = 51.5	mph
Space mean speed in outer lanes,	S_O = 52.6	mph
Space mean speed for all vehicles,	S = 52.2	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Springwells Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2719	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	306	vph
Length of first accel/decel lane	370	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)	2719	306		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	716	81		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	3220	341	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.250 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 806 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3561	9000	No
v_{R12}	1147	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 11.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.293	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_O = 52.5	mph
Space mean speed for all vehicles,	S = 52.0	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Clark Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2693	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	328	vph
Length of first accel/decel lane	140	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)	2693	328		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	709	86		v
Trucks and buses	25	3		%
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	0.889	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3189	350	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1588 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3189	9000	No
v_{12}	1588	4400	No
$v_{FO} = v_F - v_R$	2839	9000	No
v_R	350	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.525	
Space mean speed in ramp influence area,	S_R = 48.2	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 53.6	mph

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Phone: Fax:
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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Dragoon Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2828	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	26	vph
Length of first accel/decel lane	260	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)	2828		26			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	744		7			v
Trucks and buses	25		25			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	-4.00	%		%
Length	0.00	mi	0.17	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	3349	31	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1478 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3349	9000	No
v_{12}	1478	4400	No
$v_{FO} = v_F - v_R$	3318	9000	No
v_R	31	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 14.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.496	
Space mean speed in ramp influence area,	S_R = 48.6	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 54.5	mph

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Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Springwells Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	2719	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	411	vph
Length of first accel/decel lane	535	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)	2719		411			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	716		108			v
Trucks and buses	25		12			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	-1.20	%		%
Length	0.00	mi	0.13	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	3220	459	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1663 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3220	9000	No
v_{12}	1663	4400	No
$v_{FO} = v_F - v_R$	2761	9000	No
v_R	459	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.534	
Space mean speed in ramp influence area,	S_R = 48.1	mph
Space mean speed in outer lanes,	S_O = 60.3	mph
Space mean speed for all vehicles,	S = 53.3	mph

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PTG
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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Exit Ramp to Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	4893	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	972	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)	4893	972		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1288	256		v
Trucks and buses	9	19		%
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	0.913	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5382	1120	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.574 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3566 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5382	6750	No
v_{12}	3566	4400	No
$v_{FO} = v_F - v_R$	4262	6750	No
v_R	1120	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 27.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.529	
Space mean speed in ramp influence area,	S_R = 48.1	mph
Space mean speed in outer lanes,	S_0 = 57.2	mph
Space mean speed for all vehicles,	S = 50.8	mph

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Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Clark Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5354	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	530	vph
Length of first accel/decel lane	775	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)	5354		530			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1409		139			v
Trucks and buses	12		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade		%	3.81	%		%
Length		mi	0.13	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	0.990	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5974	563	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.305 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1819 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6537	9000	No
v_{R12}	2382	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 18.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.278	
Space mean speed in ramp influence area,	S_R = 51.4	mph
Space mean speed in outer lanes,	S_O = 49.3	mph
Space mean speed for all vehicles,	S = 50.1	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Dearborn Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	6313	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	71	vph
Length of first accel/decel lane	400	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)	6313	71		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1661	19		v
Trucks and buses	10	3		%
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	0.952	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6978	76	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.289 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 2019 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7054	9000	No
v_{R12}	2095	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 19.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.309	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_O = 47.4	mph
Space mean speed for all vehicles,	S = 48.4	mph

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Phone: Fax:
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Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Livernois Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5814	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	254	vph
Length of first accel/decel lane	375	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)	5814		254			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1530		67			v
Trucks and buses	11		23			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade		%	0.60	%		%
Length		mi	0.11	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	0.897	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6457	298	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.320 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 2066 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6755	9000	No
v_{R12}	2364	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 21.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.340	
Space mean speed in ramp influence area,	S_R = 50.6	mph
Space mean speed in outer lanes,	S_O = 48.9	mph
Space mean speed for all vehicles,	S = 49.5	mph

HCS+: Ramps and Ramp Junctions Release 5.2

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Service Dr Ent Ramp N of Grand
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5562	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	238	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)	5562	238		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1464	63		v
Trucks and buses	11	11		%
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	0.948	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6177	264	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.304 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1880 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6441	9000	No
v_{R12}	2144	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 18.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.289	
Space mean speed in ramp influence area,	S_R = 51.2	mph
Space mean speed in outer lanes,	S_O = 49.1	mph
Space mean speed for all vehicles,	S = 49.8	mph

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Phone: Fax:
E-mail:

Merge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Springwells Entrance Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)

