



# HIGHWAY CAPACITY SOFTWARE 2010

# HCS 2010



**SOLUTION SET**

## TWSC

### Example #1: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry    Duration: 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Major Street Direction: East-West											
Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage		
1	1	0	1	1	0	0	1	0	0	1	0
Shared			Shared			Shared			Shared		
Right Turn: Channelized			Right Turn: Channelized			Right Turn: Channelized			Right Turn: Channelized		
Flared Minor-Street Approach and Storage											
<input type="checkbox"/> Yes Storage			<input type="checkbox"/> Yes Storage			<input checked="" type="checkbox"/> Yes Storage 1			<input checked="" type="checkbox"/> Yes Storage 1		
Median Type											
Two Way Left Turn Lar			Median Storage 1			Undivided			Median Storage		
L      TR      L      TR			L      TR      L      TR			LTR      LTR			LTR      LTR		
Volume (vph), Increment 10											
45	755	40	35	430	30	15	5	10	15	5	35
Peak Hour Factor, PHF											
0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Peak-15 Minute Volume (v)											
12	205	11	10	117	8	4	1	3	4	1	10
Percent Heavy Vehicles (%)											
6			6			6	6	6	6	6	6
Percent Grade (%)											
						0			0		
Hourly Flow Rate (vph)											
48	820	43	38	467	32	16	5	10	16	5	38
Saturation Flow Rate (vph)											
1700	1700		1700	1700							
Percent Thrus Using Shared Lane (%)											
0			0								

PEDESTRIAN VOLUMES AND ADJUSTMENTS

Flow (ped/hr)	0	0	10	10
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	1	1

UPSTREAM SIGNAL DATA

	Eastbound	Westbound	Northbound	Southbound
Existing?	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Distance to Signal (ft)				
Progression Speed (mph)				
Cycle Length (sec)				
Left      Thru      Left      Thru      Left      Thru      Left      Thru				
Progressed Volume (vph)	34	730	18	423
Saturation Flow Rate per Lane (vph)	1700	1700	1700	1700
Arrival Type	3	3	3	3
Effective Green Time, g (sec)	10	40	15	35

## TWSC

### Example #1: Model Results

RESULTS											
Major Street						Minor Street					
Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)											
48			38			31			59		
Movement Capacity											
1027			750			227			424		
Shared Lane Capacity											
						188			286		
Movement v/c Ratio											
0.05			0.05			0.14			0.14		
95% Queue Length											
0.15			0.16			0.47			0.48		
Control Delay (sec/veh)											
8.7			10.1			26.7			19.3		
Movement Level of Service											
A			B			D			C		
Approach Delay (sec/veh)											
						26.7			19.3		
Approach Level of Service											
						D			C		

## TWSC

### Workshop #1: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry Duration 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Major Street Direction: East-West											
Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage		
0	2	1	1	2	0	1	0	1	0	0	0
Shared		Shared	Shared		Shared	Shared		Shared	Shared		Shared
Right Turn Channelized		Right Turn Channelized		Right Turn Channelized		Right Turn Channelized		Right Turn Channelized		Right Turn Channelized	
Flared Minor-Street Approach and Storage			Flared Minor-Street Approach and Storage			Flared Minor-Street Approach and Storage			Flared Minor-Street Approach and Storage		
<input type="checkbox"/> Yes Storage			<input type="checkbox"/> Yes Storage			<input type="checkbox"/> Yes Storage			<input type="checkbox"/> Yes Storage		
Median Type			Median Type			Median Type			Median Type		
Raised curb			Median Storage 1			Undivided			Median Storage		
T R L T						L R					
Volume (vph), Increment 10 % + -											
0	700	80	30	550	0	30	0	80	0	0	0
Peak Hour Factor, PHF											
1.00	0.90	0.90	0.90	0.90	1.00	0.90	1.00	0.90	1.00	1.00	1.00
Peak-15 Minute Volume (v)											
0	194	22	8	153	0	8	0	22	0	0	0
Percent Heavy Vehicles (%)											
0			9			9	0	9	0	0	0
Percent Grade (%)											
						0					
Hourly Flow Rate (vph)											
0	777	88	33	611	0	33	0	88	0	0	0
Saturation Flow Rate (vph)											
	1700	1700		1700	1700						
Percent Thrus Using Shared Lane (%)											
	0			0							

## TWSC

### Workshop #1: Model Results

RESULTS											
Major Street						Minor Street					
Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)			33			33			88		
Movement Capacity			731			294			637		
Shared Lane Capacity											
Movement v/c Ratio			0.05			0.11			0.14		
95% Queue Length			0.14			0.38			0.48		
Control Delay (sec/veh)			10.2			18.8			11.6		
Movement Level of Service			B			C			B		
Approach Delay (sec/veh)						13.5					
Approach Level of Service						B					

## TWSC

### Workshop #2: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry    Duration: 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right

Major Street Direction: East-West

Number of Lanes and Usage

0	2	0	1	2	0	0	0	0	0	0	0
Shared	Shared		Shared	Shared		Shared	Shared		Shared	Shared	
Right Turn	Channelized		Right Turn	Channelized		Right Turn	Channelized		Right Turn	Channelized	

Flared Minor-Street Approach and Storage

Median Type

Volume (vph), Increment 10

T	TR	L	T	LR							
0	970	5	45	15	0	35	0	0	0	0	0

Peak Hour Factor, PHF

Peak-15 Minute Volume (v)

Percent Heavy Vehicles (%)

Percent Grade (%)

Hourly Flow Rate (vph)

Saturation Flow Rate (vph)

Percent Thrus Using Shared Lane (%)

UPSTREAM SIGNAL DATA

	Eastbound	Westbound	Northbound	Southbound				
Existing?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes				
Distance to Signal (ft)	420	0						
Progression Speed (mph)	35	0						
Cycle Length (sec)	120	0						
	Left	Thru	Left	Thru	Left	Thru	Left	Thru
Progressed Volume (vph)	0	850	0	0				
Saturation Flow Rate per Lane (vph)	1700	1700	1700	1700				
Arrival Type	3	5	3	3				
Effective Green Time, g (sec)	0	45	0	0				

## TWSC

### Workshop #2: Model Results

RESULTS											
Major Street						Minor Street					
Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)			50			55					
Movement Capacity			732			420					
Shared Lane Capacity						420					
Movement v/c Ratio			0.07			0.13					
95% Queue Length			0.22			0.45					
Control Delay (sec/veh)			10.3			14.9					
Movement Level of Service			B			B					
Approach Delay (sec/veh)						14.9					
Approach Level of Service						B					

## TWSC

### Workshop #3: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry    Duration: 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right

Major Street Direction: East-West

Number of Lanes and Usage

0	1	1	0	1	0	1	0	1	0	0	0
Shared	Shared		Shared	Shared		Shared	Shared		Shared	Shared	
Right Turn	Channelized		Right Turn	Channelized		Right Turn	Channelized		Right Turn	Channelized	

Flared Minor-Street Approach and Storage

<input type="checkbox"/> Yes	Storage						
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Median Type

Raised curb	Median Storage	Undivided	Median Storage
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Volume (vph), Increment 10

T	R	LT	L	R
0	505	535	130	0
5	370	0	10	0

Peak Hour Factor, PHF

1.00	0.90	0.90	0.90	0.90	1.00	0.90	1.00	1.00	1.00	1.00
------	------	------	------	------	------	------	------	------	------	------

Peak-15 Minute Volume (v)

0	140	149	1	103	0	36	0	3	0	0	0
---	-----	-----	---	-----	---	----	---	---	---	---	---

Percent Heavy Vehicles (%)

0	0	0	2	0	0	2	0	2	0	0	0
---	---	---	---	---	---	---	---	---	---	---	---

Percent Grade (%)

0	0	0	0
---	---	---	---

Hourly Flow Rate (vph)

0	561	594	5	411	0	144	0	11	0	0	0
---	-----	-----	---	-----	---	-----	---	----	---	---	---

Saturation Flow Rate (vph)

1700	1700	1700	1700				
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Percent Thrus Using Shared Lane (%)

0	0		
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## TWSC

### Workshop #3: Model Results

RESULTS											
Major Street						Minor Street					
Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)			5			144			11		
Movement Capacity			1010			275			527		
Shared Lane Capacity											
Movement v/c Ratio			0.00			0.52			0.02		
95% Queue Length			0.01			2.81			0.06		
Control Delay (sec/veh)			8.6			31.6			12.0		
Movement Level of Service			A			D			B		
Approach Delay (sec/veh)						30.2					
Approach Level of Service						D					

## AWSC

### Example #2: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry

Duration  hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes and Usage											
<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>
Shared		Shared		Shared		Shared		Shared		Shared	
Volume (vph)											
<input type="text" value="75"/>	<input type="text" value="20"/>	<input type="text" value="40"/>	<input type="text" value="35"/>	<input type="text" value="85"/>	<input type="text" value="55"/>	<input type="text" value="65"/>	<input type="text" value="40"/>	<input type="text" value="15"/>	<input type="text" value="35"/>	<input type="text" value="20"/>	<input type="text" value="75"/>
Percent Thrus Using Left Lane, %											
<input type="text" value="50"/>			<input type="text" value="50"/>			<input type="text" value="50"/>			<input type="text" value="50"/>		
Lane 1		Lane 2		Lane 1		Lane 2		Lane 1		Lane 2	
LTR		LTR		LTR		LTR		LTR		LTR	
Peak Hour Factor, PHF											
<input type="text" value="0.94"/>		<input type="text" value="1.00"/>		<input type="text" value="0.94"/>		<input type="text" value="1.00"/>		<input type="text" value="0.94"/>		<input type="text" value="1.00"/>	
Percent Heavy Vehicles (%)											
<input type="text" value="5"/>		<input type="text" value="0"/>		<input type="text" value="5"/>		<input type="text" value="0"/>		<input type="text" value="3"/>		<input type="text" value="0"/>	
Hourly Flow Rate (vph)											
142			185			126			137		

## AWSC

### Example #2: Model Results

RESULTS				
Total Lane Flow Rate	142	185	126	137
Service Time	2.8	2.7	3.0	2.6
Degree of Utilization, $x$	0.19	0.24	0.17	0.18
Departure headway, $hd$	4.82	4.69	4.98	4.65
Capacity	392	435	376	387
Delay	8.95	9.17	9.03	8.64
Level of Service	A	A	A	A
	A	A	A	A
Intersection Delay	8.97		Intersection Level of Service	A

