

**TECHNICAL  
MEMORANDUM  
APPENDIX**

**ADDITIONAL TRAFFIC ANALYSIS  
FOR POINT MOLATE  
CASINO/RESORT**  
In the City of Richmond

**Prepared for:**

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Analytical Environmental Services  
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**Prepared by:**

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Walnut Creek, CA 94596  
Tel: 925.945.0201

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1696	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	461	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	945	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	945	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.5	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1696	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	461	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	945	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	945	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1682	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	457	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	937	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	937	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.4	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1209	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	329	v
Trucks and buses	5	%
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	0.976	
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	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	673	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.4	pc/mi/ln



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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2079	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	565	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1158	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1158	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2454	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	667	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1367	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1367	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.0	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1424	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	387	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	793	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	793	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1559	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	424	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	868	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	868	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.4	pc/mi/ln

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

Phone: Fax:  
E-mail:

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Operational Analysis  
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Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: SAT  
Freeway/Direction: SR-4 EB  
From/To: Willow Ave to Sycamore Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing  
Description: Point Molate Analysis

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Flow Inputs and Adjustments  
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Volume, V	1559	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	424	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	868	pc/h/ln

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Speed Inputs and Adjustments  
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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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LOS and Performance Measures  
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Flow rate, vp	868	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1841	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	500	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1026	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1026	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1068	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	290	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	595	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	595	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	9.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1718	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	467	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	957	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	957	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.7	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

---

 Flow Inputs and Adjustments
 

---

Volume, V	1718	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	467	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	957	pc/h/ln

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 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

---

Flow rate, vp	957	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1724	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	468	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	960	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	960	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1251	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	340	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	697	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	697	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.7	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	2151	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	585	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1198	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1198	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2151	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	585	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1198	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1198	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2529	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	687	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1409	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1409	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.7	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1499	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	407	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	835	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	835	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

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Operational Analysis  
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Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: SAT  
Freeway/Direction: SR-4 EB  
From/To: I-80 Ramps to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltA  
Description: Point Molate Analysis

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Flow Inputs and Adjustments  
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Volume, V	1661	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	451	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	925	pc/h/ln

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Speed Inputs and Adjustments  
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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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LOS and Performance Measures  
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Flow rate, vp	925	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.2	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1661	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	451	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	925	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	925	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.2	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1939	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	527	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1080	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1080	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1166	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	317	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	650	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	650	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.0	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: AM  
Freeway/Direction: SR-4 EB  
From/To: I-80 Ramps to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltB  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1732	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	471	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	965	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	965	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1732	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	471	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	965	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	965	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: AM  
Freeway/Direction: SR-4 WB  
From/To: Sycamore Ave to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltB  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1727	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	469	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	962	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	962	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: AM  
Freeway/Direction: SR-4 WB Connector  
From/To: Willow Ave on to I-80 Ramps  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltB  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1254	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	341	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	699	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	699	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2158	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	586	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1202	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1202	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

---

 Flow Inputs and Adjustments
 

---

Volume, V	2158	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	586	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1202	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1202	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.5	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2542	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	691	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1416	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1416	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1512	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	411	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	842	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

---

Flow rate, vp	842	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.0	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1669	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	454	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	930	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	930	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.3	pc/mi/ln



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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: SAT  
Freeway/Direction: SR-4 WB  
From/To: Sycamore Ave to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltB  
Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1949	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	530	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1086	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1086	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.7	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1176	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	320	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	655	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	655	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.1	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: AM  
Freeway/Direction: SR-4 EB  
From/To: I-80 Ramps to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltC  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1710	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	465	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	953	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	953	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.7	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1732	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	471	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	965	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	965	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: AM  
Freeway/Direction: SR-4 WB  
From/To: Sycamore Ave to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltC  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1710	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	465	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	953	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	953	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1237	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	336	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	689	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	689	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2123	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	577	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1183	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1183	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2123	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	577	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1183	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1183	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: PM  
Freeway/Direction: SR-4 WB  
From/To: Sycamore Ave to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltC  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2503	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	680	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1394	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1394	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1473	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	400	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	821	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	821	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1627	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	442	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	906	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	906	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.9	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: SAT  
Freeway/Direction: SR-4 EB  
From/To: Willow Ave to Sycamore Ave  
Jurisdiction: City of Hercules  
Analysis Year: Existing AltC  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1627	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	442	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	906	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	906	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.9	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1901	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	517	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1059	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1059	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.3	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltC  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1128	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	307	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	628	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	628	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	9.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1744	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	474	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	972	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	972	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.0	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1744	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	474	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	972	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	972	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.0	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis  
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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments  
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Volume, V	1708	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	464	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	951	pc/h/ln

