HCS+: Basic Freeway Segments Release 5.2

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Dearborn Exit/Springwells Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   4
Free-flow speed: Measured
     FFS or BFFS   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   1461   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   26.6   pc/mi/ln

Level of service, LOS   D

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

HCS+: Basic Freeway Segments Release 5.2

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Springwells Exit/Plaza Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	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	1353	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	24.6	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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Exit/Livernois Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   4345   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1143   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   1206   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   1206   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   21.9   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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Livernois Ent./Junction Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   4652   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1224   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   1033   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   1033   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   18.8   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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Junction Exit/Plaza Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   4510   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1187   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   1252   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   1252   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   22.8   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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Ent./Clark Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	5203	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1369	v
Trucks and buses	13	%
Recreational vehicles	0	%
Terrain type:	Grade	
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	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: 11/26/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 NB
From/To: Clark Ent./Grand Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   C

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

HCS+: Basic Freeway Segments Release 5.2

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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/I-96 WB Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   C

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Dearborn Exit/Springwells Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	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.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Springwells Exit/Plaza Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	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	733	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	13.3	pc/mi/ln

Level of service, LOS   B

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Plaza Exit/Livernois Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   1769   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   466   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   524   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   524   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   9.5   pc/mi/ln

Level of service, LOS   A

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Livernois Ent./Junction Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   1880   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   495   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   445   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   445   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   8.1   pc/mi/ln

Level of service, LOS   A

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Junction Exit/Plaza Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   1830   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   482   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   542   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   542   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   9.9   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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Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Plaza Ent./Clark Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   1984   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   522   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   587   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   587   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   10.7   pc/mi/ln

Level of service, LOS   A

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

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 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   A

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: 11/26/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 NB
From/To: Grand Exit/I-96 WB Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   A

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

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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Dearborn Exit/Springwells Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   3391   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   892   v
Trucks and buses   25   %
Recreational vehicles   0   %
Terrain type: Level
    Grade   0.00   %
    Segment length   0.00   mi
Trucks and buses PCE, ET   1.5
Recreational vehicle PCE, ER   1.2
Heavy vehicle adjustment, fHV   0.889
Driver population factor, fp   1.00
Flow rate, vp   1004   pc/h/ln

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   4
Free-flow speed: Measured
    FFS or BFFS   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   1004   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   18.3   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: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Springwells Exit/Plaza Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   4
Free-flow speed: Measured
     FFS or BFFS   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   923   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   16.8   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: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Exit/Livernois Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2147   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   565   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   616   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   616   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   4
Density, D   11.2   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: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Livernois Ent./Junction Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2280   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   600   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   521   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   521   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   5
Density, D   9.5   pc/mi/ln

Level of service, LOS   A

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

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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Junction Exit/Plaza Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2218   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   584   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   636   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   636   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   4
Density, D   11.6   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: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Plaza Ent./Clark Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2340   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   616   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   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   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   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   4
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: 11/26/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Clark Ent./Grand Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   B

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: 11/26/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 NB
From/To: Grand Exit/I-96 WB Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   B

   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: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Ambassador Ent./Grand Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   B

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

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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Grand Ent./Clark Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	3414	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	898	v
Trucks and buses	14	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.935	
Driver population factor, fp	1.00	
Flow rate, vp	641	pc/h/ln

_____Speed Inputs and Adjustments_____

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	1.00	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	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	641	pc/h/ln
Free-flow speed, FFS	55.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	6	
Density, D	11.7	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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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Clark Exit/Plaza Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
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   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   642   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   642   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   5
Density, D   11.7   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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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Exit/Junction Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2596   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   683   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   731   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   731   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   13.3   pc/mi/ln

Level of service, LOS   B

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

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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Junction Ent./Livernois Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	2630	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	692	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	592	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	592	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	10.8	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: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Livernois Exit/Plaza Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2252   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   593   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   643   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   643   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   4
Density, D   11.7   pc/mi/ln

Level of service, LOS   B

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Ent./Springwells Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	3020	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	795	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	890	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	890	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	16.2	pc/mi/ln

Level of service, LOS   B

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: AM Peak
Freeway/Direction: I-75 SB
From/To: Springwells Ent./Dearborn Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   4
Free-flow speed: Measured
    FFS or BFFS   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   929   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.

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Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Ambassador Ent./Grand Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

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

_____LOS and Performance Measures_____

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

Level of service, LOS   B

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

HCS+: Basic Freeway Segments Release 5.2

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_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Grand Ent./Clark Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   3089   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   813   v
Trucks and buses   25   %
Recreational vehicles   0   %
Terrain type: Level
     Grade   0.00   %
     Segment length   0.00   mi
Trucks and buses PCE, ET   1.5
Recreational vehicle PCE, ER   1.2
Heavy vehicle adjustment, fHV   0.889
Driver population factor, fp   1.00
Flow rate, vp   610   pc/h/ln

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   6
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   610   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   6
Density, D   11.1   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: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Clark Exit/Plaza Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2791   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   661   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   661   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   12.0   pc/mi/ln

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: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Plaza Exit/Junction Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2396   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   631   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   709   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   709   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   12.9   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: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Junction Ent./Livernois Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	2443	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	643	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	579	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	579	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	10.5	pc/mi/ln

Level of service, LOS   A

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Livernois Exit/Plaza Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	2273	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	598	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	673	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	673	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	12.2	pc/mi/ln

Level of service, LOS   B

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Plaza Ent./Springwells Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   2765   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   728   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   819   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   819   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   14.9   pc/mi/ln

Level of service, LOS   B

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: Midday Peak
Freeway/Direction: I-75 SB
From/To: Springwells Ent./Dearborn Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   4
Free-flow speed: Measured
    FFS or BFFS   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   938   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   17.1   pc/mi/ln

Level of service, LOS   B

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

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Ambassador Ent./Grand Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   6041   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1590   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   1329   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   1329   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   24.2   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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Grand Ent./Clark Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   6512   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1714   v
Trucks and buses   10   %
Recreational vehicles   0   %
Terrain type: Level
    Grade   0.00   %
    Segment length   0.00   mi
Trucks and buses PCE, ET   1.5
Recreational vehicle PCE, ER   1.2
Heavy vehicle adjustment, fHV   0.952
Driver population factor, fp   1.00
Flow rate, vp   1200   pc/h/ln

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   6
Free-flow speed: Measured
    FFS or BFFS   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   1200   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   6
Density, D   21.8   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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Clark Exit/Plaza Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   6228   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1639   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   1377   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   1377   pc/h/ln
Free-flow speed, FFS   55.0   mi/h
Average passenger-car speed, S   55.0   mi/h
Number of lanes, N   5
Density, D   25.0   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: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Exit/Junction Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V	5291	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1392	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	1455	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	1455	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.

```
                    HCS+: Basic Freeway Segments Release 5.2




Phone:                                    Fax:
E-mail:

_____Operational Analysis_____

Analyst:                 CH
Agency or Company:       PARSONS
Date Performed:          8/22/2007
Analysis Time Period:    PM Peak
Freeway/Direction:       I-75 SB
From/To:                 Junction Ent./Livernois Exit
Jurisdiction:
Analysis Year:           2035 (PA02)
Description:  Detroit River International Crossing Project


_____Flow Inputs and Adjustments_____

Volume, V                                5588          veh/h
Peak-hour factor, PHF                    0.95
Peak 15-min volume, v15                  1471          v
Trucks and buses                         9             %
Recreational vehicles                    0             %
Terrain type:                            Level
     Grade                               0.00          %
     Segment length                      0.00          mi
Trucks and buses PCE, ET                 1.5
Recreational vehicle PCE, ER             1.2
Heavy vehicle adjustment, fHV            0.957
Driver population factor, fp             1.00
Flow rate, vp                            1229          pc/h/ln


_____Speed Inputs and Adjustments_____

Lane width                               12.0          ft
Right-shoulder lateral clearance         6.0           ft
Interchange density                      1.00          interchange/mi
Number of lanes, N                       5
Free-flow speed:                         Measured
     FFS or BFFS                         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                            1229          pc/h/ln
Free-flow speed, FFS                     55.0          mi/h
Average passenger-car speed, S           55.0          mi/h
Number of lanes, N                       5
Density, D                               22.3          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:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Livernois Exit/Plaza Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   5410   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1424   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   1481   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   1481   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   26.9   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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E-mail:

_____Operational Analysis_____

Analyst: CH
Agency or Company: PARSONS
Date Performed: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Plaza Ent./Springwells Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

Volume, V   5900   veh/h
Peak-hour factor, PHF   0.95
Peak 15-min volume, v15   1553   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   1646   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   1646   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   29.9   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: 8/22/2007
Analysis Time Period: PM Peak
Freeway/Direction: I-75 SB
From/To: Springwells Ent./Dearborn Ent.
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Flow Inputs and Adjustments_____

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

_____Speed Inputs and Adjustments_____

Lane width   12.0   ft
Right-shoulder lateral clearance   6.0   ft
Interchange density   1.00   interchange/mi
Number of lanes, N   4
Free-flow speed: Measured
    FFS or BFFS   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   1743   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.

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/22/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Dearborn
Jurisdiction:
Analysis Year: 2035 (PA02)
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   5240   vph

_____Off Ramp Data_____

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

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

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

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

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2659 \quad \text{pc/h}$$

_____Capacity Checks_____