## AWSC

### Workshop #4A: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry

Duration  hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes and Usage											
<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="1"/>
Shared		Shared	Shared		Shared	Shared		Shared	Shared		Shared
Volume (vph)											
<input type="text" value="250"/>	<input type="text" value="135"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="115"/>	<input type="text" value="120"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="60"/>	<input type="text" value="0"/>	<input type="text" value="175"/>
Percent Thrus Using Left Lane, %											
<input type="text" value="50"/>			<input type="text" value="50"/>			<input type="text" value="50"/>			<input type="text" value="50"/>		
Lane 1		Lane 2	Lane 1		Lane 2	Lane 1		Lane 2	Lane 1		Lane 2
L		T	TR			L		R	L		R
Peak Hour Factor, PHF											
<input type="text" value="0.85"/>		<input type="text" value="0.85"/>	<input type="text" value="0.85"/>		<input type="text" value="1.00"/>	<input type="text" value="1.00"/>		<input type="text" value="1.00"/>	<input type="text" value="0.85"/>		<input type="text" value="0.85"/>
Percent Heavy Vehicles (%)											
<input type="text" value="2"/>		<input type="text" value="2"/>	<input type="text" value="2"/>		<input type="text" value="0"/>	<input type="text" value="0"/>		<input type="text" value="0"/>	<input type="text" value="2"/>		<input type="text" value="2"/>
Hourly Flow Rate (vph)											
294		158	276			70		205			

## AWSC

### Workshop #4A: Model Results

RESULTS					
Total Lane Flow Rate	294	158	276	70	205
Service Time	3.8	3.3	3.4	3.9	3.1
Degree of Utilization, x	0.50	0.25	0.41	0.12	0.29
Departure headway, hd	6.11	5.60	5.35	5.93	5.12
Capacity	544	408	526	320	455
Delay	14.74	10.12	12.03	9.70	10.21
	13.12		12.03	10.08	
Level of Service	B	B	B	A	B
	B		B	B	
Intersection Delay	11.99		Intersection Level of Service		
			B		

## TWSC

### Workshop #4B: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry Duration 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right									
Major Street Direction: East-West											
Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage		
1	1	0	0	1	0	0	0	0	1	0	1
Shared		Shared									
Right Turn Channelized		Right Turn Channelized	Right Turn Channelized		Right Turn Channelized	Right Turn Channelized		Right Turn Channelized	Right Turn Channelized		Right Turn Channelized
Flared Minor-Street Approach and Storage											
<input type="checkbox"/> Yes Storage <input type="checkbox"/>			<input type="checkbox"/> Yes Storage <input type="checkbox"/>			<input type="checkbox"/> Yes Storage <input type="checkbox"/>			<input type="checkbox"/> Yes Storage <input type="checkbox"/>		
Median Type											
Undivided			Undivided			Undivided			Undivided		
Median Storage 1			Median Storage			Median Storage			Median Storage		
L T TR			L R			L R			L R		
Volume (vph), Increment 10 % + -											
250	135	0	0	115	120	0	0	0	60	0	175
Peak Hour Factor, PHF											
0.85	0.85	1.00	1.00	0.85	0.85	1.00	1.00	1.00	0.85	1.00	0.85
Peak-15 Minute Volume (v)											
74	40	0	0	34	35	0	0	0	18	0	51
Percent Heavy Vehicles (%)											
2			0			0	0	0	2	0	2
Percent Grade (%)											
						0			0		
Hourly Flow Rate (vph)											
294	158	0	0	135	141	0	0	0	70	0	205
Saturation Flow Rate (vph)											
1700	1700		1700	1700							
Percent Thrus Using Shared Lane (%)											
0			0								

PEDESTRIAN VOLUMES AND ADJUSTMENTS

Flow (ped/hr)	25	0	0	25
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	3.5	4.0	4.0	3.5
Percent Blockage	2	0	0	2

## TWSC

### Workshop #4B: Model Results

RESULTS														
Major Street						Minor Street								
Eastbound			Westbound			Northbound			Southbound					
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
Volume (vph)									70			205		
Movement Capacity									207			746		
Shared Lane Capacity														
Movement v/c Ratio									0.34			0.27		
95% Queue Length									1.42			1.12		
Control Delay (sec/veh)									31.0			11.6		
Movement Level of Service									D			B		
Approach Delay (sec/veh)												16.6		
Approach Level of Service												C		

## AWSC

### Workshop #5: Model Inputs

LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry

Duration  hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes and Usage											
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="1"/>	<input type="text" value="0"/>
Shared		Shared		Shared		Shared		Shared		Shared	
Volume (vph)											
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="35"/>	<input type="text" value="0"/>	<input type="text" value="25"/>	<input type="text" value="0"/>	<input type="text" value="270"/>	<input type="text" value="35"/>	<input type="text" value="15"/>	<input type="text" value="210"/>	<input type="text" value="0"/>
Percent Thrus Using Left Lane, %											
<input type="text" value="50"/>			<input type="text" value="50"/>			<input type="text" value="50"/>			<input type="text" value="50"/>		
Lane 1		Lane 2		Lane 1		Lane 2		Lane 1		Lane 2	
				LR		T R		L T			
Peak Hour Factor, PHF											
<input type="text" value="1.00"/>		<input type="text" value="1.00"/>		<input type="text" value="0.90"/>		<input type="text" value="1.00"/>		<input type="text" value="0.90"/>		<input type="text" value="0.90"/>	
Percent Heavy Vehicles (%)											
<input type="text" value="0"/>		<input type="text" value="0"/>		<input type="text" value="3"/>		<input type="text" value="0"/>		<input type="text" value="10"/>		<input type="text" value="10"/>	
Hourly Flow Rate (vph)											
			65			300 38			16 233		

## AWSC

### Workshop #5: Model Results

RESULTS					
Total Lane Flow Rate	65	300	38	16	233
Service Time	3.2	2.8	2.1	3.3	2.8
Degree of Utilization, x	0.09	0.42	0.05	0.03	0.33
Departure headway, hd	5.18	5.07	4.36	5.64	5.13
Capacity	315	550	288	266	483
Delay	8.72	11.41	7.27	8.48	10.37
Level of Service	8.72	10.95		10.25	
	A	B	A	A	B
	A	B		B	
Intersection Delay	10.46	Intersection Level of Service		B	

## Roundabouts

### Example #3: Model Inputs

LANE DESIGNATIONS, VEHICLE VOLUMES AND ADJUSTMENTS

Duration  hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes and Usage											
<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="1"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="2"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="2"/>	<input type="text" value="0"/>
Shared		Shared		Shared		Shared		Shared		Shared	
Percent of Entry Vehicles using Left Lane											
<input type="text" value="47"/>			<input type="text" value="47"/>			<input type="text" value="47"/>			<input type="text" value="47"/>		
Conflicting Lanes on Entry											
<input type="text" value="2"/>			<input type="text" value="2"/>			<input type="text" value="2"/>			<input type="text" value="2"/>		
Right-Turn Bypass											
None			None			None			None		
Conflicting Lanes on Bypass Exit											
<input type="text" value="1"/>			<input type="text" value="1"/>			<input type="text" value="1"/>			<input type="text" value="1"/>		
No. of Pedestrians Crossing Entry											
<input type="text" value="0"/>			<input type="text" value="0"/>			<input type="text" value="0"/>			<input type="text" value="0"/>		

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)											
<input type="text" value="40"/>	<input type="text" value="15"/>	<input type="text" value="50"/>	<input type="text" value="65"/>	<input type="text" value="20"/>	<input type="text" value="70"/>	<input type="text" value="40"/>	<input type="text" value="175"/>	<input type="text" value="20"/>	<input type="text" value="95"/>	<input type="text" value="205"/>	<input type="text" value="65"/>
Peak Hour Factor, PHF, All <input type="text" value="0.96"/>											
Percent Heavy Vehicles, (%), All <input type="text" value="3"/>											
<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>	<input type="text" value="3"/>

Eastbound U-Turn		Westbound U-Turn		Northbound U-Turn		Southbound U-Turn	
Vol (vph)	% HV						
<input type="text" value="0"/>	<input type="text" value="3"/>						

## Roundabouts

### Example #3: Model Results

RESULTS											
Eastbound			Westbound			Northbound			Southbound		
Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Lane Flow (pc/h)											
113			166			119		134		184 208	
Entry Lane Capacity (pc/h)											
859			933			1002		1010		1022 1029	
Lane v/c Ratio											
0.13			0.18			0.12		0.13		0.18 0.20	
Critical Lane											
*			*			*		*		*	
Lane Control Delay (sec/veh)											
5.6			5.7			4.8		4.9		5.3 5.5	
Lane Level of Service											
A			A			A		A		A A	
Approach Delay (sec/veh)											
5.63			5.72			4.85				5.43	
95th-percentile Queue (veh)											
0.5			0.6			0.4		0.5		0.7 0.8	
Intersection Delay (sec/veh)											
			5.35					Intersection LDS		A	

# Roundabouts

## Workshop #6: Model Inputs

LANE DESIGNATIONS, VEHICLE VOLUMES AND ADJUSTMENTS

Quick Entry Duration 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Number of Lanes and Usage											
0	0	0	1	0	1	0	1	1	1	1	0
Shared		Shared	Shared		Shared	Shared		Shared	Shared		Shared
Percent of Entry Vehicles using Left Lane											
47			47			47			47		
Conflicting Lanes on Entry											
2			2			2			2		
Right-Turn Bypass											
None			None			None			None		
Conflicting Lanes on Bypass Exit											
1			1			1			1		
No. of Pedestrians Crossing Entry											
0			0			0			0		
Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)											
0	0	0	155	0	170	0	585	105	125	495	0
Peak Hour Factor, PHF, All 0.92											
Percent Heavy Vehicles, (%), All 3											
2	2	2	2	2	2	2	2	2	2	2	2
Eastbound U-Turn		Westbound U-Turn		Northbound U-Turn		Southbound U-Turn					
Vol (vph)	% HV	Vol (vph)	% HV	Vol (vph)	% HV	Vol (vph)	% HV				
0	2	0	2	0	2	0	2				

## Roundabouts

### Workshop #6: Model Results

RESULTS											
Eastbound			Westbound			Northbound			Southbound		
Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Lane Flow (pc/h)											
538			172	188		649	116		139	549	
Entry Lane Capacity (pc/h)											
0			695	718		1018	1026		993	1002	
Lane v/c Ratio											
			0.25	0.26		0.64	0.11		0.14	0.55	
Critical Lane											
			x	x		x				x	
Lane Control Delay (sec/veh)											
			8.3	8.2		12.9	4.6		5.0	10.8	
Lane Level of Service											
F			A	A		B	A		A	B	
Approach Delay (sec/veh)											
				8.24			11.65			9.60	
95th-percentile Queue (veh)											
			1.0	1.0		4.8	0.4		0.5	3.4	
Intersection Delay (sec/veh)											
				10.19							
Intersection LOS											
										B	