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 Speed Inputs and Adjustments  
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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures  
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Flow rate, vp	951	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1235	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	336	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	688	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	688	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.6	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2113	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	574	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1177	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1177	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.1	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2113	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	574	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1177	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1177	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.1	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2509	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	682	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1398	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1398	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	21.5	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1479	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	402	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	824	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	824	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	12.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1604	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	436	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	894	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	894	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1604	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	436	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	894	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	894	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.8	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1905	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	518	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1061	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1061	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.3	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave on to I-80 Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Existing AltD  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1132	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	308	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	631	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	631	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	9.7	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 52.40 mph  
 Weaving segment density, D 18.93 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5715 pc/h  
 Capacity as a 15-minute flow rate, c 5576 pc/h  
 Capacity as a full-hour volume, ch 5130 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.16

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	386	33	257	50	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1580	137	1053	206	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.56	0.41
Weaving and non-weaving speeds, Si	50.29	54.06
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1259	3500	a
Average flow rate (pcphpl)	992	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.16	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1888	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	513	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1052	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1052	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1780	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	484	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	992	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	992	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.3	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1296	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	352	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	722	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	722	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.1	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 49.59 mph  
 Weaving segment density, D 24.72 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5685 pc/h  
 Capacity as a 15-minute flow rate, c 5546 pc/h  
 Capacity as a full-hour volume, ch 5102 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	457	54	305	82	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1873	222	1248	335	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.67	0.53
Weaving and non-weaving speeds, Si	47.94	50.91
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1583	3500	a
Average flow rate (pcphpl)	1226	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2202	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	598	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1227	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1227	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.9	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2590	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	704	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1443	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1443	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1534	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	417	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	855	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	855	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.2	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 52.97 mph  
 Weaving segment density, D 17.36 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5685 pc/h  
 Capacity as a 15-minute flow rate, c 5546 pc/h  
 Capacity as a full-hour volume, ch 5102 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1261	150	841	226	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	343	41	229	61	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	
	1404	167	936	251	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.53	0.39
Weaving and non-weaving speeds, Si	50.91	54.65
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1187	3500	a
Average flow rate (pcphpl)	919	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1652	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	449	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	920	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	920	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1943	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	528	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1082	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1082	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1151	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	313	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	641	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	641	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	9.9	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 52.44 mph  
 Weaving segment density, D 19.08 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5730 pc/h  
 Capacity as a 15-minute flow rate, c 5590 pc/h  
 Capacity as a full-hour volume, ch 5143 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.16

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	392	33	257	50	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1605	137	1053	206	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.56	0.41
Weaving and non-weaving speeds, Si	50.28	54.12
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1259	3500	a
Average flow rate (pcphpl)	1000	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.16	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1910	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	519	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1064	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1064	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1822	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	495	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1015	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1015	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1338	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	364	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	745	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	745	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.5	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 49.71 mph  
 Weaving segment density, D 25.21 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5723 pc/h  
 Capacity as a 15-minute flow rate, c 5583 pc/h  
 Capacity as a full-hour volume, ch 5136 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	477	54	305	82	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1954	222	1248	335	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.67	0.52
Weaving and non-weaving speeds, Si	47.91	51.10
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1583	3500	a
Average flow rate (pcphpl)	1253	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2274	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	618	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1267	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1267	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2665	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	724	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1485	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1485	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1609	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	437	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	896	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	896	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.8	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.78  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 53.18 mph  
 Weaving segment density, D 18.00 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5755 pc/h  
 Capacity as a 15-minute flow rate, c 5615 pc/h  
 Capacity as a full-hour volume, ch 5166 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.41  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	370	41	229	61	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1518	167	936	251	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.53	0.38
Weaving and non-weaving speeds, Si	50.85	54.95
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1187	3500	a
Average flow rate (pcphpl)	957	2350	b
Volume ratio, VR	0.41	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1754	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	477	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	977	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	977	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.0	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2041	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	555	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1137	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