```
                    Actual       Maximum       LOS F?
v   = v             5957         9000          No
 Fi   F
v                   2659         4400          No
 12
v   = v - v         5847         9000          No
 FO   F   R
v                   110          2000          No
 R
```

_____Level of Service Determination (if not F)_____

Density, $\qquad D_D = 4.252 + 0.0086\, v_R - 0.009\, L_{12} = 26.0 \quad$ pc/mi/ln

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

_____Speed Estimation_____

```
Intermediate speed variable,          D  = 0.438
                                       S
Space mean speed in ramp influence area,   S  = 49.3    mph
                                            R
Space mean speed in outer lanes,      S  = 57.8    mph
                                       0
Space mean speed for all vehicles,    S  = 53.7    mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/22/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Springwells
Jurisdiction:
Analysis Year: 2035 (PA02)
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   5141   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   402   vph
Length of first accel/decel lane   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)	5141	402		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1353	106		v
Trucks and buses	16	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	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          0.926       0.990
Driver population factor, fP           1.00        1.00
Flow rate, vp                          5845        427                pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \quad\quad\quad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation} \quad 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = \quad 2789 \quad pc/h$$

_____Capacity Checks_____

```
                     Actual       Maximum       LOS F?
 v  = v              5845         9000          No
  Fi   F
 v                   2789         4400          No
  12
 v  = v - v          5418         9000          No
  FO   F   R
 v                   427          2000          No
  R
```

_____Level of Service Determination (if not F)_____

Density, $\quad\quad\quad D = 4.252 + 0.0086\ v_R - 0.009\ L_D = \quad 26.0 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $\quad\quad D_S = 0.466$

Space mean speed in ramp influence area, $\quad S_R = 48.9 \quad mph$

Space mean speed in outer lanes, $\quad\quad S_O = 58.3 \quad mph$

Space mean speed for all vehicles, $\quad\quad S = 53.4 \quad mph$

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/22/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Plaza Exit Ramp W of Waterman
Jurisdiction:
Analysis Year: 2035 (PA02)
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   4739   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   2
Free-Flow speed on ramp   45.0   mph
Volume on ramp   394   vph
Length of first accel/decel lane   1963   ft
Length of second accel/decel lane   0   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4739	394		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1247	104		v
Trucks and buses	17	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	5.00 %		%
Length	0.00 mi	0.17 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	2.5		

```
Heavy vehicle adjustment, fHV              0.922      0.889
Driver population factor, fP               1.00       1.00
Flow rate, vp                              5412       467                    pcph

_____Estimation of V12 Diverge Areas_____

             L   =                  (Equation 25-8 or 25-9)
              EQ
             P   =     0.260    Using Equation  0
              FD
             v   = v   + (v - v ) P   =   1753    pc/h
              12    R     F   R   FD

_____Capacity Checks_____

                        Actual         Maximum        LOS F?
        v   = v          5412           9000           No
         Fi    F
        v                1753           4400           No
         12
        v   = v - v       4945           9000           No
         FO    F   R
        v                 467           4100           No
         R

_____Level of Service Determination (if not F)_____

Density,              D = 4.252 + 0.0086 v  - 0.009  L   =   -16.0   pc/mi/ln
                       R                   12         D
Level of service for ramp-freeway junction areas of influence A

_____Speed Estimation_____

Intermediate speed variable,              D  = 0.340
                                           S
Space mean speed in ramp influence area,  S  = 50.6    mph
                                           R
Space mean speed in outer lanes,          S  = 57.1    mph
                                           0
Space mean speed for all vehicles,        S  = 54.8    mph
_____
```

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Entrance Ramp W of Livernois
Jurisdiction:
Analysis Year: 2035 (PA02)
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   4345   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   307   vph
Length of first accel/decel lane   1164   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)	4345	307		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1143	81		v
Trucks and buses	11	3		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-1.20	%	%
Length	mi	0.06	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   4825   328   pcph

_____Estimation of V12 Merge Areas_____

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

                 P_{FM} =   0.548   Using Equation 4

                 $v_{12} = v_F (P_{FM}) =$ 2642   pc/h

_____Capacity Checks_____

                       Actual   Maximum   LOS F?
     v_{FO} 5153   9000   No

     v_{R12} 2970   4600   No

_____Level of Service Determination (if not F)_____

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ =   21.2   pc/mi/ln

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

_____Speed Estimation_____

Intermediate speed variable, M_S = 0.316

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

Space mean speed in outer lanes, S_O = 52.9   mph

Space mean speed for all vehicles, S = 51.7   mph

_____

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   4652   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   142   vph
Length of first accel/decel lane   647   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)	4652	142		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1224	37		v
Trucks and buses	11	5		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.28 %	%	
Length	0.00 mi	0.03 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      0.976
Driver population factor, fP           1.00       1.00
Flow rate, vp                          5166       153              pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 2339 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5166	9000	No
v_{12}	2339	4400	No
$v_{FO} = v_F - v_R$	5013	9000	No
v_R	153	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D = 18.5$ pc/mi/ln

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.442$

Space mean speed in ramp influence area, $S_R = 49.3$ mph

Space mean speed in outer lanes, $S_O = 58.7$ mph

Space mean speed for all vehicles, $S = 54.0$ mph

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Entrance Ramp E of Clark
Jurisdiction:
Analysis Year: 2035 (PA02)
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   5203   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   329   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)	5203	329		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1369	87		v
Trucks and buses	13	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              0.939      0.901
Driver population factor, fP               1.00       1.00
Flow rate, vp                              5833       384                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.358 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = 2087 \quad pc/h$$

_____Capacity Checks_____

```
                   Actual        Maximum        LOS F?
  v                6217          9000           No
   FO
  v                2471          4600           No
   R12
```

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 20.9 \quad pc/mi/ln$$

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

_____Speed Estimation_____

```
Intermediate speed variable,            M  = 0.326
                                         S
Space mean speed in ramp influence area, S  = 50.8      mph
                                         R
Space mean speed in outer lanes,        S  = 50.1      mph
                                         O
Space mean speed for all vehicles,      S  = 50.3      mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp E of Grand
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

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

_____Off Ramp Data_____

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

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5532	20		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1456	5		v
Trucks and buses	14	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	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          0.935      0.889
Driver population factor, fP           1.00       1.00
Flow rate, vp                          6231       24                   pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = \quad 2323 \quad pc/h$$

_____Capacity Checks_____

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

_____Level of Service Determination (if not F)_____

Density, $\qquad D = 4.252 + 0.0086\, v_R - 0.009\, L_{12} = \quad 22.1 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.430$

Space mean speed in ramp influence area, $S_R = 49.4 \quad mph$

Space mean speed in outer lanes, $S_O = 58.4 \quad mph$

Space mean speed for all vehicles, $S = 54.1 \quad mph$

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Dearborn
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2795   vph

_____Off Ramp Data_____

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

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

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

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

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \quad\quad\quad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 1470 \quad \text{pc/h}$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3310	9000	No
v_{12}	1470	4400	No
$v_{FO} = v_F - v_R$	3262	9000	No
v_R	48	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12} = 15.8 \quad \text{pc/mi/ln}$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.432$

Space mean speed in ramp influence area, $S_R = 49.4 \quad \text{mph}$

Space mean speed in outer lanes, $S_0 = 60.3 \quad \text{mph}$

Space mean speed for all vehicles, $S = 54.9 \quad \text{mph}$
```

Phone:                                          Fax:
E-mail:

_____Diverge Analysis_____

Analyst:                    CH
Agency/Co.:                 PARSONS
Date performed:             8/23/2007
Analysis time period:       Midday Peak
Freeway/Dir of Travel:      I-75 NB
Junction:                   Exit Ramp W of Springwells
Jurisdiction:
Analysis Year:              2035 (PA02)
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                        2751          vph

_____Off Ramp Data_____

Side of freeway                          Right
Number of lanes in ramp                  1
Free-Flow speed on ramp                  35.0          mph
Volume on ramp                           273           vph
Length of first accel/decel lane         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) | 2751 | 273 | | vph |
| Peak-hour factor, PHF | 0.95 | 0.95 | | |
| Peak 15-min volume, v15 | 724 | 72 | | v |
| Trucks and buses | 25 | 10 | | % |
| Recreational vehicles | 0 | 0 | | % |
| Terrain type: | Level | 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     0.952
Driver population factor, fP             1.00      1.00
Flow rate, vp                            3258      302              pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \quad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R)\,P_{FD} = \quad 1591 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3258	9000	No
v_{12}	1591	4400	No
$v_{FO} = v_F - v_R$	2956	9000	No
v_R	302	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\,v_{12} - 0.009\,L_D = \quad 15.7 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.455$

Space mean speed in ramp influence area, $S_R = 49.1 \quad$ mph

Space mean speed in outer lanes, $S_O = 60.3 \quad$ mph

Space mean speed for all vehicles, $S = 54.3 \quad$ mph

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Plaza Exit Ramp W of Waterman
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2477   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   2
Free-Flow speed on ramp   45.0   mph
Volume on ramp   708   vph
Length of first accel/decel lane   1963   ft
Length of second accel/decel lane   0   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2477	708		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	652	186		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	5.00 %	%	
Length	0.00 mi	0.17 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	2.5		

```
Heavy vehicle adjustment, fHV          0.889      0.889
Driver population factor, fP           1.00       1.00
Flow rate, vp                          2933       838                pcph
_____Estimation of V12 Diverge Areas_____

              L   =              (Equation 25-8 or 25-9)
                EQ
              P   =    0.260   Using Equation  0
                FD
              v   = v   + (v - v ) P   =   1383    pc/h
               12    R     F   R   FD

_____Capacity Checks_____

                    Actual         Maximum        LOS F?
        v   = v      2933           9000           No
         Fi    F
        v                1383       4400           No
         12
        v   = v - v      2095       9000           No
         FO    F   R
        v                838        4100           No
         R

_____Level of Service Determination (if not F)_____

Density,            D = 4.252 + 0.0086 v  - 0.009  L   =   -19.2   pc/mi/ln
                                        R              12     D
Level of service for ramp-freeway junction areas of influence A

_____Speed Estimation_____

Intermediate speed variable,           D  = 0.373
                                        S
Space mean speed in ramp influence area,   S  = 50.1    mph
                                            R
Space mean speed in outer lanes,           S  = 60.3    mph
                                            O
Space mean speed for all vehicles,         S  = 55.1    mph
_____
```

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Entrance Ramp W of Livernois
Jurisdiction:
Analysis Year: 2035 (PA02)
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   1769   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   111   vph
Length of first accel/decel lane   1164   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)	1769	111		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	466	29		v
Trucks and buses	25	10		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade		-1.20 %	%	%
Length	mi	0.06 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV          0.889     0.952
Driver population factor, fP           1.00      1.00
Flow rate, vp                          2095      123              pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.573 \quad \text{Using Equation } 4$$

$$v_{12} = v_F(P_{FM}) = 1201 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v_{FO}	2218	9000	No
v_{R12}	1324	4600	No

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 8.4 \quad pc/mi/ln$$

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

_____Speed Estimation_____

Intermediate speed variable, M_S = 0.254

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

Space mean speed in outer lanes, S_O = 55.0   mph

Space mean speed for all vehicles, S = 53.0   mph

_____

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   1880   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   51   vph
Length of first accel/decel lane   647   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)	1880	51		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	495	13		v
Trucks and buses	25	18		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.28 %		%
Length	0.00 mi	0.03 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                          2226       59              pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = \quad 1004 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2226	9000	No
v_{12}	1004	4400	No
$v_{FO} = v_F - v_R$	2167	9000	No
v_R	59	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_{12} = \quad 7.1 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.433$

Space mean speed in ramp influence area, $S_R = 49.4 \quad$ mph

Space mean speed in outer lanes, $S_0 = 60.3 \quad$ mph

Space mean speed for all vehicles, $S = 54.8 \quad$ mph

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Entrance Ramp E of Clark
Jurisdiction:
Analysis Year: 2035 (PA02)
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   1984   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   395   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)	1984	395		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	522	104		v
Trucks and buses	25	23		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV          0.889      0.897
Driver population factor, fP           1.00       1.00
Flow rate, vp                          2349       464                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad\qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.348 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = \quad 817 \quad \text{pc/h}$$

_____Capacity Checks_____

```
                    Actual        Maximum        LOS F?
v                   2813          9000           No
 FO
v                   1281          4600           No
 R12
```

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\,v_R + 0.0078\,v_{12} - 0.00627\,L_A = \quad 11.6 \quad \text{pc/mi/ln}$$

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

_____Speed Estimation_____

```
Intermediate speed variable,           M  = 0.294
                                        S
Space mean speed in ramp influence area, S  = 51.2     mph
                                          R
Space mean speed in outer lanes,       S  = 54.0     mph
                                        0
Space mean speed for all vehicles,     S  = 52.7     mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp E of Grand
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Diverge
Number of lanes in freeway   5
Free-flow speed on freeway   55.0   mph
Volume on freeway   2379   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   244   vph
Length of first accel/decel lane   235   ft
Length of second accel/decel lane   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2379	244		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	626	64		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	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                          2817       289                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation 8}$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 1391 \quad pc/h$$

_____Capacity Checks_____

```
                       Actual      Maximum      LOS F?
  v   = v              2817        9000         No
   Fi    F
  v                    1391        4400         No
   12
  v   = v  - v         2528        9000         No
   FO    F    R
  v                    289         2000         No
   R
```

_____Level of Service Determination (if not F)_____

$$\text{Density,} \qquad D = 4.252 + 0.0086\, v_R - 0.009\, L_D = 14.1 \quad pc/mi/ln$$

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

_____Speed Estimation_____

```
Intermediate speed variable,           D  = 0.454
                                        S
Space mean speed in ramp influence area,   S  = 49.1    mph
                                            R
Space mean speed in outer lanes,           S  = 60.3    mph
                                            0
Space mean speed for all vehicles,         S  = 54.2    mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Dearborn
Jurisdiction:
Analysis Year: 2035 (PA02)
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   3422   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   29   vph
Length of first accel/decel lane   120   ft
Length of second accel/decel lane   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3422	29		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	901	8		v
Trucks and buses	25	7		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV          0.889      0.966
Driver population factor, fP           1.00       1.00
Flow rate, vp                          4052       32                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 1785 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4052	9000	No
v_{12}	1785	4400	No
$v_{FO} = v_F - v_R$	4020	9000	No
v_R	32	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D = 18.5 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.431$

Space mean speed in ramp influence area, $S_R = 49.4 \quad mph$

Space mean speed in outer lanes, $S_O = 59.8 \quad mph$

Space mean speed for all vehicles, $S = 54.7 \quad mph$

_____

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Springwells
Jurisdiction:
Analysis Year: 2035 (PA02)
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   3391   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   277   vph
Length of first accel/decel lane   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)	3391	277		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	892	73		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                            4016       293                  pcph

_____Estimation of V12 Diverge Areas_____

             L   =                (Equation 25-8 or 25-9)
              EQ
             P   =    0.436    Using Equation  8
              FD
             v  = v  + (v - v ) P  =   1916    pc/h
              12   R    F   R   FD

_____Capacity Checks_____

                    Actual        Maximum        LOS F?
      v  = v         4016          9000           No
       Fi   F
      v                1916          4400           No
       12
      v   = v - v     3723          9000           No
       FO   F   R
      v                293           2000           No
       R

_____Level of Service Determination (if not F)_____

Density,              D = 4.252 + 0.0086 v  - 0.009  L    =    18.5    pc/mi/ln
                       R                   12         D
Level of service for ramp-freeway junction areas of influence B