# Signalized Intersections

## Example #4: Model Inputs

**PRIMARY INPUT DATA**

General

Urban Street: Mahan Dr

Intersection: Dempsey Mayo Rd

Description: Example #4

Data File: MahanDr\_DempseyMayoRd\_v5(recreate)

Forward Direction: EB Area Type: Other

Segment Length, ft: PHF: 0.95

Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Demand, veh/h	215	845	0	0	540	50	0	0	0	120	0	150	
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
Storage Length, ft	450	0	0	0	0	400	0	0	0	0	0	0	
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Heavy Vehicles, %	6	6	0	0	6	6	0	0	0	3	0	3	
Grade, %	0				0					0			
Buses, per h		0				0			0			0	
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0	
Bicycles, per h		0			0			0			0		
Pedestrians, per h		0			0			0			0		
Arrival Type	4	4	3	3	4	4	3	3	3	3	3	3	
Upstream Filtering (I)	I-EB	1.00			I-WB	1.00			I-NB	1.00		I-SB	1.00
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0	
Speed Limit, mi/h		45			45			45			45		
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40	
RTOR, veh/h		0			0			0			0		

Phasing

Cycle, s: 80

Offset, s: 0

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Green	6.2	46.4	9.9	0.0	0.0	0.0	0.0	0.0
Yellow	3.0	4.3	4.0	0.0	0.0	0.0	0.0	0.0
Red	3.5	1.7	1.0	0.0	0.0	0.0	0.0	0.0

Timing

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	18.0	64.0	0.0	46.0	0.0	0.0	0.0	16.0
Yellow Change, s	3.0	4.4	4.0	4.3	4.0	4.0	4.0	4.0
Red Clearance, s	3.5	1.6	1.0	1.7	1.0	1.0	1.0	1.0
Minimum Green, s	5	15	5	15	5	5	5	5
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S				

## Signalized Intersections

### Example #4: Model Results

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2			6	16				7		14
Adjusted Flow Rate ( $v$ ), veh/h	226	889			568	53				126		158
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1707	1706			1706	1519				1757		1563
Queue Service Time ( $g_s$ ), s	4.0	0.5			3.9	0.7				5.4		7.9
Cycle Queue Clearance Time ( $g_c$ ), s	4.0	0.5			3.9	0.7				5.4		7.9
Green Ratio ( $g/C$ )	0.68	0.74			0.58	0.58				0.12		0.12
Capacity ( $c$ ), veh/h	651	2520			1980	881				218		194
Volume-to-Capacity Ratio ( $X$ )	0.348	0.353			0.287	0.060				0.579		0.814
Available Capacity ( $c_a$ ), veh/h	788	2520			1980	881				242		215
Back of Queue ( $Q$ ), veh/ln (50th percentile)	0.9	0.2			1.1	0.2				2.2		0.9
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.05	0.00			0.00	0.01				0.00		0.00
Uniform Delay ( $d_1$ ), s/veh	4.8	0.2			4.2	3.9				33.1		34.1
Incremental Delay ( $d_2$ ), s/veh	0.1	0.4			0.4	0.1				1.4		17.2
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0			0.0	0.0				0.0		0.0
Control Delay ( $d$ ), s/veh	5.0	0.6			4.6	4.0				34.4		51.3
Level of Service (LOS)	A	A			A	A				C		D
Approach Delay, s/veh / LOS	1.4	A		4.6	A		0.0			43.8		D
Intersection Delay, s/veh / LOS	8.4						A					

## Signalized Intersections

### Workshop #7: Model Inputs

**PRIMARY INPUT DATA**

**General**

Urban Street: Tyndall Pkwy  
 Intersection: SR 22  
 Description: Workshop #7  
 Data File: TyndallPkwy\_SR22\_v4(recreated).xus

Forward Direction: NB Area Type: Other  
 Segment Length, ft: PHF: 0.90

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	70	230	55	115	170	305	80	1170	150	410	890	35
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	300	0	300	500	0	0	400	0	500	400	0	0
Saturation, pc/h/ln	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	0
Grade, %	0			0			0			0		
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h	0			0			0			0		
Pedestrians, per h	0			0			0			0		
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Upstream Filtering (I)	I-EB	1.00		I-WB	1.00		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		35		35			35			35		
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Phasing**

Cycle, s: 160  
 Offset, s: 0  
 Phase 2 Direction: NB  
 Phase 4 Direction: EB  
 Reference Phase: 2  
 Reference Point: End  
 Force Mode: Fixed  
 Include in Optimization:

Side Street Split Phasing:   
 Uncoordinated Intersection:   
 Field-Measured Phase Times:

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Green	25.0	70.0	10.0	35.0	0.0	0.0		
Yellow	3.5	3.5	3.5	3.5	0.0	0.0		
Red	1.5	1.5	1.5	1.5	0.0	0.0		

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	15.0	40.0	15.0	40.0	30.0	75.0	30.0	75.0
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Minimum Green, s	8	15	8	15	8	15	8	15
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Off	Off	Off	Off	Ma	Off	Ma
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap <input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S						

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## Signalized Intersections

### Workshop #7: Model Results

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate ( $v$ ), veh/h	78	256	61	128	189	339	89	1300	167	456	517	510
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1752	1840	1559	1752	1840	1559	1752	1751	1559	1701	1840	1815
Queue Service Time ( $g_s$ ), s	5.3	20.2	4.1	9.0	14.3	27.8	6.9	49.0	7.4	20.6	30.0	30.0
Cycle Queue Clearance Time ( $g_c$ ), s	5.3	20.2	4.1	9.0	14.3	27.8	6.9	49.0	7.4	20.6	30.0	30.0
Green Ratio ( $g/C$ )	0.28	0.22	0.38	0.28	0.22	0.38	0.16	0.44	0.50	0.16	0.44	0.44
Capacity ( $c$ ), veh/h	288	402	585	241	402	585	274	1532	780	532	805	794
Volume-to-Capacity Ratio ( $X$ )	0.270	0.635	0.105	0.530	0.469	0.580	0.325	0.848	0.214	0.857	0.643	0.643
Available Capacity ( $c_a$ ), veh/h	288	402	585	241	402	585	274	1532	780	532	805	794
Back of Queue ( $Q$ ), veh/ln (50th percentile)	2.4	9.7	1.6	4.0	6.7	10.8	3.0	19.8	2.7	9.5	12.8	12.6
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.21	0.00	0.14	0.21	0.00	0.00	0.20	0.00	0.14	0.62	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	44.1	56.7	32.5	46.3	54.4	39.9	56.2	29.0	16.2	61.6	25.0	25.0
Incremental Delay ( $d_2$ ), s/veh	0.2	2.5	0.0	1.1	0.3	1.0	0.3	6.0	0.6	12.5	3.9	4.0
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	44.3	59.2	32.6	47.5	54.7	40.9	56.4	35.0	16.8	74.1	28.9	29.0
Level of Service (LOS)	D	E	C	D	D	D	E	C	B	E	C	C
Approach Delay, s/veh / LOS	52.2		D	46.2		D	34.3		C	42.8		D
Intersection Delay, s/veh / LOS	41.0						D					

## Signalized Intersections

### Workshop #8: Model Inputs

**PRIMARY INPUT DATA**

General

Urban Street: Mahan Dr

Intersection: Buck Lake Rd

Description:

Data File: Streets1.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: Duration: 0.25

All Segment Lengths PHF: 0.92

Phasing

Cycle, s: 160

Offset, s: 0

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Traffic

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	10	985	625	45	540	0	325	0	25	0	0	0
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	0	0	500	280	0	0	320	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	8	8	8	8	8	0	8	8	0	0	0	0
Grade, %	0		0		0		0		0		0	
Buses, per h	0		0		0		0		0		0	
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h	0		0		0		0		0		0	
Pedestrians, per h	0		0		0		0		0		0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB 1.00		I-WB 1.00		I-NB 1.00		I-SB 1.00		I-SB 1.00		I-SB 1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h	45		45		45		45		45		45	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h	0		0		0		0		0		0	

Timing

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	0.0	100.0	18.0	118.0	42.0	42.0	0.0	0.0
Yellow Change, s	3.0	4.1	3.0	4.1	3.0	3.0	3.0	3.0
Red Clearance, s	3.3	1.9	3.3	1.9	4.0	4.0	3.3	3.3
Minimum Green, s	4	4	4	4	7	7	4	4
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input checked="" type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input checked="" type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap <input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S						

## Signalized Intersections

### Workshop #8: Model Results

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6		3	8	18			
Adjusted Flow Rate ( $v$ ), veh/h	11	1071	679	49	587		353	353				
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	779	1675	1319	1675	1597		1675	1675				
Queue Service Time ( $g_s$ ), s	0.9	31.0	10.7	1.6	6.7		14.7	14.7				
Cycle Queue Clearance Time ( $g_c$ ), s	0.9	31.0	10.7	1.6	6.7		14.7	14.7				
Green Ratio ( $g/C$ )	0.59	0.59	0.81	0.67	0.70		0.22	0.22				
Capacity ( $c$ ), veh/h	503	1968	2128	363	3355		733	733				
Volume-to-Capacity Ratio ( $X$ )	0.022	0.544	0.319	0.135	0.175		0.482	0.482				
Available Capacity ( $c_a$ ), veh/h	503	1968	2128	363	3355		733	733				
Back of Queue ( $Q$ ), veh/ln (50th percentile)	0.2	11.9	2.4	0.6	2.2		6.2	6.2				
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.00	0.00	0.13	0.05	0.00		0.51	0.51				
Uniform Delay ( $d_1$ ), s/veh	13.8	20.0	4.0	12.6	8.2		54.6	54.6				
Incremental Delay ( $d_2$ ), s/veh	0.1	1.1	0.4	0.1	0.1		0.2	0.2				
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0				
Control Delay ( $d$ ), s/veh	13.9	21.1	4.4	12.6	8.3		54.8	54.8				
Level of Service (LOS)	B	C	A	B	A		D	D				
Approach Delay, s/veh / LOS	14.6	B		8.7	A		54.4	D		0.0		
Intersection Delay, s/veh / LOS				18.7						B		

## Signalized Intersections

### Workshop #9: Model Inputs

**PRIMARY INPUT DATA**

**General**

Urban Street: SR 924  
 Intersection: NW 7th Ave/US 441  
 Description: Urban Arterial  
 Data File: SR924\_US441\_V3.xus  
 Forward Direction: EB Area Type: Other  
 Segment Length, ft: Duration: 0.25  
 All Segment Lengths PHF: 0.96

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	185	915	120	125	1095	90	220	1050	115	115	740	185
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	140	0	0	130	0	0	100	0	0	100	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	3	3	0	3	3	0	3	3	0	3	3	0
Grade, %		0			0			0			0	
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	1.00		I-WB	1.00		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		40			40			40			40	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Phasing**