 LOS and Performance Measures
 

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Flow rate, vp	1137	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltA  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1249	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	339	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	696	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	696	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.7	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 52.47 mph  
 Weaving segment density, D 19.17 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5739 pc/h  
 Capacity as a 15-minute flow rate, c 5599 pc/h  
 Capacity as a full-hour volume, ch 5151 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.16

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1455	123	946	185	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	395	33	257	50	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	
	1621	137	1053	206	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.56	0.40
Weaving and non-weaving speeds, Si	50.27	54.16
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1259	3500	a
Average flow rate (pcphpl)	1005	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.16	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1924	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	523	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1072	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1072	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.5	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1825	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	496	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1017	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1017	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1341	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	364	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	747	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	747	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.5	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 49.72 mph  
 Weaving segment density, D 25.25 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5727 pc/h  
 Capacity as a 15-minute flow rate, c 5587 pc/h  
 Capacity as a full-hour volume, ch 5140 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1761	200	1121	301	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	479	54	305	82	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	
	1961	222	1248	335	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.67	0.52
Weaving and non-weaving speeds, Si	47.91	51.12
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1583	3500	a
Average flow rate (pcphpl)	1255	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2281	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	620	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1271	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1271	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.6	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2678	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	728	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1492	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1492	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	23.0	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1622	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	441	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	904	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	904	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.9	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.78  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 53.19 mph  
 Weaving segment density, D 18.05 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5761 pc/h  
 Capacity as a 15-minute flow rate, c 5620 pc/h  
 Capacity as a full-hour volume, ch 5170 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.41  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	373	41	229	61	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1527	167	936	251	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.53	0.38
Weaving and non-weaving speeds, Si	50.84	54.97
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1187	3500	a
Average flow rate (pcphpl)	960	2350	b
Volume ratio, VR	0.41	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1762	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	479	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	982	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	982	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.1	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2051	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	557	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1143	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1143	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1259	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	342	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	701	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	701	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.8	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 52.42 mph  
 Weaving segment density, D 19.02 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5725 pc/h  
 Capacity as a 15-minute flow rate, c 5585 pc/h  
 Capacity as a full-hour volume, ch 5138 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.16

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	389	33	257	50	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1596	137	1053	206	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.56	0.41
Weaving and non-weaving speeds, Si	50.28	54.10
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1259	3500	a
Average flow rate (pcphpl)	997	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.16	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.



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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

---

 Flow Inputs and Adjustments
 

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Volume, V	1808	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	491	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1007	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1007	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

---

 Flow Inputs and Adjustments
 

---

Volume, V	1324	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	360	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	738	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

---

Flow rate, vp	738	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.4	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 49.66 mph  
 Weaving segment density, D 25.02 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5709 pc/h  
 Capacity as a 15-minute flow rate, c 5570 pc/h  
 Capacity as a full-hour volume, ch 5124 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	469	54	305	82	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1922	222	1248	335	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.67	0.53
Weaving and non-weaving speeds, Si	47.92	51.03
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1583	3500	a
Average flow rate (pcphpl)	1242	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2246	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	610	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1251	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1251	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	2639	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	717	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1470	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1470	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1583	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	430	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	882	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	882	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.6	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 53.11 mph  
 Weaving segment density, D 17.79 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5733 pc/h  
 Capacity as a 15-minute flow rate, c 5593 pc/h  
 Capacity as a full-hour volume, ch 5146 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	361	41	229	61	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1480	167	936	251	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.53	0.38
Weaving and non-weaving speeds, Si	50.87	54.85
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1187	3500	a
Average flow rate (pcphpl)	944	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1720	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	467	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	958	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	958	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: SAT  
Freeway/Direction: SR-4 WB  
From/To: Sycamore Ave to Willow Ave  
Jurisdiction: City of Hercules  
Analysis Year: Background AltC  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2003	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	544	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1116	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1116	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1211	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	329	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	675	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	675	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.4	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 52.49 mph  
 Weaving segment density, D 19.24 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5746 pc/h  
 Capacity as a 15-minute flow rate, c 5606 pc/h  
 Capacity as a full-hour volume, ch 5158 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.16