_____Speed Estimation_____

Intermediate speed variable,              D  = 0.454
                                           S
Space mean speed in ramp influence area,  S  = 49.1     mph
                                           R
Space mean speed in outer lanes,          S  = 60.1     mph
                                           0
Space mean speed for all vehicles,        S  = 54.3     mph
_____
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Plaza Exit Ramp W of Waterman
Jurisdiction:
Analysis Year: 2035 (PA02)
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   3116   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   2
Free-Flow speed on ramp   45.0   mph
Volume on ramp   969   vph
Length of first accel/decel lane   1963   ft
Length of second accel/decel lane   0   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3116	969		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	820	255		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	5.00 %	%	
Length	0.00 mi	0.17 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	2.5		

```
Heavy vehicle adjustment, fHV          0.889     0.889
Driver population factor, fP           1.00      1.00
Flow rate, vp                          3690      1148              pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.260 \quad \text{Using Equation } 0$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = \quad 1809 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3690	9000	No
v_{12}	1809	4400	No
$v_{FO} = v_F - v_R$	2542	9000	No
v_R	1148	4100	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D = \quad -15.5 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.401$

Space mean speed in ramp influence area, $S_R = 49.8 \quad$ mph

Space mean speed in outer lanes, $S_0 = 60.3 \quad$ mph

Space mean speed for all vehicles, $S = 54.7 \quad$ mph

_____

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Entrance Ramp W of Livernois
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2147   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   133   vph
Length of first accel/decel lane   1164   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)	2147	133		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	565	35		v
Trucks and buses	18	17		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-1.20	%	%
Length	mi	0.06	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      0.922
Driver population factor, fP           1.00       1.00
Flow rate, vp                          2463       152                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.570 \quad \text{Using Equation } 4$$

$$v_{12} = v_F(P_{FM}) = 1403 \quad \text{pc/h}$$

_____Capacity Checks_____

```
                   Actual        Maximum        LOS F?
   v               2615          9000           No
    FO
   v               1555          4600           No
    R12
```

_____Level of Service Determination (if not F)_____

Density, $D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 10.2 \quad$ pc/mi/ln

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

_____Speed Estimation_____

```
Intermediate speed variable,            M  = 0.258
                                         S
Space mean speed in ramp influence area, S  = 51.6    mph
                                          R
Space mean speed in outer lanes,        S  = 54.9    mph
                                         0
Space mean speed for all vehicles,      S  = 52.9    mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp W of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2280   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   61   vph
Length of first accel/decel lane   647   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)	2280	61		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	600	16		v
Trucks and buses	17	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.28 %	%	
Length	0.00 mi	0.03 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      0.930
Driver population factor, fP             1.00       1.00
Flow rate, vp                            2604       69                    pcph

_____Estimation of V12 Diverge Areas_____

              L   =            (Equation 25-8 or 25-9)
               EQ
              P   =    0.436   Using Equation  8
               FD
              v   = v   + (v  - v ) P  =  1174    pc/h
               12    R        F    R   FD

_____Capacity Checks_____

                    Actual       Maximum        LOS F?
      v   = v        2604         9000           No
       Fi    F
      v                1174       4400           No
       12
      v   = v  - v     2535       9000           No
       FO    F    R
      v                  69       2000           No
       R

_____Level of Service Determination (if not F)_____

Density,           D = 4.252 + 0.0086 v  - 0.009  L   =   8.5     pc/mi/ln
                    R                  12         D
Level of service for ramp-freeway junction areas of influence A

_____Speed Estimation_____

Intermediate speed variable,            D  = 0.434
                                         S
Space mean speed in ramp influence area, S  = 49.4    mph
                                          R
Space mean speed in outer lanes,         S  = 60.3    mph
                                          0
Space mean speed for all vehicles,       S  = 54.8    mph
```

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Entrance Ramp W of Clark
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2340   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   709   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)	2340	709		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	616	187		v
Trucks and buses	21	13		%
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            0.905      0.939
Driver population factor, fP             1.00       1.00
Flow rate, vp                            2722       795                  pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.306 \quad \text{Using Equation} \quad 4$$

$$v_{12} = v_F(P_{FM}) = \quad 834 \quad pc/h$$

_____Capacity Checks_____

```
                    Actual        Maximum         LOS F?
     v              3517          9000            No
      FO
     v              1629          4600            No
      R12
```

_____Level of Service Determination (if not F)_____

Density, $D = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A = 14.1$ pc/mi/ln

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

_____Speed Estimation_____

Intermediate speed variable, $M_S = 0.300$

Space mean speed in ramp influence area, $S_R = 51.1$ mph

Space mean speed in outer lanes, $S_O = 53.4$ mph

Space mean speed for all vehicles, $S = 52.3$ mph

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 NB
Junction: Exit Ramp E of Grand
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Diverge
Number of lanes in freeway   5
Free-flow speed on freeway   55.0   mph
Volume on freeway   3049   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   204   vph
Length of first accel/decel lane   235   ft
Length of second accel/decel lane   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3049	204		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	802	54		v
Trucks and buses	19	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	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	0.913	0.889
Driver population factor, fP	1.00	1.00
Flow rate, vp	3514	242

pcph

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation 8}$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 1669 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3514	9000	No
v_{12}	1669	4400	No
$v_{FO} = v_F - v_R$	3272	9000	No
v_R	242	2000	No

_____Level of Service Determination (if not F)_____

Density, $\qquad D = 4.252 + 0.0086\ v_R - 0.009\ L_{12} = 16.5 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $\qquad D_S = 0.450$

Space mean speed in ramp influence area, $\qquad S_R = 49.2 \quad mph$

Space mean speed in outer lanes, $\qquad S_0 = 60.3 \quad mph$

Space mean speed for all vehicles, $\qquad S = 54.5 \quad mph$

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Service Dr Ent Ramp E of Grand
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Merge
Number of lanes in freeway   4
Free-flow speed on freeway   55.0   mph
Volume on freeway   3386   vph

_____On Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-flow speed on ramp   35.0   mph
Volume on ramp   28   vph
Length of first accel/decel lane   590   ft
Length of second accel/decel lane   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3386	28		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	891	7		v
Trucks and buses	14	18		%
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      0.917
Driver population factor, fP           1.00       1.00
Flow rate, vp                          3814       32                    pcph
```

$$\underline{\hspace{3cm}\text{Estimation of V12 Merge Areas}\hspace{3cm}}$$

$$L_{EQ} = \hspace{2cm} \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.402 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = 1532 \quad \text{pc/h}$$

$$\underline{\hspace{3cm}\text{Capacity Checks}\hspace{3cm}}$$

	Actual	Maximum	LOS F?
v_{FO}	3846	9000	No
v_{R12}	1564	4600	No

$$\underline{\hspace{2cm}\text{Level of Service Determination (if not F)}\hspace{2cm}}$$

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

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

$$\underline{\hspace{3cm}\text{Speed Estimation}\hspace{3cm}}$$

Intermediate speed variable, $M_S = 0.298$

Space mean speed in ramp influence area, $S_R = 51.1$ mph

Space mean speed in outer lanes, $S_0 = 52.7$ mph

Space mean speed for all vehicles, $S = 52.0$ mph

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp E of Clark
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Diverge
Number of lanes in freeway   4
Free-flow speed on freeway   55.0   mph
Volume on freeway   3414   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   602   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)	3414	602		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	898	158		v
Trucks and buses	14	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %		%
Length	0.00 mi	0.00 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV            0.935      0.995
Driver population factor, fP             1.00       1.00
Flow rate, vp                            3845       637                pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 2036 \quad \text{pc/h}$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3845	9000	No
v_{12}	2036	4400	No
$v_{FO} = v_F - v_R$	3208	9000	No
v_R	637	2000	No

_____Level of Service Determination (if not F)_____

Density, $$D = 4.252 + 0.0086\, v_R - 0.009\, L_D = 20.5 \quad \text{pc/mi/ln}$$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.485$

Space mean speed in ramp influence area, $S_R = 48.7$ mph

Space mean speed in outer lanes, $S_0 = 60.3$ mph

Space mean speed for all vehicles, $S = 53.6$ mph

_____

.