Cycle, s: 100  
 Offset, s: 0  
 Phase 2 Direction: EB  
 Phase 4 Direction: SB  
 Reference Phase: 2  
 Reference Point: End  
 Force Mode: Fixed  
 Include in Optimization:   
 Side Street Split Phasing:   
 Uncoordinated Intersection:   
 Field-Measured Phase Times:

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	7.0	36.7	7.0	36.7	7.0	30.0	7.0	30.0
Yellow Change, s	4.2	4.3	4.2	4.3	3.8	4.3	3.8	4.3
Red Clearance, s	0.0	1.3	0.0	1.3	0.0	1.4	0.0	1.4
Minimum Green, s	5	7	5	7	5	7	5	7
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Ma	Ma	Ma	Ma	Ma	Ma	Ma	Ma
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S				

## Signalized Intersections

### Workshop #9: Model Results

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	193	733	345	130	834	400	229	823	391	120	663	301
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1757	1845	1732	1757	1845	1770	1757	1845	1748	1757	1845	1654
Queue Service Time ( $g_s$ ), s	6.9	15.7	15.8	4.5	18.5	18.5	7.0	20.1	20.1	4.6	15.3	15.6
Cycle Queue Clearance Time ( $g_c$ ), s	6.9	15.7	15.8	4.5	18.5	18.5	7.0	20.1	20.1	4.6	15.3	15.6
Green Ratio ( $g/C$ )	0.44	0.37	0.37	0.44	0.37	0.37	0.37	0.30	0.30	0.37	0.30	0.30
Capacity ( $c$ ), veh/h	267	1354	636	293	1354	650	267	1107	524	231	1107	496
Volume-to-Capacity Ratio ( $X$ )	0.722	0.541	0.543	0.445	0.616	0.616	0.860	0.744	0.745	0.519	0.599	0.606
Available Capacity ( $c_a$ ), veh/h	267	1354	636	293	1354	650	267	1107	524	231	1107	496
Back of Queue ( $Q$ ), veh/ln (50th percentile)	3.8	6.8	6.7	2.1	8.1	8.2	2.1	9.2	9.4	2.3	6.9	6.7
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.70	0.00	0.00	0.42	0.00	0.00	0.54	0.00	0.00	0.60	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	21.5	25.0	25.0	19.2	25.9	25.9	30.1	31.5	31.5	24.6	29.9	29.9
Incremental Delay ( $d_2$ ), s/veh	15.5	1.6	3.3	4.8	2.1	4.3	28.5	4.5	9.3	8.1	2.4	5.4
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	37.1	26.6	28.3	24.1	28.0	30.2	58.6	36.1	40.8	32.8	32.3	35.4
Level of Service (LOS)	D	C	C	C	C	C	E	D	D	C	C	D
Approach Delay, s/veh / LOS	28.6	C		28.3	C		40.9	D		33.2	C	
Intersection Delay, s/veh / LOS	32.9						C					

## Signalized Intersections

### Workshop #10: Model Inputs

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street

Intersection: 18th Street

Description:

Data File: MainSt\_18th\_St\_V3.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: Duration: 0.25

All Segment Lengths PHF: 0.90

**Phasing**

Cycle, s: 120

Offset, s: 0

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	300	1230	30	20	325	85	20	150	40	30	100	50
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	450	0	0	0	0	0	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	2	2	0	0	2	0	0	2	0	0	2	0
Grade, %	0		0		0		0		0		0	
Buses, per h	0		0		0		0		0		0	
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h	0		0		0		0		0		0	
Pedestrians, per h	40		40		40		40		40		40	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	1.00	I-WB	1.00	I-NB	1.00	I-SB	1.00				
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h	25		25		25		25		25		25	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h	0		0		0		0		0		0	

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	18.5	54.5	0.0	30.5	0.0	24.5	0.0	24.5
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input checked="" type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Ma	Ma	Off	Ma	Off	Ma	Mir	Ma
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

## Signalized Intersections

### Workshop #10: Model Results

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	333	703	697	234		244		233			200	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1774	1863	1842	1447		1529		1769			1727	
Queue Service Time ( $g_s$ ), s	16.0	39.7	39.9	0.6		17.0		14.5			12.5	
Cycle Queue Clearance Time ( $g_c$ ), s	16.0	39.7	39.9	16.4		17.0		14.5			12.5	
Green Ratio ( $g/C$ )	0.42	0.45	0.45	0.25		0.25		0.20			0.20	
Capacity ( $c$ ), veh/h	439	846	837	401		389		361			353	
Volume-to-Capacity Ratio ( $X$ )	0.760	0.831	0.833	0.584		0.627		0.646			0.567	
Available Capacity ( $c_a$ ), veh/h	439	846	837	401		389		361			353	
Back of Queue ( $Q$ ), veh/ln (50th percentile)	8.2	19.7	19.6	6.6		7.2		7.3			6.0	
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.46	0.00	0.00	0.00		0.00		0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh	26.8	28.7	28.8	38.2		39.7		43.8			43.0	
Incremental Delay ( $d_2$ ), s/veh	11.7	9.3	9.5	6.1		7.5		8.6			6.5	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0		0.0		0.0			0.0	
Control Delay ( $d$ ), s/veh	38.5	38.0	38.3	44.3		47.2		52.4			49.5	
Level of Service (LOS)	D	D	D	D		D		D			D	
Approach Delay, s/veh / LOS	38.2		D	45.8		D	52.4		D	49.5		D
Intersection Delay, s/veh / LOS	41.7						D					

# Urban Streets - Segments

## Example #5: Model Inputs at Main St and 15th St

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street  
 Intersection: 15th Street  
 Description: Example #5  
 Data File: MainSt\_UrbanSegment\_V4.xus

Forward Direction: EB Area Type: Other  
 Segment Length, ft: 675 Duration: 0.25  
 All Segment Lengths PHF: 0.90

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	10	950	15	50	325	125	40	10	30	530	80	120
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	200	0	0	200	0	200	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %		0			0			0			0	
Buses, per h			5			5			0			0
Parking, per h	0	N	0	0	F	10	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		20			20			20			20	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	1.00		I-WB	0.98		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		25			25			25			25	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Phasing**

Cycle, s: 90  
 Offset, s: 0  
 Phase 2 Direction: EB  
 Phase 4 Direction: SB  
 Reference Phase: 2  
 Reference Point: End  
 Force Mode: Fixed  
 Include in Optimization:

Side Street Split Phasing:   
 Uncoordinated Intersection:   
 Field-Measured Phase Times:

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	0.0	29.5	0.0	29.5	0.0	14.5	0.0	29.5
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Ma	Off	Ma	Off	Ma	Off	Ma
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input checked="" type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S				

## Urban Streets - Segments

### Example #5: Model Inputs at Main St and 17th St NB

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street

Intersection: 17th Street NB

Description: Example #5

Data File: MainSt\_UrbanSegment\_V4.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 675 Duration: 0.25

All Segment Lengths PHF: 0.90

**Phasing**

Cycle, s: 90

Offset, s: 0

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	30	1530	0	0	345	50	50	60	30	0	0	0
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	0	0	0	0	0	0	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %		0			0			0			0	
Buses, per h			0			5			0			0
Parking, per h	0	N	0	0	F	10	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		20			20			20			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	0.27		I-WB	1.00		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		25			25			25			25	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	0.0	62.5	0.0	62.5	0.0	16.5	0.0	0.0
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Ma	Off	Ma	Off	Ma	Off	Off
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input checked="" type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

## Urban Streets - Segments

Example #5: Inputs for Segment and Access Point  
(Visual Mode Shown)

Segment Properties

Segment Data | O-D Seeds | Access Points | Streets | Pedestrian | Bicycle | Transit

Segment Name:

	EB	WB
Upstream Width, ft	60	60
Restrictive Median, ft	0	0
Right-Hand Curb, %	70	70
Right-Hand Access Points	0	0
Mid-Segment Delay, s/veh	0.0	0.0

Visual mode diagram showing a street segment between 15th Street (Node 1) and 17th Street NB (Node 2). The segment length is 675ft. An access point is located at 17th Street SB.

Segment Properties (Access Point tab):

Critical Headway (left from major), s	4.1
Follow-Up Headway (left from major), s	2.2
Right-Turn Equivalency Factor	2.20
Maximum Turn Bay Length, ft	250
Deceleration Rate, ft/s <sup>2</sup>	6.7
Right-Turn Speed, ft/s	20

Access Points Active:

PHF: 0.90

1 > 17th Street SB (Count: 1)

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	0	1510	0	0	395	0	0	0	0	50	0	105
Lanes	0	2	0	0	2	0	0	0	0	1	0	1

Name: 17th Street SB | Location, ft: 585

## Urban Streets - Segments

### Example #5: Model Results at Main St and 15th St

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	11	543	529	56	361	139		89		589	589	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1004	1863	1813	524	1773	1275		1679		1774	1774	
Queue Service Time ( $g_s$ ), s	0.8	24.9	24.9	4.6	6.9	7.4		4.2		29.5	29.5	
Cycle Queue Clearance Time ( $g_c$ ), s	7.6	24.9	24.9	29.5	6.9	7.4		4.2		29.5	29.5	
Green Ratio ( $g/C$ )	0.33	0.33	0.33	0.33	0.33	0.33		0.16		0.33	0.33	
Capacity ( $c$ ), veh/h	333	611	594	107	1163	418		270		581	581	
Volume-to-Capacity Ratio ( $X$ )	0.033	0.890	0.890	0.521	0.311	0.332		0.329		1.013	1.013	
Available Capacity ( $c_a$ ), veh/h	333	611	594	107	1163	418		270		581	581	
Back of Queue ( $Q$ ), veh/ln (50th percentile)	0.2	13.8	13.5	1.7	2.9	2.4		2.0		18.8	18.8	
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.03	0.00	0.00	0.22	0.00	0.31		0.00		0.00	0.00	
Uniform Delay ( $d_1$ ), s/veh	25.5	28.7	28.7	43.9	22.6	22.8		33.4		30.3	30.3	
Incremental Delay ( $d_2$ ), s/veh	0.2	17.6	18.0	16.7	0.7	2.1		3.2		40.5	40.5	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay ( $d$ ), s/veh	25.7	46.3	46.7	60.6	23.3	24.9		36.7		70.8	70.8	
Level of Service (LOS)	C	D	D	E	C	C		D		F	F	
Approach Delay, s/veh / LOS	46.3		D	27.5		C		36.7	D	58.4		E
Intersection Delay, s/veh / LOS	45.7						D					