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1467	123	946	185	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	399	33	257	50	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	pc/h
	1634	137	1053	206	

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.56	0.40
Weaving and non-weaving speeds, Si	50.26	54.19
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1259	3500	a
Average flow rate (pcphpl)	1010	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.16	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1936	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	526	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1078	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1078	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	16.6	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1806	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	491	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1006	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1006	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: AM  
Freeway/Direction: SR-4 WB Connector  
From/To: Willow Ave to I-80 On-Ramps  
Jurisdiction: City of Hercules  
Analysis Year: Background AltD  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	1322	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	359	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	736	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	736	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.3	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 49.65 mph  
 Weaving segment density, D 24.95 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5703 pc/h  
 Capacity as a 15-minute flow rate, c 5564 pc/h  
 Capacity as a full-hour volume, ch 5119 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1716	200	1121	301	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	466	54	305	82	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	
	1911	222	1248	335	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.67	0.53
Weaving and non-weaving speeds, Si	47.93	51.00
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1583	3500	a
Average flow rate (pcphpl)	1238	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2236	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	608	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1246	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1246	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2645	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	719	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1473	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1473	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	22.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	1589	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	432	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	885	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	885	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.6	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 53.07 mph  
 Weaving segment density, D 17.64 pc/mi/ln  
 Level of service, LOS B  
 Capacity of base condition, cb 5717 pc/h  
 Capacity as a 15-minute flow rate, c 5578 pc/h  
 Capacity as a full-hour volume, ch 5132 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.21

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	355	41	229	61	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1455	167	936	251	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.53	0.38
Weaving and non-weaving speeds, Si	50.88	54.79
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1187	3500	a
Average flow rate (pcphpl)	936	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.21	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	1697	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	461	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	945	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	945	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.5	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2007	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	545	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1118	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1118	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.2	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Background AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1215	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	330	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	677	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	677	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.4	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 51.79 mph  
 Weaving segment density, D 20.42 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5729 pc/h  
 Capacity as a 15-minute flow rate, c 5589 pc/h  
 Capacity as a full-hour volume, ch 5142 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.14

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	419	30	279	46	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1717	124	1145	187	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.58	0.43
Weaving and non-weaving speeds, Si	49.70	53.41
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1332	3500	a
Average flow rate (pcphpl)	1057	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.14	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2150	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	584	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1198	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1198	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2290	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	622	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1276	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1276	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.6	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1340	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	364	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	746	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	746	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.5	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.83  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 44.95 mph  
 Weaving segment density, D 38.56 pc/mi/ln  
 Level of service, LOS E  
 Capacity of base condition, cb 5664 pc/h  
 Capacity as a 15-minute flow rate, c 5526 pc/h  
 Capacity as a full-hour volume, ch 5084 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.44  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	626	90	417	135	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2566	369	1711	554	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.89	0.79
Weaving and non-weaving speeds, Si	44.09	45.64
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	2265	3500	a
Average flow rate (pcphpl)	1733	2350	b
Volume ratio, VR	0.44	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	3020	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	821	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1682	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1682	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	26.0+	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2920	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	793	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1627	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1627	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	2	
Density, D	25.1	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2104	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	572	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1172	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1172	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.0+	pc/mi/ln

unconstrained operation, Nw (Exhibit 24-7) 1.81  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.65 mph  
 Weaving segment density, D 26.73 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5664 pc/h  
 Capacity as a 15-minute flow rate, c 5526 pc/h  
 Capacity as a full-hour volume, ch 5084 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.44  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	470	68	313	102	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1925	277	1283	416	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.71	0.58
Weaving and non-weaving speeds, Si	47.21	49.83
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1699	3500	a
Average flow rate (pcphpl)	1300	2350	b
Volume ratio, VR	0.44	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2265	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	615	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1262	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1262	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	2190	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	595	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1220	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