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	5810	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	55.0	mph
Volume on ramp	502	vph
Length of first accel/decel lane	370	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)	5810	502		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1529	132		v
Trucks and buses	11	3		%
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	0.985	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6452	536	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.226 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1457 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6988	9000	No
v_{R12}	1993	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 18.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.309	
Space mean speed in ramp influence area,	S_R = 51.0	mph
Space mean speed in outer lanes,	S_O = 47.3	mph
Space mean speed for all vehicles,	S = 48.3	mph

HCS+: Ramps and Ramp Junctions Release 5.2

Phone: Fax:
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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Clark Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5354	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	447	vph
Length of first accel/decel lane	140	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)	5354		447			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1409		118			v
Trucks and buses	12		4			%
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	0.980	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5974	480	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2875 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5974	9000	No
v_{12}	2875	4400	No
$v_{FO} = v_F - v_R$	5494	9000	No
v_R	480	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 27.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.536	
Space mean speed in ramp influence area,	S_R = 48.0	mph
Space mean speed in outer lanes,	S_O = 58.2	mph
Space mean speed for all vehicles,	S = 52.8	mph

HCS+: Ramps and Ramp Junctions Release 5.2

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Dragoon Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5814	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	70	vph
Length of first accel/decel lane	260	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)	5814		70			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1530		18			v
Trucks and buses	11		25			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	-4.00	%		%
Length	0.00	mi	0.17	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	6457	83	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2862 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6457	9000	No
v_{12}	2862	4400	No
$v_{FO} = v_F - v_R$	6374	9000	No
v_R	83	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 26.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.500	
Space mean speed in ramp influence area,	S_R = 48.5	mph
Space mean speed in outer lanes,	S_O = 57.2	mph
Space mean speed for all vehicles,	S = 53.0	mph

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Phone: Fax:
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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	8/16/2007
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Junction:	Springwells Exit Ramp
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	5810	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	257	vph
Length of first accel/decel lane	535	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)	5810		257			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1529		68			v
Trucks and buses	11		19			%
Recreational vehicles	0		0			%
Terrain type:	Level		Grade			
Grade	0.00	%	-1.20	%		%
Length	0.00	mi	0.13	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	0.913	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6452	296	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2980 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6452	9000	No
v_{12}	2980	4400	No
$v_{FO} = v_F - v_R$	6156	9000	No
v_R	296	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 25.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.520	
Space mean speed in ramp influence area,	S_R = 48.2	mph
Space mean speed in outer lanes,	S_O = 57.5	mph
Space mean speed for all vehicles,	S = 52.8	mph

HCS+: Ramps and Ramp Junctions Release 5.2

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-96 EB
Junction:	Exit Ramp to Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	1120	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	349	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)	1120	349		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	295	92		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		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	1326	400	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1326 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1326	4500	No
v_{12}	1326	4400	No
$v_{FO} = v_F - v_R$	926	4500	No
v_R	400	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 8.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.464	
Space mean speed in ramp influence area,	S_R = 49.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 49.0	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	Midday Peak
Freeway/Dir of Travel:	I-96 EB
Junction:	Exit Ramp to Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	909	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	495	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)	909	495		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	239	130		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	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	1076	586	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1076 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1076	4500	No
v_{12}	1076	4400	No
$v_{FO} = v_F - v_R$	490	4500	No
v_R	586	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 6.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.481	
Space mean speed in ramp influence area,	S_R = 48.8	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 48.8	mph

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Diverge Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date performed:	11/17/08
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-96 EB
Junction:	Exit Ramp to Ambassador
Jurisdiction:	MDOT
Analysis Year:	2035 No Build
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	1864	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	972	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)	1864	972		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	491	256		v
Trucks and buses	15	19		%
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	0.930	0.913	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2109	1120	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2109 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2109	4500	No
v_{12}	2109	4400	No
$v_{FO} = v_F - v_R$	989	4500	No
v_R	1120	2000	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 15.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.529	
Space mean speed in ramp influence area,	S_R = 48.1	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 48.1	mph