## Urban Streets - Segments

### Example #5: Model Results at Main St and 17th St NB

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2			6	16	3	8	18			
Adjusted Flow Rate ( $v$ ), veh/h	901	825			244	195		156				
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1826	1695			1863	1469		1749				
Queue Service Time ( $g_s$ ), s	0.0	24.7			4.1	4.2		7.2				
Cycle Queue Clearance Time ( $g_c$ ), s	25.7	24.7			4.1	4.2		7.2				
Green Ratio ( $g/C$ )	0.69	0.69			0.69	0.69		0.18				
Capacity ( $c$ ), veh/h	1309	1177			1294	1020		321				
Volume-to-Capacity Ratio ( $X$ )	0.688	0.701			0.188	0.191		0.485				
Available Capacity ( $c_a$ ), veh/h	1309	1177			1294	1020		321				
Back of Queue ( $Q$ ), veh/ln (50th percentile)	8.9	8.3			1.5	1.2		3.5				
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.00	0.00			0.00	0.00		0.00				
Uniform Delay ( $d_1$ ), s/veh	8.1	8.2			4.8	4.8		32.9				
Incremental Delay ( $d_2$ ), s/veh	0.8	1.0			0.3	0.4		5.2				
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0			0.0	0.0		0.0				
Control Delay ( $d$ ), s/veh	8.9	9.1			5.2	5.3		38.1				
Level of Service (LOS)	A	A			A	A		D				
Approach Delay, s/veh / LOS	9.0	A		5.2	A		38.1	D		0.0		
Intersection Delay, s/veh / LOS	10.3						B					

## Urban Streets - Segments

Example #5: Segment Results on Main St from 15th St to 17th St

Segment Output Data		Eastbound			Westbound		
		EBL	EBT	EBR	WBL	WBT	WBR
Segment	Movement	5	2			6	16
1	Bay/Lane Spillback Time, h	never	never	never	never	never	never
1	Shared Lane Spillback Time, h				never		never
1	Base Free-Flow Speed, mph	37.02			37.02		
1	Running Time, s	17.15			16.41		
1	Running Speed, mph	26.83			28.05		
1	Through Delay, s/veh	9.04			23.32		
1	Travel Speed, mph	17.57			11.58		
1	Stop Rate, stops/veh	0.38			0.65		
1	Spatial Stop Rate, stops/mi	2.93			5.11		
1	Through vol/cap Ratio	0.69			0.31		
1	Percent of Base FFS	47.46			31.29		
1	Level of Service	D			E		
1	Auto Traveler Perception Score	2.84			3.24		

## Urban Streets - Segments

### Workshop #11: Model Inputs at SR 22 and Transmitter Rd

**PRIMARY INPUT DATA**

**General**

Urban Street: SR 22

Intersection: Transmitter Rd

Description: Workshop #11

Data File: Streets1.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 2620 Duration: 0.25

All Segment Lengths PHF: 0.92

**Phasing**

Cycle, s: 60

Offset, s: 15

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	95	465	10	5	285	65	5	10	5	170	10	25
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	200	0	0	120	0	200	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	6	6	0	6	6	6	0	6	0	0	6	6
Grade, %		0			0			0			0	
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	1.00		I-WB	0.95		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		45			45			45			45	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	0.0	40.0	0.0	40.0	0.0	10.0	10.0	20.0
Yellow Change, s	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	2	2	2	2	2	2	2	2
Lag Phase	<input type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input type="checkbox"/> NL	<input type="checkbox"/> NT	<input checked="" type="checkbox"/> SL	<input type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Mir	Off
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input checked="" type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

## Urban Streets - Segments

### Workshop #11: Model Inputs at SR 22 and Bob Little Rd

**PRIMARY INPUT DATA**

**General**

Urban Street: SR 22

Intersection: Bob Little Rd

Description: Workshop #11

Data File: Streets1.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 2620 Duration: 0.25

All Segment Lengths PHF: 0.92

**Phasing**

Cycle, s: 60

Offset, s: 35

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	35	435	120	40	260	25	105	140	25	60	110	15
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	200	0	0	200	0	0	100	0	0	100	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	6	6	0	6	6	0	6	6	0	6	6	0
Grade, %	0			0			0			0		
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (!)	I-EB	0.88		I-WB	1.00		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		45			45			45			45	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	0.0	35.0	0.0	35.0	15.0	25.0	0.0	10.0
Yellow Change, s	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	2	2	2	2	2	2	2	2
Lag Phase	<input type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input checked="" type="checkbox"/> NL	<input type="checkbox"/> NT	<input type="checkbox"/> SL	<input type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

## Urban Streets - Segments

### Workshop #11: Model Results at SR 22 and Transmitter Rd

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	103	516		5	310	71		22			196	27
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1025	1786		848	1792	1519		1744			1236	1519
Queue Service Time ( $g_s$ ), s	3.1	9.8		0.1	4.0	0.4		0.0			0.0	0.8
Cycle Queue Clearance Time ( $g_c$ ), s	7.1	9.8		9.9	4.0	0.4		0.7			13.0	0.8
Green Ratio ( $g/C$ )	0.60	0.60		0.60	0.60	0.70		0.10			0.27	0.27
Capacity ( $c$ ), veh/h	667	1071		491	1075	1063		249			446	405
Volume-to-Capacity Ratio ( $X$ )	0.155	0.482		0.011	0.288	0.067		0.087			0.438	0.067
Available Capacity ( $c_a$ ), veh/h	667	1071		491	1075	1063		249			446	405
Back of Queue ( $Q$ ), veh/ln (50th percentile)	0.6	2.7		0.0	1.0	0.1		0.3			2.2	0.2
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.08	0.00		0.00	0.00	0.01		0.00			0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	7.2	6.8		4.8	4.3	1.1		24.6			20.8	16.4
Incremental Delay ( $d_2$ ), s/veh	0.5	1.6		0.0	0.6	0.1		0.1			0.3	0.0
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Control Delay ( $d$ ), s/veh	7.7	8.3		4.9	4.9	1.2		24.7			21.1	16.5
Level of Service (LOS)	A	A		A	A	A		C			C	B
Approach Delay, s/veh / LOS	8.2		A	4.2		A	24.7		C	20.5		C
Intersection Delay, s/veh / LOS				9.5						A		

## Urban Streets - Segments

### Workshop #11: Model Results at SR 22 and Bob Little Rd

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	38	605		43	310		114	179		65	136	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1025	1725		781	1765		1707	1745		1155	1755	
Queue Service Time ( $g_s$ ), s	1.5	15.4		2.6	6.2		0.0	4.5		1.5	4.5	
Cycle Queue Clearance Time ( $g_c$ ), s	7.6	15.4		18.1	6.2		0.0	4.5		6.0	4.5	
Green Ratio ( $g/C$ )	0.52	0.52		0.52	0.52		0.25	0.35		0.10	0.10	
Capacity ( $c$ ), veh/h	544	891		322	912		433	611		149	175	
Volume-to-Capacity Ratio ( $X$ )	0.070	0.679		0.135	0.340		0.264	0.294		0.436	0.774	
Available Capacity ( $c_a$ ), veh/h	544	891		322	912		433	611		149	175	
Back of Queue ( $Q$ ), veh/ln (50th percentile)	0.3	4.9		0.5	1.9		1.2	1.5		0.9	2.5	
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.04	0.00		0.06	0.00		0.30	0.00		0.23	0.00	
Uniform Delay ( $d_1$ ), s/veh	11.9	10.5		17.4	8.5		20.0	14.1		29.7	26.3	
Incremental Delay ( $d_2$ ), s/veh	0.2	3.6		0.9	1.0		0.1	0.1		0.7	17.5	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Control Delay ( $d$ ), s/veh	12.1	14.1		18.3	9.5		20.1	14.2		30.4	43.9	
Level of Service (LOS)	B	B		B	A		C	B		C	D	
Approach Delay, s/veh / LOS	14.0		B	10.6		B	16.5		B	39.5		D
Intersection Delay, s/veh / LOS	17.1						B					

## Urban Streets - Segments

### Workshop #11: Segment Results for Transmitter Rd to Bob Little Rd

Segment Output Data		Eastbound			Westbound		
		EBL	EBT	EBR	WBL	WBT	WBR
Segment	Movement	5	2	12	1	6	16
1	Bay/Lane Spillback Time, h	never	never	never	never	never	never
1	Shared Lane Spillback Time, h	never			never		never
1	Base Free-Flow Speed, mph	46.42			46.42		
1	Running Time, s	41.65			41.00		
1	Running Speed, mph	42.89			43.56		
1	Through Delay, s/veh	14.09			4.91		
1	Travel Speed, mph	32.05			38.91		
1	Stop Rate, stops/veh	0.49			0.20		
1	Spatial Stop Rate, stops/mi	0.98			0.41		
1	Through vol/cap Ratio	0.68			0.29		
1	Percent of Base FFS	69.03			83.82		
1	Level of Service	B			B		
1	Auto Traveler Perception Score	2.45			2.30		

# Urban Streets - Facilities

## Example #6: Model Inputs at Main St and 15th St

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street

Intersection: 15th Street

Description: Example #6

Data File: MainSt\_UrbanFacility\_V5.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 675 Duration: 0.25

All Segment Lengths PHF: 0.90

**Phasing**

Cycle, s: 90

Offset, s: 0

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	10	950	15	50	325	125	40	10	30	530	80	120
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	200	0	0	200	0	200	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0		0		0		0		0		0	
Buses, per h	5		5		0		0		0		0	
Parking, per h	0	N	0	0	F	10	0	N	0	0	N	0
Bicycles, per h	0		0		0		0		0		0	
Pedestrians, per h	20		20		20		20		20		20	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	1.00	I-WB	0.98	I-NB	1.00	I-SB	1.00				
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h	25		25		25		25		25		25	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h	0		0		0		0		0		0	

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	0.0	29.5	0.0	29.5	0.0	14.5	0.0	29.5
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Ma	Off	Ma	Off	Ma	Off	Ma
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

# Urban Streets - Facilities

## Example #6: Model Inputs at Main St and 17th St

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street

Intersection: 17th Street NB

Description: Example #6

Data File: MainSt\_UrbanFacility\_V5.xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 675 Duration: 0.25

All Segment Lengths PHF: 0.90

**Phasing**

Cycle, s: 90

Offset, s: 0

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	30	1530	0	0	345	50	50	60	30	0	0	0
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	0	0	0	0	0	0	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0		0		0		0		0		0	
Buses, per h	0		0		5		0		0		0	
Parking, per h	0	N	0	0	F	10	0	N	0	0	N	0
Bicycles, per h	0		0		0		0		0		0	
Pedestrians, per h	20		20		20		20		0		0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB 0.27		I-WB 0.70		I-NB 1.00		I-SB 1.00					
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h	25		25		25		25		25		25	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h	0		0		0		0		0		0	

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	0.0	62.5	0.0	62.5	0.0	16.5	0.0	0.0
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Ma	Off	Ma	Off	Ma	Off	Off
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