---

 LOS and Performance Measures
 

---

Flow rate, vp	1220	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.8	pc/mi/ln



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unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 51.83 mph  
 Weaving segment density, D 20.57 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5742 pc/h  
 Capacity as a 15-minute flow rate, c 5602 pc/h  
 Capacity as a full-hour volume, ch 5154 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.14

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	425	30	279	46	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1742	124	1145	187	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.59	0.43
Weaving and non-weaving speeds, Si	49.69	53.47
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1332	3500	a
Average flow rate (pcphpl)	1066	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.14	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2172	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	590	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1210	pc/h/ln

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 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1210	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.6	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2332	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	634	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1299	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1299	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln



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unconstrained operation, Nw (Exhibit 24-7) 1.82  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.04 mph  
 Weaving segment density, D 39.09 pc/mi/ln  
 Level of service, LOS E  
 Capacity of base condition, cb 5692 pc/h  
 Capacity as a 15-minute flow rate, c 5553 pc/h  
 Capacity as a full-hour volume, ch 5109 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	2376	332	1536	498	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	646	90	417	135	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2647	369	1711	554	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.89	0.79
Weaving and non-weaving speeds, Si	44.07	45.79
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	2265	3500	a
Average flow rate (pcphpl)	1760	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	3092	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	840	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1722	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1722	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	2	
Density, D	26.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2295	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	624	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1278	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1278	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.7	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2179	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	592	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1214	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1214	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.7	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.80 mph  
 Weaving segment density, D 27.42 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5715 pc/h  
 Capacity as a 15-minute flow rate, c 5576 pc/h  
 Capacity as a full-hour volume, ch 5130 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1830	249	1152	374	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	497	68	313	102	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	
	2038	277	1283	416	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.71	0.57
Weaving and non-weaving speeds, Si	47.17	50.08
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1699	3500	a
Average flow rate (pcphpl)	1338	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2367	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	643	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1319	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1319	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.3	pc/mi/ln



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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltA  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1676	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	455	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	934	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	934	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.4	pc/mi/ln

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unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 51.85 mph  
 Weaving segment density, D 20.66 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5751 pc/h  
 Capacity as a 15-minute flow rate, c 5611 pc/h  
 Capacity as a full-hour volume, ch 5162 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.41  
 Weaving ratio, R 0.14

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	429	30	279	46	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1758	124	1145	187	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.59	0.43
Weaving and non-weaving speeds, Si	49.68	53.51
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1332	3500	a
Average flow rate (pcphpl)	1071	2350	b
Volume ratio, VR	0.41	0.50	c
Weaving ratio, R	0.14	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2186	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	594	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1218	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1218	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2335	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	635	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1301	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1301	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1385	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	376	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	772	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	772	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.9	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.82  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.04 mph  
 Weaving segment density, D 39.13 pc/mi/ln  
 Level of service, LOS E  
 Capacity of base condition, cb 5694 pc/h  
 Capacity as a 15-minute flow rate, c 5555 pc/h  
 Capacity as a full-hour volume, ch 5111 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	2383	332	1536	498	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	648	90	417	135	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2654	369	1711	554	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.89	0.79
Weaving and non-weaving speeds, Si	44.07	45.80
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	2265	3500	a
Average flow rate (pcphpl)	1762	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	3099	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	842	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1726	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1726	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.4	mi/h
Number of lanes, N	2	
Density, D	26.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	3008	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	817	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1676	pc/h/ln

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 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1676	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.6	mi/h
Number of lanes, N	2	
Density, D	25.9	pc/mi/ln