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Plaza Exit Ramp E of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2812   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   2
Free-Flow speed on ramp   45.0   mph
Volume on ramp   216   vph
Length of first accel/decel lane   1963   ft
Length of second accel/decel lane   0   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	216		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	740	57		v
Trucks and buses	17	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.22 %	%	
Length	0.00 mi	0.46 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      0.889
Driver population factor, fP               1.00       1.00
Flow rate, vp                              3212       256                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \quad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.260 \quad \text{Using Equation} \quad 0$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 1025 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3212	9000	No
v_{12}	1025	4400	No
$v_{FO} = v_F - v_R$	2956	9000	No
v_R	256	4100	No

_____Level of Service Determination (if not F)_____

Density, $\quad D = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = -22.3 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $\quad D_S = 0.321$

Space mean speed in ramp influence area, $\quad S_R = 50.8 \quad mph$

Space mean speed in outer lanes, $\quad S_0 = 60.0 \quad mph$

Space mean speed for all vehicles, $\quad S = 56.7 \quad mph$

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Ent. Ramp W of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2596   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   34   vph
Length of first accel/decel lane   1164   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)	2596	34		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	683	9		v
Trucks and buses	14	12		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-4.00	%	%
Length	mi	0.04	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                          2924       38                      pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.584 \quad \text{Using Equation } 4$$

$$v_{12} = v_F(P_{FM}) = 1707 \quad pc/h$$

_____Capacity Checks_____

```
                  Actual       Maximum       LOS F?
  v               2962         9000          No
   FO
  v               1745         4600          No
   R12
```

_____Level of Service Determination (if not F)_____

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

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

_____Speed Estimation_____

Intermediate speed variable, $M_S = 0.262$

Space mean speed in ramp influence area, $S_R = 51.6 \quad mph$

Space mean speed in outer lanes, $S_0 = 54.6 \quad mph$

Space mean speed for all vehicles, $S = 52.8 \quad mph$

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp W of Livernois
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2630   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   378   vph
Length of first accel/decel lane   647   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)	2630	378		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	692	99		v
Trucks and buses	14	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	5.00 %		%
Length	0.00 mi	0.07 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	2.5		

```
Heavy vehicle adjustment, fHV          0.935      1.000
Driver population factor, fP           1.00       1.00
Flow rate, vp                          2962       398                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation} \quad 8$$

$$v_{12} = v_R + (v_F - v_R)\,P_{FD} = 1516 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2962	9000	No
v_{12}	1516	4400	No
$v_{FO} = v_F - v_R$	2564	9000	No
v_R	398	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\,v_{R} - 0.009\,L_{12} \quad = \quad 11.5 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.464$

Space mean speed in ramp influence area, $S_R = 49.0 \quad$ mph

Space mean speed in outer lanes, $S_O = 60.3 \quad$ mph

Space mean speed for all vehicles, $S = 53.9 \quad$ mph

_____

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Springwells
Jurisdiction:
Analysis Year: 2035 (PA02)
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   3020   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   134   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)	3020	134		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	795	35		v
Trucks and buses	24	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV          0.893      0.980
Driver population factor, fP           1.00       1.00
Flow rate, vp                          3560       144                      pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.318 \quad \text{Using Equation} \quad 4$$

$$v_{12} = v_F (P_{FM}) = \quad 1131 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v_{FO}	3704	9000	No
v_{R12}	1275	4600	No

_____Level of Service Determination (if not F)_____

Density, $D = 5.475 + 0.00734\,v_R + 0.0078\,v_{12} - 0.00627\,L_A = 13.0$ 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, $S_0 = 52.4$ mph

Space mean speed for all vehicles, $S = 51.9$ mph

_____

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: AM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Dearborn
Jurisdiction:
Analysis Year: 2035 (PA02)
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   3153   vph

_____On Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-flow speed on ramp   35.0   mph
Volume on ramp   59   vph
Length of first accel/decel lane   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)	3153	59		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	830	16		v
Trucks and buses	24	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV            0.893       0.889
Driver population factor, fP             1.00        1.00
Flow rate, vp                            3717        70                        pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.336 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = 1251 \quad \text{pc/h}$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v_{FO}	3787	9000	No
v_{R12}	1321	4600	No

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 13.2 \quad \text{pc/mi/ln}$$

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

_____Speed Estimation_____

```
Intermediate speed variable,             M  = 0.308
                                          S
Space mean speed in ramp influence area, S  = 51.0     mph
                                          R
Space mean speed in outer lanes,         S  = 52.4     mph
                                          O
Space mean speed for all vehicles,       S  = 51.9     mph
```

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Service Dr Ent Ramp E of Grand
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Merge
Number of lanes in freeway   4
Free-flow speed on freeway   55.0   mph
Volume on freeway   3048   vph

_____On Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-flow speed on ramp   35.0   mph
Volume on ramp   39   vph
Length of first accel/decel lane   590   ft
Length of second accel/decel lane   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3048	39		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	802	10		v
Trucks and buses	25	15		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV            0.889      0.930
Driver population factor, fP             1.00       1.00
Flow rate, vp                            3609       44                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.400 \quad \text{Using Equation } 4$$

$$v_{12} = v_F(P_{FM}) = 1445 \quad pc/h$$

_____Capacity Checks_____

```
                    Actual      Maximum          LOS F?
     v              3653        9000             No
      FO
     v              1489        4600             No
      R12
```

_____Level of Service Determination (if not F)_____

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

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

_____Speed Estimation_____

Intermediate speed variable, $M_S = 0.297$

Space mean speed in ramp influence area, $S_R = 51.1$ mph

Space mean speed in outer lanes, $S_0 = 52.9$ mph

Space mean speed for all vehicles, $S = 52.2$ mph

_____

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp E of Clark
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Diverge
Number of lanes in freeway   4
Free-flow speed on freeway   55.0   mph
Volume on freeway   3089   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   298   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)	3089	298		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	813	78		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                            3658       323                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = \quad 1777 \quad \text{pc/h}$$

_____Capacity Checks_____

```
                    Actual        Maximum        LOS F?
```

$$v_{Fi} = v_F \qquad 3658 \qquad 9000 \qquad \text{No}$$

$$v_{12} \qquad\qquad 1777 \qquad 4400 \qquad \text{No}$$

$$v_{FO} = v_F - v_R \quad 3335 \qquad 9000 \qquad \text{No}$$

$$v_R \qquad\qquad 323 \qquad 2000 \qquad \text{No}$$

_____Level of Service Determination (if not F)_____

$$\text{Density,} \qquad D = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = \quad 18.3 \quad \text{pc/mi/ln}$$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.457$

Space mean speed in ramp influence area, $S_R = 49.1$ mph

Space mean speed in outer lanes, $S_0 = 60.3$ mph

Space mean speed for all vehicles, $S = 54.3$ mph

_____

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Plaza Exit Ramp E of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2791   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   2
Free-Flow speed on ramp   45.0   mph
Volume on ramp   395   vph
Length of first accel/decel lane   1963   ft
Length of second accel/decel lane   0   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)	2791	395		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	734	104		v
Trucks and buses	25	25		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.22 %	%	
Length	0.00 mi	0.46 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                          3305       468                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.260 \quad \text{Using Equation} \quad 0$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 1206 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3305	9000	No
v_{12}	1206	4400	No
$v_{FO} = v_F - v_R$	2837	9000	No
v_R	468	4100	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = -20.7 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.340$

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

Space mean speed in outer lanes, $S_0 = 60.1 \quad mph$

Space mean speed for all vehicles, $S = 56.3 \quad mph$

_____

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Ent. Ramp W of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2396   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   48   vph
Length of first accel/decel lane   1164   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)	2396	48		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	631	13		v
Trucks and buses	25	17		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-4.00	%	%
Length	mi	0.04	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                          2837       55                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.582 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = \quad 1650 \quad pc/h$$

_____Capacity Checks_____

```
              Actual       Maximum          LOS F?
  v_FO        2892         9000             No

  v_R12       1705         4600             No
```

_____Level of Service Determination (if not F)_____

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

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

_____Speed Estimation_____

Intermediate speed variable, M_S = 0.261

Space mean speed in ramp influence area, S_R = 51.6   mph

Space mean speed in outer lanes, S_O = 54.7   mph

Space mean speed for all vehicles, S = 52.8   mph

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp W of Livernois
Jurisdiction:
Analysis Year: 2035 (PA02)
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   2443   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   172   vph
Length of first accel/decel lane   647   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)	2443	172		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	643	45		v
Trucks and buses	25	9		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	5.00 %		%
Length	0.00 mi	0.07 mi		mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	2.5		