## Urban Streets - Facilities

### Example #6: Model Inputs at Main St and 18th St

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street  
 Intersection: 18th Street  
 Description: Example #6  
 Data File: MainSt\_UrbanFacility\_V5.xus

Forward Direction: EB Area Type: Other  
 Segment Length, ft: 325 Duration: 0.25  
 All Segment Lengths PHF: 0.90

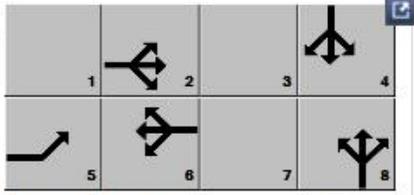
**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	300	1230	30	20	325	85	20	150	40	30	100	50
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	450	0	0	0	0	0	0	0	0	0	0	0
Saturation, pc/h/in	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0			0			0			0		
Buses, per h	5			5			0			0		
Parking, per h	0	N	0	0	F	10	0	N	0	0	N	0
Bicycles, per h	0			0			0			0		
Pedestrians, per h	40			40			40			40		
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB 0.66		I-WB 0.92		I-NB 1.00		I-SB 1.00					
Initial Queue, veh	0											
Speed Limit, mi/h	25			25			25			25		
Detector, ft	40											
RTOR, veh/h	0			0			0			0		

**Phasing**

Cycle, s: 120  
 Offset, s: 0  
 Phase 2 Direction: EB  
 Phase 4 Direction: SB  
 Reference Phase: 2  
 Reference Point: End  
 Force Mode: Fixed  
 Include in Optimization:

Side Street Split Phasing:   
 Uncoordinated Intersection:   
 Field-Measured Phase Times:



	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Green	18.5	30.5	24.5	24.5	0.0	0.0		
Yellow	3.5	3.5	3.5	3.5	0.0	0.0		
Red	2.0	2.0	2.0	2.0	0.0	0.0		

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	18.5	54.5	0.0	30.5	0.0	24.5	0.0	24.5
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input type="checkbox"/> EL	<input type="checkbox"/> ET	<input type="checkbox"/> WL	<input type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input type="checkbox"/> ST
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Ma	Ma	Mir	Ma	Off	Ma	Off	Ma
Dual Entry	<input type="checkbox"/> EL	<input checked="" type="checkbox"/> ET	<input type="checkbox"/> WL	<input checked="" type="checkbox"/> WT	<input type="checkbox"/> NL	<input checked="" type="checkbox"/> NT	<input type="checkbox"/> SL	<input checked="" type="checkbox"/> ST
Dallas Phasing	<input type="checkbox"/> E/W	<input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W	<input checked="" type="checkbox"/> N/S		

# Urban Streets - Facilities

## Example #6: Model Inputs at Main St and 19th St

**PRIMARY INPUT DATA**

**General**

Urban Street: Main Street  
 Intersection: 19th Street  
 Description: Example #6  
 Data File: MainSt\_UrbanFacility\_V5.xus

Forward Direction: EB Area Type: Other  
 Segment Length, ft: 335 Duration: 0.25  
 All Segment Lengths PHF: 0.90

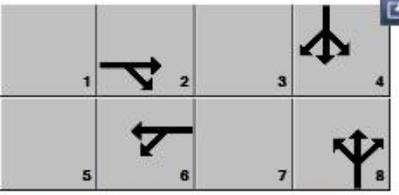
**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	0	1230	10	10	330	0	25	0	250	25	10	75
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	0	0	0	0	0	0	0	0	0	0	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	0	2	0	0	2	0	0	2	0	2	2	0
Grade, %	0			0			0			0		
Buses, per h		5			0			0				0
Parking, per h	0	N	0	0	F	10	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		10			10			10			10	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	0.46		I-WB	1.00		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		25			25			25			25	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0						0			0

**Phasing**

Cycle, s: 90  
 Offset, s: 0  
 Phase 2 Direction: EB  
 Phase 4 Direction: SB  
 Reference Phase: 2  
 Reference Point: End  
 Force Mode: Fixed  
 Include in Optimization:

Side Street Split Phasing:   
 Uncoordinated Intersection:   
 Field-Measured Phase Times:



	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Green	32.0	23.0	18.0	0.0	0.0	0.0	0.0	0.0
Yellow	3.5	3.5	3.5	0.0	0.0	0.0	0.0	0.0
Red	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Maximum Green, s	0.0	32.0	0.0	32.0	0.0	23.0	0.0	18.0
Yellow Change, s	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	4	4	4	4	4	4	4	4
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Ma	Off	Ma	Off	Ma	Off	Ma
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S				

## Urban Streets - Facilities

### Example #6: Model Results at Main St and 15th St

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	11	543	529	56	361	139		89		589	589	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1004	1863	1813	524	1773	1275		1679		1774	1774	
Queue Service Time ( $g_s$ ), s	0.8	24.9	24.9	4.6	6.9	7.4		4.2		29.5	29.5	
Cycle Queue Clearance Time ( $g_c$ ), s	7.6	24.9	24.9	29.5	6.9	7.4		4.2		29.5	29.5	
Green Ratio ( $g/C$ )	0.33	0.33	0.33	0.33	0.33	0.33		0.16		0.33	0.33	
Capacity ( $c$ ), veh/h	333	611	594	107	1163	418		270		581	581	
Volume-to-Capacity Ratio ( $X$ )	0.033	0.890	0.890	0.521	0.311	0.332		0.329		1.013	1.013	
Available Capacity ( $c_a$ ), veh/h	333	611	594	107	1163	418		270		581	581	
Back of Queue ( $Q$ ), veh/ln (50th percentile)	0.2	13.8	13.5	1.7	2.9	2.4		2.0		18.8	18.8	
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.03	0.00	0.00	0.22	0.00	0.31		0.00		0.00	0.00	
Uniform Delay ( $d_1$ ), s/veh	25.5	28.7	28.7	43.9	22.6	22.8		33.4		30.3	30.3	
Incremental Delay ( $d_2$ ), s/veh	0.2	17.6	18.0	16.7	0.7	2.1		3.2		40.5	40.5	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	
Control Delay ( $d$ ), s/veh	25.7	46.3	46.7	60.6	23.3	24.9		36.7		70.8	70.8	
Level of Service (LOS)	C	D	D	E	C	C		D		F	F	
Approach Delay, s/veh / LOS	46.3		D	27.5		C	36.7		D	58.4		E
Intersection Delay, s/veh / LOS	45.7			D			D			E		

## Urban Streets - Facilities

### Example #6: Model Results at Main St and 17th St

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2			6	16	3	8	18			
Adjusted Flow Rate ( $v$ ), veh/h	901	825			244	195		156				
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1826	1695			1863	1469		1749				
Queue Service Time ( $g_s$ ), s	0.0	24.7			4.1	4.2		7.2				
Cycle Queue Clearance Time ( $g_c$ ), s	25.7	24.7			4.1	4.2		7.2				
Green Ratio ( $g/C$ )	0.69	0.69			0.69	0.69		0.18				
Capacity ( $c$ ), veh/h	1309	1177			1294	1020		321				
Volume-to-Capacity Ratio ( $X$ )	0.688	0.701			0.188	0.191		0.485				
Available Capacity ( $c_a$ ), veh/h	1309	1177			1294	1020		321				
Back of Queue ( $Q$ ), veh/ln (50th percentile)	8.9	8.3			1.5	1.2		3.5				
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.00	0.00			0.00	0.00		0.00				
Uniform Delay ( $d_1$ ), s/veh	8.1	8.2			4.8	4.8		32.9				
Incremental Delay ( $d_2$ ), s/veh	0.8	1.0			0.2	0.3		5.2				
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0			0.0	0.0		0.0				
Control Delay ( $d$ ), s/veh	8.9	9.1			5.1	5.1		38.1				
Level of Service (LOS)	A	A			A	A		D				
Approach Delay, s/veh / LOS	9.0	A		5.1	A		38.1	D		0.0		
Intersection Delay, s/veh / LOS	10.2						B					

## Urban Streets - Facilities

### Example #6: Model Results at Main St and 18th St

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	332	707	687	256		221		233			200	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1774	1863	1805	1447		1261		1769			1727	
Queue Service Time ( $g_s$ ), s	15.9	40.1	40.2	2.6		15.3		14.5			12.5	
Cycle Queue Clearance Time ( $g_c$ ), s	15.9	40.1	40.2	18.8		15.3		14.5			12.5	
Green Ratio ( $g/C$ )	0.42	0.45	0.45	0.25		0.25		0.20			0.20	
Capacity ( $c$ ), veh/h	451	846	820	400		320		361			353	
Volume-to-Capacity Ratio ( $X$ )	0.735	0.836	0.838	0.641		0.691		0.646			0.567	
Available Capacity ( $c_a$ ), veh/h	451	846	820	400		320		361			353	
Back of Queue ( $Q$ ), veh/ln (50th percentile)	7.6	19.2	18.8	7.4		6.7		7.3			6.0	
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.43	0.00	0.00	0.00		0.00		0.00			0.00	
Uniform Delay ( $d_1$ ), s/veh	26.3	28.8	28.9	39.1		39.1		43.8			43.0	
Incremental Delay ( $d_2$ ), s/veh	6.9	6.5	6.8	7.0		10.7		8.6			6.5	
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0		0.0		0.0			0.0	
Control Delay ( $d$ ), s/veh	33.2	35.4	35.7	46.1		49.8		52.4			49.5	
Level of Service (LOS)	C	D	D	D		D		D			D	
Approach Delay, s/veh / LOS	35.1		D	47.8		D	52.4		D	49.5		D
Intersection Delay, s/veh / LOS	40.0						D					

## Urban Streets - Facilities

### Example #6: Model Results at Main St and 19th St

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement		2	12	1	6		3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h		694	678	162	216			306		28	94	
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln		1863	1820	1074	1441			1577		1774	1586	
Queue Service Time ( $g_s$ ), s		20.3	32.0	0.0	5.1			16.0		1.1	4.5	
Cycle Queue Clearance Time ( $g_c$ ), s		20.3	32.0	32.0	5.1			16.0		1.1	4.5	
Green Ratio ( $g/C$ )		0.36	0.36	0.36	0.36			0.26		0.20	0.20	
Capacity ( $c$ ), veh/h		666	651	427	515			405		357	319	
Volume-to-Capacity Ratio ( $X$ )		1.042	1.043	0.380	0.419			0.754		0.078	0.296	
Available Capacity ( $c_a$ ), veh/h		666	651	427	515			405		357	319	
Back of Queue ( $Q$ ), veh/ln (50th percentile)		20.3	19.9	2.7	3.6			7.4		0.5	1.9	
Queue Storage Ratio ( $RQ$ ) (50th percentile)		0.00	0.00	0.00	0.00			0.00		0.00	0.00	
Uniform Delay ( $d_1$ ), s/veh		28.8	28.8	21.3	21.2			30.6		29.0	30.4	
Incremental Delay ( $d_2$ ), s/veh		35.3	35.8	2.6	2.5			12.2		0.4	2.4	
Initial Queue Delay ( $d_3$ ), s/veh		0.0	0.0	0.0	0.0			0.0		0.0	0.0	
Control Delay ( $d$ ), s/veh		64.1	64.5	23.8	23.7			42.9		29.4	32.7	
Level of Service (LOS)		F	F	C	C			D		C	C	
Approach Delay, s/veh / LOS	64.3	E		23.7	C		42.9	D		32.0	C	
Intersection Delay, s/veh / LOS	52.4						D					