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unconstrained operation, Nw (Exhibit 24-7) 1.80  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.82 mph  
 Weaving segment density, D 27.47 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5718 pc/h  
 Capacity as a 15-minute flow rate, c 5579 pc/h  
 Capacity as a full-hour volume, ch 5133 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	499	68	313	102	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2047	277	1283	416	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.71	0.57
Weaving and non-weaving speeds, Si	47.16	50.10
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1699	3500	a
Average flow rate (pcphpl)	1341	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2375	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	645	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1323	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1323	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.4	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2298	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	624	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1280	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1280	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.7	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltB  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1686	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	458	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	939	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	939	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.4	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 51.81 mph  
 Weaving segment density, D 20.52 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5737 pc/h  
 Capacity as a 15-minute flow rate, c 5597 pc/h  
 Capacity as a full-hour volume, ch 5149 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.42  
 Weaving ratio, R 0.14

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	423	30	279	46	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1733	124	1145	187	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.59	0.43
Weaving and non-weaving speeds, Si	49.70	53.45
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1332	3500	a
Average flow rate (pcphpl)	1063	2350	b
Volume ratio, VR	0.42	0.50	c
Weaving ratio, R	0.14	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2164	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	588	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1205	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1205	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.5	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2318	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	630	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1291	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1291	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.9	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1368	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	372	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	762	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	762	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.7	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.82  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.00 mph  
 Weaving segment density, D 38.88 pc/mi/ln  
 Level of service, LOS E  
 Capacity of base condition, cb 5681 pc/h  
 Capacity as a 15-minute flow rate, c 5542 pc/h  
 Capacity as a full-hour volume, ch 5099 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	2348	332	1536	498	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	638	90	417	135	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2615	369	1711	554	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.89	0.79
Weaving and non-weaving speeds, Si	44.08	45.73
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	2265	3500	a
Average flow rate (pcphpl)	1749	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	3064	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	833	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1707	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1707	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	26.5	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2969	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	807	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1654	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1654	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	25.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

---

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

---

Volume, V	2153	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	585	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1199	pc/h/ln

---

 Speed Inputs and Adjustments
 

---

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1199	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.4	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.81  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.75 mph  
 Weaving segment density, D 27.18 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5698 pc/h  
 Capacity as a 15-minute flow rate, c 5559 pc/h  
 Capacity as a full-hour volume, ch 5114 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	1796	249	1152	374	
Peak 15-min volume, v15	0.92	0.92	0.92	0.92	
Trucks and buses	488	68	313	102	v
Recreational vehicles	5	5	5	5	%
Trucks and buses PCE, ET	0	0	0	0	%
Recreational vehicle PCE, ER	1.5	1.5	1.5	1.5	
Heavy vehicle adjustment, fHV	1.2	1.2	1.2	1.2	
Driver population adjustment, fP	0.976	0.976	0.976	0.976	
Flow rate, v	1.00	1.00	1.00	1.00	
	2000	277	1283	416	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.71	0.57
Weaving and non-weaving speeds, Si	47.18	50.00
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1699	3500	a
Average flow rate (pcphpl)	1325	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
Agency or Company: Abrams Associates  
Date Performed: 11/20/2009  
Analysis Time Period: SAT  
Freeway/Direction: SR-4 EB  
From/To: Willow Ave to Sycamore Ave  
Jurisdiction: City of Hercules  
Analysis Year: Cumulative AltC  
Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2333	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	634	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1300	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1300	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2250	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	611	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1253	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1253	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.3	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltC  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1638	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	445	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	912	pc/h/ln

---

 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	912	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.0	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.79  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 51.87 mph  
 Weaving segment density, D 20.74 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5758 pc/h  
 Capacity as a 15-minute flow rate, c 5618 pc/h  
 Capacity as a full-hour volume, ch 5169 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.41  
 Weaving ratio, R 0.14

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	432	30	279	46	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1771	124	1145	187	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.59	0.43
Weaving and non-weaving speeds, Si	49.68	53.54
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1332	3500	a
Average flow rate (pcphpl)	1075	2350	b
Volume ratio, VR	0.41	0.50	c
Weaving ratio, R	0.14	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: Fax:  
E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