```
Heavy vehicle adjustment, fHV          0.889     0.957
Driver population factor, fP           1.00      1.00
Flow rate, vp                          2893      189                pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = \quad 1368 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2893	9000	No
v_{12}	1368	4400	No
$v_{FO} = v_F - v_R$	2704	9000	No
v_R	189	2000	No

_____Level of Service Determination (if not F)_____

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = \quad 10.2 \quad pc/mi/ln$

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

_____Speed Estimation_____

```
Intermediate speed variable,            D  = 0.445
                                         S
Space mean speed in ramp influence area, S  = 49.2    mph
                                          R
Space mean speed in outer lanes,        S  = 60.3    mph
                                         O
Space mean speed for all vehicles,      S  = 54.5    mph
```

HCS+: Ramps and Ramp Junctions Release 5.2

```
Phone:                                    Fax:
E-mail:
```

_____Merge Analysis_____

```
Analyst:                 CH
Agency/Co.:              PARSONS
Date performed:          8/23/2007
Analysis time period:    Midday Peak
Freeway/Dir of Travel:   I-75 SB
Junction:                Entrance Ramp W of Springwells
Jurisdiction:
Analysis Year:           2035 (PA02)
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                        2765          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                           405           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)	2765	405		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	728	107		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                          3274        473                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad\qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.277 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = \quad 905 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v_{FO}	3747	9000	No
v_{R12}	1378	4600	No

_____Level of Service Determination (if not F)_____

Density, $D = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A = 13.7$ pc/mi/ln

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

_____Speed Estimation_____

Intermediate speed variable, $M_S = 0.311$

Space mean speed in ramp influence area, $S_R = 51.0$ mph

Space mean speed in outer lanes, $S_O = 52.5$ mph

Space mean speed for all vehicles, $S = 51.9$ mph

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Dearborn
Jurisdiction:
Analysis Year: 2035 (PA02)
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   3169   vph

_____On Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-flow speed on ramp   35.0   mph
Volume on ramp   42   vph
Length of first accel/decel lane   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)	3169	42		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	834	11		v
Trucks and buses	25	24		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV          0.889      0.893
Driver population factor, fP           1.00       1.00
Flow rate, vp                          3753       50                        pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.339 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = \quad 1272 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v_{FO}	3803	9000	No
v_{R12}	1322	4600	No

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = \quad 13.3 \quad pc/mi/ln$$

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

_____Speed Estimation_____

Intermediate speed variable, M_S = 0.308

Space mean speed in ramp influence area, S_R = 51.0   mph

Space mean speed in outer lanes, S_O = 52.3   mph

Space mean speed for all vehicles, S = 51.9   mph

_____

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Service Dr Ent Ramp E of Grand
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Merge
Number of lanes in freeway   4
Free-flow speed on freeway   55.0   mph
Volume on freeway   6041   vph

_____On Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-flow speed on ramp   35.0   mph
Volume on ramp   469   vph
Length of first accel/decel lane   590   ft
Length of second accel/decel lane   ft

_____Adjacent Ramp Data (if one exists)_____

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

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6041	469		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1590	123		v
Trucks and buses	9	21		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade		%	%	%
Length		mi	mi	mi
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV                0.957        0.905
Driver population factor, fP                 1.00         1.00
Flow rate, vp                                6645         546                          pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.338 \quad \text{Using Equation } 4$$

$$v_{12} = v_F(P_{FM}) = 2243 \quad pc/h$$

_____Capacity Checks_____

```
                    Actual          Maximum         LOS F?
v                   7191            9000            No
 FO
v                   2789            4600            No
 R12
```

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734 \, v_R + 0.0078 \, v_{12} - 0.00627 \, L_A = 23.3 \quad pc/mi/ln$$

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

_____Speed Estimation_____

```
Intermediate speed variable,         M  = 0.343
                                      S
Space mean speed in ramp influence area,  S  = 50.5    mph
                                           R
Space mean speed in outer lanes,     S  = 48.9    mph
                                      0
Space mean speed for all vehicles,   S  = 49.5    mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp E of Clark
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Freeway Data_____

Type of analysis   Diverge
Number of lanes in freeway   4
Free-flow speed on freeway   55.0   mph
Volume on freeway   6512   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-Flow speed on ramp   35.0   mph
Volume on ramp   284   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)	6512	284		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1714	75		v
Trucks and buses	10	10		%
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       0.952
Driver population factor, fP                     1.00        1.00
Flow rate, vp                                    7197        314                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation } 8$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 3315 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7197	9000	No
v_{12}	3315	4400	No
$v_{FO} = v_F - v_R$	6883	9000	No
v_R	314	2000	No

_____Level of Service Determination (if not F)_____

$$\text{Density,} \quad D = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 31.5 \quad pc/mi/ln$$

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

_____Speed Estimation_____

```
Intermediate speed variable,             DS  = 0.456

Space mean speed in ramp influence area, SR  = 49.1    mph

Space mean speed in outer lanes,         S0  = 56.7    mph

Space mean speed for all vehicles,       S   = 52.9    mph
```

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Plaza Exit Ramp E of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   6228   vph

_____Off Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   2
Free-Flow speed on ramp   45.0   mph
Volume on ramp   937   vph
Length of first accel/decel lane   1963   ft
Length of second accel/decel lane   0   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)	6228	937		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1639	247		v
Trucks and buses	10	16		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	0.00 %	1.22 %	%	
Length	0.00 mi	0.46 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      0.926
Driver population factor, fP               1.00       1.00
Flow rate, vp                              6884       1065                 pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = 0.260 \quad \text{Using Equation} \quad 0$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 2578 \quad \text{pc/h}$$

_____Capacity Checks_____

```
                        Actual        Maximum        LOS F?
v   = v                 6884          9000           No
 Fi    F
v                       2578          4400           No
 12
v   = v - v             5819          9000           No
 FO    F   R
v                       1065          4100           No
 R
```

_____Level of Service Determination (if not F)_____

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = -8.9$ pc/mi/ln

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.394$

Space mean speed in ramp influence area, $S_R = 49.9$ mph

Space mean speed in outer lanes, $S_0 = 55.8$ mph

Space mean speed for all vehicles, $S = 53.4$ mph

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Ent. Ramp W of Junction
Jurisdiction:
Analysis Year: 2035 (PA02)
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   5292   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   296   vph
Length of first accel/decel lane   1164   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)	5292	296		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1393	78		v
Trucks and buses	9	0		%
Recreational vehicles	0	0		%
Terrain type:	Level	Grade		
Grade	%	-4.00 %	%	
Length	mi	0.04 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	5821	312	pcph

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.550 \quad \text{Using Equation } 4$$

$$v_{12} = v_F(P_{FM}) = 3199 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
v_{FO}	6133	9000	No
v_{R12}	3511	4600	No

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 25.4 \quad pc/mi/ln$$

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

_____Speed Estimation_____

Intermediate speed variable,	M_S = 0.370	
Space mean speed in ramp influence area,	S_R = 50.2	mph
Space mean speed in outer lanes,	S_0 = 52.1	mph
Space mean speed for all vehicles,	S = 51.0	mph

_____

Phone: Fax:
E-mail:

_____Diverge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Exit Ramp W of Livernois
Jurisdiction:
Analysis Year: 2035 (PA02)
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   5588   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   177   vph
Length of first accel/decel lane   647   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)	5588	177	vph
Peak-hour factor, PHF	0.95	0.95	
Peak 15-min volume, v15	1471	47	v
Trucks and buses	9	23	%
Recreational vehicles	0	0	%
Terrain type:	Level	Grade	
Grade	0.00 %	5.00 %	%
Length	0.00 mi	0.07 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	2.5	

```
Heavy vehicle adjustment, fHV          0.957       0.897
Driver population factor, fP           1.00        1.00
Flow rate, vp                          6147        208                    pcph
```

_____Estimation of V12 Diverge Areas_____

$$L_{EQ} = \quad \text{(Equation 25-8 or 25-9)}$$

$$P_{FD} = \quad 0.436 \quad \text{Using Equation} \quad 8$$

$$v_{12} = v_R + (v_F - v_R)\, P_{FD} = 2797 \quad pc/h$$

_____Capacity Checks_____

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6147	9000	No
v_{12}	2797	4400	No
$v_{FO} = v_F - v_R$	5939	9000	No
v_R	208	2000	No