## Urban Streets - Facilities

### Example #6: Main St Facility-Wide Model Results

Facility Output Data	Eastbound	Westbound
Facility Travel Time, s	151.70	117.08
Facility Travel Speed, mph	6.00	7.77
Facility Base Free Flow Speed, mph	37.02	37.02
Facility Percent of Base FFS	16.21	21.00
Facility Level of Service	F	F
Facility Auto Traveler Perception Score	3.57	3.48

## Urban Streets - Facilities

### Workshop #12: Model Inputs at SR 924 and 32nd Ave

**PRIMARY INPUT DATA**

**General**

Urban Street: SR 924 Gratigny Pkwy

Intersection: 32nd Ave

Description: Workshop #12

Data File: SR\_924\_v4(recreated).xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 2750 Duration: 0.25

All Segment Lengths PHF: 0.92

**Phasing**

Cycle, s: 100

Offset, s: 28

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	165	1510	285	90	2055	55	395	385	180	95	270	150
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	390	0	0	320	0	0	310	0	0	300	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	5	5	5	5	5	0	14	14	0	14	14	14
Grade, %		0			0			0			0	
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	1.00	I-WB	0.38	I-NB	1.00	I-SB	1.00				
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		40		40		40		40		40		40
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	11.0	20.5	11.0	20.5	28.5	40.0	28.5	40.0
Yellow Change, s	5.0	4.3	5.0	4.3	3.5	4.0	3.5	4.0
Red Clearance, s	0.0	1.1	0.0	1.1	0.0	1.8	0.0	1.8
Minimum Green, s	5	5	5	5	5	7	5	7
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap <input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S						

**Green, Yellow, Red Times**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Green	5.2	3.0	40.5	7.1	5.7	15.3		
Yellow	5.0	0.0	4.3	3.5	3.5	4.0		
Red	0.0	0.0	1.1	0.0	0.0	1.8		

## Urban Streets - Facilities

### Workshop #12: Model Inputs at SR 924 and 27th Ave

**PRIMARY INPUT DATA**

**General**

Urban Street: SR 924 Gragny Pkwy

Intersection: 27th Ave

Description: Workshop #12

Data File: SR 924\_v4(recreated).xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 2750 Duration: 0.25

All Segment Lengths PHF: 0.96

Clear

**Phasing**

Cycle, s: 100

Offset, s: 50

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	175	1070	165	250	1760	95	155	1435	155	135	1165	260
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	140	0	540	340	0	0	170	0	210	270	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	5	5	5	5	5	0	7	7	7	7	7	0
Grade, %		0			0			0			0	
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (!)	I-EB	0.57	I-WB	0.34	I-NB	1.00	I-SB	1.00				
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		40		40		45		45				
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	15.8	38.8	15.8	38.8	15.4	30.0	15.4	30.0
Yellow Change, s	4.8	4.0	4.8	4.0	4.4	4.4	4.4	4.4
Red Clearance, s	0.0	1.8	0.0	1.8	0.0	1.8	0.0	1.8
Minimum Green, s	5	5	5	5	5	7	5	7
Lag Phase	<input checked="" type="checkbox"/> EL <input type="checkbox"/> ET <input checked="" type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap		<input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S				

## Urban Streets - Facilities

### Workshop #12: Model Inputs at SR 924 and 22nd Ave

**PRIMARY INPUT DATA**

**General**

Urban Street: SR 924 Gragny Pkwy

Intersection: 22nd Ave

Description: Workshop #12

Data File: SR 924\_v4(recreated).xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 2750 Duration: 0.25

All Segment Lengths PHF: 0.93

**Phasing**

Cycle, s: 100

Offset, s: 99

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	165	1140	200	95	1385	105	305	865	125	120	350	180
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	160	0	0	210	0	0	150	0	0	80	0	200
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	3	3	0	3	3	0	2	2	0	2	2	2
Grade, %		0			0			0			0	
Buses, per h			0			0			0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	0.43		I-WB	0.59		I-NB	1.00		I-SB	1.00	
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		40			40			40			40	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0			0			0			0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	12.0	44.0	12.0	44.0	14.0	30.0	14.0	30.0
Yellow Change, s	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
Red Clearance, s	0.0	1.5	0.0	1.5	0.0	1.5	0.0	1.5
Minimum Green, s	5	5	5	5	5	7	5	7
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap <input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S						

## Urban Streets - Facilities

### Workshop #12: Model Inputs at SR 924 and 17th Ave

**PRIMARY INPUT DATA**

General

Urban Street: SR 924 Gragny Pkwy

Intersection: 17th Ave

Description: Workshop #12

Data File: SR 924\_v4(recreated).xus

Forward Direction: EB Area Type: Other

Segment Length, ft: 2640 Duration: 0.25

All Segment Lengths PHF: 0.88

Clear

Phasing

Cycle, s: 100

Offset, s: 68

Phase 2 Direction: EB

Phase 4 Direction: SB

Reference Phase: 2

Reference Point: End

Force Mode: Fixed

Include in Optimization:

Side Street Split Phasing:

Uncoordinated Intersection:

Field-Measured Phase Times:

**Traffic**

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	120	1065	135	100	1515	75	285	545	85	115	245	65
Lane Width, ft	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Storage Length, ft	440	0	0	360	0	0	160	0	0	130	0	0
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	3	3	0	3	3	0	3	3	0	3	3	0
Grade, %		0			0			0			0	
Buses, per h			0						0			0
Parking, per h	0	N	0	0	N	0	0	N	0	0	N	0
Bicycles, per h		0			0			0			0	
Pedestrians, per h		0			0			0			0	
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filtering (I)	I-EB	0.54	I-WB	1.00	I-NB	1.00	I-SB	1.00				
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mi/h		40			40			40			40	
Detector, ft	40	40	40	40	40	40	40	40	40	40	40	40
RTOR, veh/h			0					0				0

**Timing**

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	11.0	42.4	11.0	42.4	14.0	32.6	14.0	32.6
Yellow Change, s	3.5	4.0	3.5	4.0	3.5	4.0	3.5	4.0
Red Clearance, s	0.0	1.1	0.0	1.1	0.0	1.6	0.0	1.6
Minimum Green, s	5	5	5	5	5	7	5	7
Lag Phase	<input type="checkbox"/> EL <input type="checkbox"/> ET <input type="checkbox"/> WL <input type="checkbox"/> WT <input type="checkbox"/> NL <input type="checkbox"/> NT <input type="checkbox"/> SL <input type="checkbox"/> ST							
Passage Time, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	Off	Mir	Off	Mir	Off	Off	Off	Off
Dual Entry	<input type="checkbox"/> EL <input checked="" type="checkbox"/> ET <input type="checkbox"/> WL <input checked="" type="checkbox"/> WT <input type="checkbox"/> NL <input checked="" type="checkbox"/> NT <input type="checkbox"/> SL <input checked="" type="checkbox"/> ST							
Dallas Phasing	<input type="checkbox"/> E/W <input type="checkbox"/> N/S	Simultaneous Gap <input checked="" type="checkbox"/> E/W <input checked="" type="checkbox"/> N/S						

## Urban Streets - Facilities

### Workshop #12: Model Results at SR 924 and 32nd Ave

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	179	1641	310	99	1746	572	429	322	292	103	293	163
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1723	1643	1533	1723	1810	1776	1541	1667	1487	1587	1587	1412
Queue Service Time ( $g_s$ ), s	6.0	28.2	14.3	3.4	29.7	29.8	13.5	18.1	18.4	5.4	8.6	11.1
Cycle Queue Clearance Time ( $g_c$ ), s	6.0	28.2	14.3	3.4	29.7	29.8	13.5	18.1	18.4	5.4	8.6	11.1
Green Ratio ( $g/C$ )	0.49	0.44	0.44	0.46	0.41	0.41	0.16	0.24	0.24	0.22	0.15	0.15
Capacity ( $c$ ), veh/h	229	2148	668	200	2201	720	503	408	364	214	484	216
Volume-to-Capacity Ratio ( $X$ )	0.782	0.764	0.464	0.493	0.794	0.794	0.854	0.790	0.802	0.483	0.606	0.756
Available Capacity ( $c_a$ ), veh/h	668	2148	668	691	2201	720	771	868	775	498	1361	606
Back of Queue ( $Q$ ), veh/ln (50th percentile)	2.3	10.7	5.2	1.1	13.4	13.7	5.2	7.2	6.6	2.0	3.3	3.8
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.15	0.00	0.00	0.09	0.00	0.00	0.47	0.00	0.00	0.19	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	22.4	23.9	19.9	18.7	31.9	32.2	40.7	35.4	35.5	33.0	39.6	40.6
Incremental Delay ( $d_2$ ), s/veh	2.2	2.6	2.3	0.3	1.2	3.6	3.7	1.3	1.6	0.6	0.5	2.0
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	24.6	26.5	22.3	19.0	33.1	35.8	44.4	36.7	37.1	33.6	40.0	42.6
Level of Service (LOS)	C	C	C	B	C	D	D	D	D	C	D	D
Approach Delay, s/veh / LOS	25.7	C		33.2	C		40.0	D		39.6	D	
Intersection Delay, s/veh / LOS	32.3						C					