Flow Inputs and Adjustments

Volume, V	2198	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	597	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1224	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1224	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2316	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	629	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1290	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1290	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: AM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1336	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	363	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	744	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	744	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.4	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.82  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 44.99 mph  
 Weaving segment density, D 38.81 pc/mi/ln  
 Level of service, LOS E  
 Capacity of base condition, cb 5677 pc/h  
 Capacity as a 15-minute flow rate, c 5539 pc/h  
 Capacity as a full-hour volume, ch 5096 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C 2338	B-D 332	A-D 1536	B-C 498	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	635	90	417	135	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2604	369	1711	554	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.89	0.79
Weaving and non-weaving speeds, Si	44.08	45.71
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	2265	3500	a
Average flow rate (pcphpl)	1746	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	3054	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	830	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1701	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1701	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.5	mi/h
Number of lanes, N	2	
Density, D	26.4	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2975	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	808	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1657	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1657	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	2	
Density, D	25.6	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: PM  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2159	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	587	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1203	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1203	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	18.5	pc/mi/ln

HCS+: Freeway Weaving Release 5.21

unconstrained operation, Nw (Exhibit 24-7) 1.81  
 Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.00  
 Type of operation is Unconstrained

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.72 mph  
 Weaving segment density, D 27.03 pc/mi/ln  
 Level of service, LOS C  
 Capacity of base condition, cb 5687 pc/h  
 Capacity as a 15-minute flow rate, c 5548 pc/h  
 Capacity as a full-hour volume, ch 5104 pc/h

Phone: Fax:  
 E-mail:

Operational Analysis

Analyst: Steve Abrams  
 Agency/Co.: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Dir of Travel: SR-4 EB  
 Weaving Location: I-80 Ramps to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

Inputs

Freeway free-flow speed, SFF 65 mph  
 Weaving number of lanes, N 3  
 Weaving segment length, L 1500 ft  
 Terrain type Level  
 Grade %  
 Length mi  
 Weaving type C  
 Volume ratio, VR 0.43  
 Weaving ratio, R 0.24

Conversion to pc/h Under Base Conditions

	Non-Weaving		Weaving		
	V	V	V	V	
Volume, V	A-C	B-D	A-D	B-C	veh/h
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	
Peak 15-min volume, v15	482	68	313	102	v
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1975	277	1283	416	pc/h

Weaving and Non-Weaving Speeds

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.71	0.57
Weaving and non-weaving speeds, Si	47.19	49.94
Number of lanes required for		

Limitations on Weaving Segments

	Analyzed	If Max Exceeded	See Note
Weaving flow rate, Vw	1699	3500	a
Average flow rate (pcphpl)	1317	2350	b
Volume ratio, VR	0.43	0.50	c
Weaving ratio, R	0.24	0.40	d
Weaving length (ft)	1500	2500	e

Notes:

- Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- Capacity constrained by basic freeway capacity.
- Capacity occurs under constrained operating conditions.
- 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.
- 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.
- Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- 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.
- 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.
- 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.

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 EB  
 From/To: Willow Ave to Sycamore Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2310	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	628	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1287	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1287	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.8	pc/mi/ln

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

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-mail: \_\_\_\_\_

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB  
 From/To: Sycamore Ave to Willow Ave  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	2254	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	612	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1256	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	1256	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	19.3	pc/mi/ln

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

Phone: Fax:  
E-mail:

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 Operational Analysis
 

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Analyst: Steve Abrams  
 Agency or Company: Abrams Associates  
 Date Performed: 11/20/2009  
 Analysis Time Period: SAT  
 Freeway/Direction: SR-4 WB Connector  
 From/To: Willow Ave to I-80 On-Ramps  
 Jurisdiction: City of Hercules  
 Analysis Year: Cumulative AltD  
 Description: Point Molate Analysis

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 Flow Inputs and Adjustments
 

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Volume, V	1642	veh/h
Peak-hour factor, PHF	0.92	
Peak 15-min volume, v15	446	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	915	pc/h/ln

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 Speed Inputs and Adjustments
 

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Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	4.5	mi/h
Free-flow speed, FFS	65.0	mi/h
	Urban Freeway	

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 LOS and Performance Measures
 

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Flow rate, vp	915	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.1	pc/mi/ln