HCS+: Freeway Weaving Release 5.2

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-75 NB
Weaving Location:	From Clark Ent. to Grand Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1251	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.10	
Weaving ratio, R	0.43	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	4957	80	216	297	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1304	21	57	78	v
Trucks and buses	12	3	25	19	%
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	0.943	0.985	0.889	0.913	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5530	85	255	342	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	0.61	0.25
Weaving and non-weaving speeds, Si	42.90	50.91
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	50.02	mph
Weaving segment density, D	24.84	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	9641	pc/h
Capacity as a 15-minute flow rate, c	9095	pc/h
Capacity as a full-hour volume, ch	8640	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	597	2800	a
Average flow rate (pcphpl)	1242	2250	b
Volume ratio, VR	0.10	0.20	c
Weaving ratio, R	0.43	N/A	d
Weaving length (ft)	1251	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	Midday Peak
Freeway/Dir of Travel:	I-75 NB
Weaving Location:	From Clark Ent. to Grand Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1251	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.30	
Weaving ratio, R	0.34	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2095	40	595	314	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	551	11	157	83	v
Trucks and buses	25	0	25	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	0.889	1.000	0.889	0.901	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2480	42	704	366	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	1.22	0.14
Weaving and non-weaving speeds, Si	35.28	54.49
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.86
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	46.89	mph
Weaving segment density, D	15.32	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9061	pc/h
Capacity as a 15-minute flow rate, c	8054	pc/h
Capacity as a full-hour volume, ch	7651	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1070	2800	a
Average flow rate (pcphpl)	718	2250	b
Volume ratio, VR	0.30	0.20	c
Weaving ratio, R	0.34	N/A	d
Weaving length (ft)	1251	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date Performed:	8/15/2007
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-75 NB
Weaving Location:	From Clark Ent. to Grand Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
Description:	Detroit River International Crossing Project

Inputs

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1251	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.29	
Weaving ratio, R	0.39	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2812	48	669	442	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	740	13	176	116	v
Trucks and buses	12	0	25	15	%
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	0.943	1.000	0.889	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3137	50	792	500	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	1.49	0.18
Weaving and non-weaving speeds, Si	33.10	53.12
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.87
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	45.23	mph
Weaving segment density, D	19.81	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9061	pc/h
Capacity as a 15-minute flow rate, c	8548	pc/h
Capacity as a full-hour volume, ch	8121	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1292	2800	a
Average flow rate (pcphpl)	895	2250	b
Volume ratio, VR	0.29	0.20	c
Weaving ratio, R	0.39	N/A	d
Weaving length (ft)	1251	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:	8/16/2007
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-75 SB
Weaving Location:	From Amb. Ent. to Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	0.28	
Weaving ratio, R	0.38	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2631	178	451	643	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	692	47	119	169	v
Trucks and buses	15	3	0	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	0.930	0.985	1.000	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2977	190	474	761	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	1.38	0.17
Weaving and non-weaving speeds, Si	33.87	53.60
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.85
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	46.07	mph
Weaving segment density, D	19.11	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9129	pc/h
Capacity as a 15-minute flow rate, c	8492	pc/h
Capacity as a full-hour volume, ch	8067	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1235	2800	a
Average flow rate (pcphpl)	880	2250	b
Volume ratio, VR	0.28	0.20	c
Weaving ratio, R	0.38	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:	8/16/2007
Analysis Time Period:	Midday Peak
Freeway/Dir of Travel:	I-75 SB
Weaving Location:	From Amb. Ent. to Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	0.24	
Weaving ratio, R	0.40	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2253	131	328	440	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	593	34	86	116	v
Trucks and buses	25	0	3	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	0.985	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2668	137	350	521	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	1.08	0.11
Weaving and non-weaving speeds, Si	36.67	55.39
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.64
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	49.41	mph
Weaving segment density, D	14.88	pc/mi/ln
Level of service, LOS	B	
Capacity of base condition, cb	9129	pc/h
Capacity as a 15-minute flow rate, c	8115	pc/h
Capacity as a full-hour volume, ch	7709	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	871	2800	a
Average flow rate (pcphpl)	735	2250	b
Volume ratio, VR	0.24	0.20	c
Weaving ratio, R	0.40	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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Phone: Fax:
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Operational Analysis

Analyst:	CH
Agency/Co.:	PARSONS
Date Performed:	8/16/2007
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-75 SB
Weaving Location:	From Amb. Ent. to Clark Exit
Jurisdiction:	
Analysis Year:	2035 (PA0)
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	0.38	

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	4683	172	447	670	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1232	45	118	176	v
Trucks and buses	10	0	4	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	0.952	1.000	0.980	0.889	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5175	181	479	793	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	1.76	0.21
Weaving and non-weaving speeds, Si	31.31	52.14
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)	1.53
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	46.24	mph
Weaving segment density, D	28.67	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb	9176	pc/h
Capacity as a 15-minute flow rate, c	8739	pc/h
Capacity as a full-hour volume, ch	8302	pc/h

Limitations on Weaving Segments

	Analyzed	If Max Exceeded Maximum	See Note Note
Weaving flow rate, Vw	1272	2800	a
Average flow rate (pcphpl)	1325	2250	b
Volume ratio, VR	0.19	0.20	c
Weaving ratio, R	0.38	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.