_____Level of Service Determination (if not F)_____

Density, $D = 4.252 + 0.0086\, v_{12} - 0.009\, L_D = 22.5 \quad pc/mi/ln$

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

_____Speed Estimation_____

Intermediate speed variable, $D_S = 0.447$

Space mean speed in ramp influence area, $S_R = 49.2 \quad mph$

Space mean speed in outer lanes, $S_0 = 57.7 \quad mph$

Space mean speed for all vehicles, $S = 53.5 \quad mph$

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Springwells
Jurisdiction:
Analysis Year: 2035 (PA02)
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   5900   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   346   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)	5900	346		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1553	91		v
Trucks and buses	12	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          0.943        0.926
Driver population factor, fP           1.00         1.00
Flow rate, vp                          6583         393                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = 0.287 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = 1886 \quad pc/h$$

_____Capacity Checks_____

```
                 Actual        Maximum         LOS F?
   v             6976          9000            No
    FO
   v             2279          4600            No
    R12
```

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 20.8 \quad pc/mi/ln$$

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

_____Speed Estimation_____

```
Intermediate speed variable,        M  = 0.333
                                     S
Space mean speed in ramp influence area,   S  = 50.7    mph
                                            R
Space mean speed in outer lanes,    S  = 48.2    mph
                                     0
Space mean speed for all vehicles,  S  = 49.0    mph
```

Phone: Fax:
E-mail:

_____Merge Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date performed: 8/23/2007
Analysis time period: PM Peak
Freeway/Dir of Travel: I-75 SB
Junction: Entrance Ramp W of Dearborn
Jurisdiction:
Analysis Year: 2035 (PA02)
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   6247   vph

_____On Ramp Data_____

Side of freeway   Right
Number of lanes in ramp   1
Free-flow speed on ramp   35.0   mph
Volume on ramp   82   vph
Length of first accel/decel lane   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)	6247	82		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1644	22		v
Trucks and buses	12	4		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		

```
Heavy vehicle adjustment, fHV          0.943       0.980
Driver population factor, fP           1.00        1.00
Flow rate, vp                          6970        88                    pcph
```

_____Estimation of V12 Merge Areas_____

$$L_{EQ} = \qquad \text{(Equation 25-2 or 25-3)}$$

$$P_{FM} = \quad 0.334 \quad \text{Using Equation } 4$$

$$v_{12} = v_F (P_{FM}) = 2330 \quad pc/h$$

_____Capacity Checks_____

```
                    Actual        Maximum         LOS F?
        v           7058          9000            No
         FO
        v           2418          4600            No
         R12
```

_____Level of Service Determination (if not F)_____

$$\text{Density, } D = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 21.8 \quad pc/mi/ln$$

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

_____Speed Estimation_____

```
Intermediate speed variable,           M  = 0.337
                                        S
Space mean speed in ramp influence area, S = 50.6    mph
                                          R
Space mean speed in outer lanes,       S  = 48.3     mph
                                        0
Space mean speed for all vehicles,     S  = 49.1     mph
```

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Livernois Ent/Junct. Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF   55   mph
Weaving number of lanes, N   5
Weaving segment length, L   975   ft
Terrain type   Level
    Grade   %
    Length   mi
Weaving type   A
Volume ratio, VR   0.09
Weaving ratio, R   0.32

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	4203	0	142	307	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1106	0	37	81	v
Trucks and buses	12	0	5	3	%
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	0.976	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4689	0	153	328	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	0.62	0.24
Weaving and non-weaving speeds, Si	42.74	51.36
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7)   0.92
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   50.42   mph
Weaving segment density, D   20.51   pc/mi/ln
Level of service, LOS   C
Capacity of base condition, cb   9335   pc/h
Capacity as a 15-minute flow rate, c 8807   pc/h
Capacity as a full-hour volume, ch   8367   pc/h

_____Limitations on Weaving Segments_____

| | | If Max Exceeded See Note | |
	Analyzed	Maximum	Note
Weaving flow rate, Vw	481	2800	a
Average flow rate (pcphpl)	1034	2250	b
Volume ratio, VR	0.09	0.20	c
Weaving ratio, R	0.32	N/A	d
Weaving length (ft)	975	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.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Clark Ent. to Grand Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
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   0.07
Weaving ratio, R   0.06

_____Conversion to pc/h Under Base Conditions_____

                              Non-Weaving   Weaving
                              V   V   V   V
                              A-C   B-D   A-D   B-C
Volume, V   5184   0   20   329   veh/h
Peak-hour factor, PHF   0.95   0.95   0.95   0.95
Peak 15-min volume, v15   1364   0   5   87   v
Trucks and buses   13   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 0.939   1.000   0.889   0.901
Driver population adjustment, fP 1.00   1.00   1.00   1.00
Flow rate, v   5811   0   23   384   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 0.58   0.23
Weaving and non-weaving speeds, Si 43.55   51.70
Number of lanes required for

```
unconstrained operation, Nw (Exhibit 24-7)        0.79
Maximum number of lanes, Nw (max) (Exhibit 24-7)  1.40
Type of operation is                              Unconstrained
```

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

```
Weaving segment speed, S            51.07  mph
Weaving segment density, D          24.35  pc/mi/ln
Level of service, LOS               C
Capacity of base condition, cb      9641   pc/h
Capacity as a 15-minute flow rate, c 9053  pc/h
Capacity as a full-hour volume, ch  8600   pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	407	2800	a
Average flow rate (pcphpl)	1243	2250	b
Volume ratio, VR	0.07	0.20	c
Weaving ratio, R	0.06	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: 8/23/2007
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Livernois Ent/Junct. Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF   55   mph
Weaving number of lanes, N   5
Weaving segment length, L   975   ft
Terrain type   Level
    Grade   %
    Length   mi
Weaving type   A
Volume ratio, VR   0.08
Weaving ratio, R   0.32

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	1719	0	51	111	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	452	0	13	29	v
Trucks and buses	25	0	18	10	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.917	0.952	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2035	0	58	122	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	0.27	0.08
Weaving and non-weaving speeds, Si	50.52	56.84
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)          0.79
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              56.27   mph
Weaving segment density, D            7.87    pc/mi/ln
Level of service, LOS                 A
Capacity of base condition, cb        9335    pc/h
Capacity as a 15-minute flow rate, c  8298    pc/h
Capacity as a full-hour volume, ch    7883    pc/h
```

_____Limitations on Weaving Segments_____

		If Max Exceeded See Note	
	Analyzed	Maximum	Note
Weaving flow rate, Vw	180	2800	a
Average flow rate (pcphpl)	443	2250	b
Volume ratio, VR	0.08	0.20	c
Weaving ratio, R	0.32	N/A	d
Weaving length (ft)	975	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: 8/23/2007
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Clark Ent. to Grand Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
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   0.27
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	1740	0	244	395	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	458	0	64	104	v
Trucks and buses	25	0	25	23	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.889	0.897	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2060	0	288	463	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	0.91	0.09
Weaving and non-weaving speeds, Si	38.54	56.20
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)          1.71
Maximum number of lanes, Nw (max) (Exhibit 24-7)    1.40
Type of operation is                                Constrained
```

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

```
Weaving segment speed, S                50.07   mph
Weaving segment density, D              11.23   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 See Note Maximum	Note
Weaving flow rate, Vw	751	2800	a
Average flow rate (pcphpl)	562	2250	b
Volume ratio, VR	0.27	0.20	c
Weaving ratio, R	0.38	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: 8/23/2007
Analysis Time Period: PM Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Livernois Ent/Junct. Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF   55   mph
Weaving number of lanes, N   5
Weaving segment length, L   975   ft
Terrain type   Level
    Grade   %
    Length   mi
Weaving type   A
Volume ratio, VR   0.08
Weaving ratio, R   0.31

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2085	0	61	133	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	549	0	16	35	v
Trucks and buses	18	0	15	17	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.917	1.000	0.930	0.922	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2392	0	69	151	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	0.32	0.09
Weaving and non-weaving speeds, Si	49.21	56.11
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)          0.82
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                 55.45   mph
Weaving segment density, D                9.42   pc/mi/ln
Level of service, LOS                     A
Capacity of base condition, cb           9335    pc/h
Capacity as a 15-minute flow rate, c     8564    pc/h
Capacity as a full-hour volume, ch       8136    pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	220	2800	a
Average flow rate (pcphpl)	522	2250	b
Volume ratio, VR	0.08	0.20	c
Weaving ratio, R	0.31	N/A	d
Weaving length (ft)	975	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.

Phone: Fax:
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_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: PM Peak
Freeway/Dir of Travel: I-75 NB
Weaving Location: From Clark Ent. to Grand Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
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	0.23		

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2136	0	204	709	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	562	0	54	187	v
Trucks and buses	18	0	25	13	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.917	1.000	0.889	0.939	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2450	0	241	794	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	1.18	0.13
Weaving and non-weaving speeds, Si	35.62	54.69
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                47.19  mph
Weaving segment density, D              14.77  pc/mi/ln
Level of service, LOS                   B
Capacity of base condition, cb          9061   pc/h
Capacity as a 15-minute flow rate, c    8313   pc/h
Capacity as a full-hour volume, ch      7897   pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	1035	2800	a
Average flow rate (pcphpl)	697	2250	b
Volume ratio, VR	0.30	0.20	c
Weaving ratio, R	0.23	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: 8/23/2007
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Amb. Ent. to Clark Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
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   0.20
Weaving ratio, R   0.17

_____Conversion to pc/h Under Base Conditions_____

| | Non-Weaving | | Weaving | | |
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2692	0	602	120	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	708	0	158	32	v
Trucks and buses	17	0	1	4	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.922	1.000	0.995	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3074	0	636	128	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	1.05	0.11
Weaving and non-weaving speeds, Si	36.96	55.67
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)          1.48
Maximum number of lanes, Nw (max) (Exhibit 24-7)    1.40
Type of operation is                                Constrained
```

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

```
Weaving segment speed, S                50.57  mph
Weaving segment density, D              15.18  pc/mi/ln
Level of service, LOS                   B
Capacity of base condition, cb          9134   pc/h
Capacity as a 15-minute flow rate, c    8418   pc/h
Capacity as a full-hour volume, ch      7997   pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	764	2800	a
Average flow rate (pcphpl)	767	2250	b
Volume ratio, VR	0.20	0.20	c
Weaving ratio, R	0.17	N/A	d
Weaving length (ft)	1316	2500	e

Notes:
a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: AM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Junct. Ent. to Liver.Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1100	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.15	
Weaving ratio, R	0.09	

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	2218	0	378	34	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	584	0	99	9	v
Trucks and buses	17	0	0	12	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.922	1.000	1.000	0.943	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2533	0	397	37	pc/h

_____Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.37	0.13
Weaving and non-weaving speeds, Si	47.94	54.91
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)        1.17
Maximum number of lanes, Nw (max) (Exhibit 24-7)  1.40
Type of operation is                              Unconstrained
```

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

```
Weaving segment speed, S          53.77  mph
Weaving segment density, D        11.04  pc/mi/ln
Level of service, LOS             B
Capacity of base condition, cb    9216   pc/h
Capacity as a 15-minute flow rate, c  8494   pc/h
Capacity as a full-hour volume, ch    8069   pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	434	2800	a
Average flow rate (pcphpl)	593	2250	b
Volume ratio, VR	0.15	0.20	c
Weaving ratio, R	0.09	N/A	d
Weaving length (ft)	1100	2500	e

Notes:

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Amb. Ent. to Clark Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
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   0.12
Weaving ratio, R   0.23

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2702	0	298	89	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	711	0	78	23	v
Trucks and buses	25	0	6	7	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.889	1.000	0.971	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3199	0	323	96	pc/h

_____Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.36	0.13
Weaving and non-weaving speeds, Si	48.03	54.84
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)              1.06
Maximum number of lanes, Nw (max) (Exhibit 24-7)        1.40
Type of operation is                                    Unconstrained
```

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

```
Weaving segment speed, S              53.95  mph
Weaving segment density, D            13.41  pc/mi/ln
Level of service, LOS                 B
Capacity of base condition, cb        9617   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	See Note
		Maximum	Note
Weaving flow rate, Vw	419	2800	a
Average flow rate (pcphpl)	723	2250	b
Volume ratio, VR	0.12	0.20	c
Weaving ratio, R	0.23	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.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: Midday Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Junct. Ent. to Liver.Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF   55   mph
Weaving number of lanes, N   5
Weaving segment length, L   1100   ft
Terrain type   Level
    Grade   %
    Length   mi
Weaving type   A
Volume ratio, VR   0.08
Weaving ratio, R   0.22

_____Conversion to pc/h Under Base Conditions_____

| | Non-Weaving | | Weaving | | |
	V A-C	V B-D	V A-D	V B-C	
Volume, V	2225	0	172	48	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	586	0	45	13	v
Trucks and buses	25	0	9	17	%
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	0.957	0.922	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2634	0	189	54	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	0.31	0.10
Weaving and non-weaving speeds, Si	49.23	55.98
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)        0.84
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              55.34  mph
Weaving segment density, D            10.40  pc/mi/ln
Level of service, LOS                 B
Capacity of base condition, cb        9484   pc/h
Capacity as a 15-minute flow rate, c  8430   pc/h
Capacity as a full-hour volume, ch    8008   pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	243	2800	a
Average flow rate (pcphpl)	575	2250	b
Volume ratio, VR	0.08	0.20	c
Weaving ratio, R	0.22	N/A	d
Weaving length (ft)	1100	2500	e

Notes:

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: PM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Amb. Ent. to Clark Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF	55		mph
Weaving number of lanes, N	5		
Weaving segment length, L	1316		ft
Terrain type	Level		
Grade			%
Length			mi
Weaving type	A		
Volume ratio, VR	0.14		
Weaving ratio, R	0.32		

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	A-C	B-D	A-D	B-C	
Volume, V	5648	0	284	580	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1486	0	75	153	v
Trucks and buses	9	0	10	22	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	1.000	0.952	0.901	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6212	0	313	677	pc/h

_____Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.00
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.74	0.34
Weaving and non-weaving speeds, Si	40.91	48.52
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)          1.26
Maximum number of lanes, Nw (max) (Exhibit 24-7)    1.40
Type of operation is                                Unconstrained
```

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

```
Weaving segment speed, S                  47.31   mph
Weaving segment density, D                30.44   pc/mi/ln
Level of service, LOS                     D
Capacity of base condition, cb            9491    pc/h
Capacity as a 15-minute flow rate, c      9082    pc/h
Capacity as a full-hour volume, ch        8628    pc/h
```

_____Limitations on Weaving Segments_____

		If Max Exceeded See Note	
	Analyzed	Maximum	Note
Weaving flow rate, Vw	990	2800	a
Average flow rate (pcphpl)	1440	2250	b
Volume ratio, VR	0.14	0.20	c
Weaving ratio, R	0.32	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.

Phone: Fax:
E-mail:

_____Operational Analysis_____

Analyst: CH
Agency/Co.:   PARSONS
Date Performed: 8/23/2007
Analysis Time Period: PM Peak
Freeway/Dir of Travel: I-75 SB
Weaving Location: From Junct. Ent. to Liver.Exit
Jurisdiction:
Analysis Year: 2035 (PA02)
Description: Detroit River International Crossing Project

_____Inputs_____

Freeway free-flow speed, SFF	55	mph
Weaving number of lanes, N	5	
Weaving segment length, L	1100	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	A	
Volume ratio, VR	0.08	
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	5114	0	177	296	veh/h
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1346	0	47	78	v
Trucks and buses	9	0	23	0	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.957	1.000	0.897	1.000	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5625	0	207	311	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	0.66	0.26
Weaving and non-weaving speeds, Si	42.17	50.63
Number of lanes required for		

```
unconstrained operation, Nw (Exhibit 24-7)        0.90
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                49.79  mph
Weaving segment density, D              24.68  pc/mi/ln
Level of service, LOS                   C
Capacity of base condition, cb          9484   pc/h
Capacity as a 15-minute flow rate, c    9076   pc/h
Capacity as a full-hour volume, ch      8622   pc/h
```

_____Limitations on Weaving Segments_____

	Analyzed	If Max Exceeded See Note Maximum	Note
Weaving flow rate, Vw	518	2800	a
Average flow rate (pcphpl)	1228	2250	b
Volume ratio, VR	0.08	0.20	c
Weaving ratio, R	0.40	N/A	d
Weaving length (ft)	1100	2500	e

Notes:

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".

b. Capacity constrained by basic freeway capacity.

c. Capacity occurs under constrained operating conditions.

d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.

e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.

f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).

g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.

h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.

i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.