## Urban Streets - Facilities

### Workshop #12: Model Results at SR 924 and 27th Ave

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	241	1472	227	282	1583	509	161	1495	161	141	1148	337
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1723	1643	1533	1723	1810	1743	1691	1612	1505	1691	1776	1551
Queue Service Time ( $g_s$ ), s	9.2	27.3	8.5	11.0	25.9	25.7	6.9	26.9	8.8	6.0	20.3	20.5
Cycle Queue Clearance Time ( $g_c$ ), s	9.2	27.3	8.5	11.0	25.9	25.7	6.9	26.9	8.8	6.0	20.3	20.5
Green Ratio ( $g/C$ )	0.44	0.33	0.33	0.44	0.33	0.33	0.35	0.27	0.27	0.34	0.26	0.26
Capacity ( $c$ ), veh/h	272	1626	506	282	1791	575	240	1301	405	206	1383	403
Volume-to-Capacity Ratio ( $X$ )	0.887	0.906	0.449	1.001	0.884	0.884	0.674	1.149	0.399	0.684	0.830	0.836
Available Capacity ( $c_a$ ), veh/h	272	1626	506	282	1791	575	276	1301	405	258	1383	403
Back of Queue ( $Q$ ), veh/ln (50th percentile)	5.4	8.8	2.5	6.2	8.2	8.2	2.8	19.2	3.1	2.4	8.8	8.8
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.99	0.00	0.12	0.48	0.00	0.00	0.44	0.00	0.38	0.24	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	27.5	23.6	16.2	23.1	22.2	21.3	26.6	36.6	29.9	27.2	34.9	35.0
Incremental Delay ( $d_2$ ), s/veh	17.5	5.4	1.7	31.3	2.5	7.1	3.6	76.4	0.2	3.0	4.1	13.5
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	45.0	29.0	17.8	54.4	24.6	28.3	30.1	113.0	30.2	30.3	39.1	48.5
Level of Service (LOS)	D	C	B	F	C	C	C	F	C	C	D	D
Approach Delay, s/veh / LOS	29.7	C		29.0	C		98.2	F		40.3	D	
Intersection Delay, s/veh / LOS	47.7						D					

## Urban Streets - Facilities

### Workshop #12: Model Results at SR 924 and 22nd Ave

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	195	1081	499	127	1343	649	328	544	520	129	376	194
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1757	1845	1700	1757	1845	1776	1774	1863	1780	1774	1773	1579
Queue Service Time ( $g_s$ ), s	8.5	17.0	14.8	7.2	32.7	32.9	10.5	27.8	27.8	5.4	9.0	10.6
Cycle Queue Clearance Time ( $g_c$ ), s	8.5	17.0	14.8	7.2	32.7	32.9	10.5	27.8	27.8	5.4	9.0	10.6
Green Ratio ( $g/C$ )	0.09	0.38	0.38	0.09	0.38	0.38	0.37	0.28	0.28	0.32	0.24	0.24
Capacity ( $c$ ), veh/h	150	1420	654	150	1420	683	414	518	495	200	869	387
Volume-to-Capacity Ratio ( $X$ )	1.299	0.762	0.762	0.848	0.946	0.951	0.792	1.051	1.052	0.646	0.433	0.501
Available Capacity ( $c_a$ ), veh/h	150	1420	654	150	1420	683	414	518	495	258	869	387
Back of Queue ( $Q$ ), veh/ln (50th percentile)	10.4	3.7	3.1	4.2	7.9	8.6	3.2	19.7	19.0	2.2	3.7	3.9
Queue Storage Ratio ( $RQ$ ) (50th percentile)	1.66	0.00	0.00	0.51	0.00	0.00	0.54	0.00	0.00	0.71	0.00	0.50
Uniform Delay ( $d_1$ ), s/veh	49.8	9.7	7.5	49.1	15.3	14.3	28.4	36.1	36.1	28.2	31.9	32.5
Incremental Delay ( $d_2$ ), s/veh	154.1	1.7	3.6	21.7	9.4	17.0	9.3	53.8	54.8	1.3	0.1	0.4
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	203.9	11.4	11.1	70.9	24.7	31.3	37.8	89.9	90.9	29.5	32.0	32.9
Level of Service (LOS)	F	B	B	E	C	C	D	F	F	C	C	C
Approach Delay, s/veh / LOS	32.4		C	29.5		C	78.0		E	31.8		C
Intersection Delay, s/veh / LOS	41.9						D					

## Urban Streets - Facilities

### Workshop #12: Model Results at SR 924 and 17th Ave

Movement Group Results	EB			WB			NB			SB		
	L	T	R	L	T	R	L	T	R	L	T	R
Approach Movement												
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ( $v$ ), veh/h	146	990	465	114	1214	593	324	366	350	131	180	172
Adjusted Saturation Flow Rate ( $s$ ), veh/h/ln	1757	1845	1735	1757	1845	1798	1757	1845	1757	1757	1845	1712
Queue Service Time ( $g_s$ ), s	4.5	18.9	19.0	3.4	26.8	26.9	10.5	19.1	19.2	5.8	8.7	8.9
Cycle Queue Clearance Time ( $g_c$ ), s	4.5	18.9	19.0	3.4	26.8	26.9	10.5	19.1	19.2	5.8	8.7	8.9
Green Ratio ( $g/C$ )	0.52	0.47	0.47	0.51	0.45	0.45	0.32	0.23	0.23	0.28	0.20	0.20
Capacity ( $c$ ), veh/h	234	1718	808	257	1672	815	368	420	400	218	368	342
Volume-to-Capacity Ratio ( $X$ )	0.622	0.576	0.576	0.442	0.726	0.727	0.880	0.871	0.874	0.599	0.489	0.504
Available Capacity ( $c_a$ ), veh/h	375	1718	808	420	1672	815	368	550	524	268	498	462
Back of Queue ( $Q$ ), veh/ln (50th percentile)	1.4	7.4	7.2	1.3	11.4	11.7	4.7	9.4	9.1	2.4	3.8	3.7
Queue Storage Ratio ( $RQ$ ) (50th percentile)	0.08	0.00	0.00	0.09	0.00	0.00	0.76	0.00	0.00	0.48	0.00	0.00
Uniform Delay ( $d_1$ ), s/veh	17.5	18.2	18.3	15.9	22.3	22.3	33.0	37.2	37.2	30.2	35.5	35.6
Incremental Delay ( $d_2$ ), s/veh	0.5	0.8	1.6	0.4	2.8	5.6	20.3	9.5	10.2	1.0	0.4	0.4
Initial Queue Delay ( $d_3$ ), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay ( $d$ ), s/veh	18.0	19.0	19.9	16.3	25.1	27.9	53.3	46.7	47.4	31.2	35.9	36.1
Level of Service (LOS)	B	B	B	B	C	C	D	D	D	C	D	D
Approach Delay, s/veh / LOS	19.2		B	25.4		C	49.0		D	34.7		C
Intersection Delay, s/veh / LOS	29.2						C					

## Urban Streets - Facilities

### Workshop #12: SR 924 Facility-Wide Model Results

Facility Output Data	Eastbound	Westbound
Facility Travel Time, s	194.24	220.62
Facility Travel Speed, mph	28.57	25.16
Facility Base Free Flow Speed, mph	44.07	44.07
Facility Percent of Base FFS	64.83	57.08
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.28	2.32

## Basic Freeway Segments

### Example #7: Model Inputs

FLOW RATE		PLANNING DATA	
Volume, DDHV	2111 vph	Average annual daily traffic, AADT	37700 vpd
Peak Hour factor, PHF	0.88	Peak-hour proportion of AADT, K	0.10
Peak 15-minute volume	618 v	Peak-hour direction proportion, D	56 %
Number of lanes, N	2	FREE-FLOW SPEED	
Terrain:	Level	Free-Flow Speed and Type	
Grade	%	<input type="radio"/> Measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
Length	mi	75.4 mph	
Trucks and buses	20 %	Speed Adjustments	
$E_T$	1.5	Lane width, LW	12.0 ft
RVs	0 %	Right-side lateral clearance, LC	6.0 ft
$E_R$	1.2	$f_{LW}$	0.0 mph
Heavy vehicle adjustment, $f_{HV}$	0.909	$f_{LC}$	0.0 mph
Driver population adj., $f_P$	1.00	Total ramp density, TRD	0.66 ramps/mi
Flow rate, vp	1319 pc/h/ln	TRD adjustment	2.3 mph
Desired level of service (LOS)		Free-flow speed, FFS	73.1 mph
		Use Speed Curve for	75 mph

## Basic Freeway Segments

### Example #7: Model Results

#### RESULTS

Flow rate, $vp$	1319 pc/h/ln	Free-flow speed	73.1 mph
Number of lanes, $N$	2	Speed, $S$	73.9 mph
Level of service, LOS	B	Density, $D$	17.9 pc/mi/ln

# Basic Freeway Segments

## Workshop #13: Model Inputs

FLOW RATE		PLANNING DATA	
Volume, DDHV	3627 vph	Average annual daily traffic, AADT	77500 vpd
Peak Hour factor, PHF	0.92	Peak-hour proportion of AADT, K	0.09
Peak 15-minute volume	v	Peak-hour direction proportion, D	52 %
Number of lanes, N	3	<b>FREE-FLOW SPEED</b>	
Terrain:	Level	Free-Flow Speed and Type	
Grade	%	<input type="radio"/> Measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
Length	mi	75.4 mph	
Trucks and buses	14 %	Speed Adjustments	
$E_T$	1.5	Lane width, LW	11.0 ft
RVs	0 %	$f_{LW}$	1.9 mph
$E_R$	1.2	Right-side lateral clearance, LC	3.0 ft
Heavy vehicle adjustment, $f_{HV}$	0.935	$f_{LC}$	1.2 mph
Driver population adj., $f_P$	1.00	Total ramp density, TRD	0.00 ramps/mi
Flow rate, vp	1406 pc/h/ln	TRD adjustment	0.0 mph
Desired level of service (LOS)		Free-flow speed, FFS	72.3 mph
		Use Speed Curve for	70 mph

## Basic Freeway Segments

### Workshop #13: Model Results

#### RESULTS

Flow rate, vp	1406 pc/h/ln	Free-flow speed	72.3 mph
Number of lanes, N	3	Speed, S	69.5 mph
Level of service, LOS	C	Density, D	20.2 pc/mi/ln

# Basic Freeway Segments

## Workshop #14: Model Inputs

FLOW RATE		PLANNING DATA	
Volume, DDHV	7266 vph	Average annual daily traffic, AADT	149500 vpd
Peak Hour factor, PHF	0.94	Peak-hour proportion of AADT, K	0.09
Peak 15-minute volume	1932 v	Peak-hour direction proportion, D	54 %
Number of lanes, N	4	<b>FREE-FLOW SPEED</b>	
Terrain:	Level	Free-Flow Speed and Type	
Grade	%	<input type="radio"/> Measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
Length	mi	75.4 mph     75.4 mph	
Trucks and buses	6 %	Speed Adjustments	
$E_T$	1.5	Lane width, LW	12.0 ft
RVs	0 %	$f_{LW}$	0.0 mph
$E_R$	1.2	Right-side lateral clearance, LC	6.0 ft
Heavy vehicle adjustment, $f_{HV}$	0.971	$f_{LC}$	0.0 mph
Driver population adj., $f_P$	1.00	Total ramp density, TRD	1.00 ramps/mi
Flow rate, vp	1990 pc/h/ln	TRD adjustment	3.2 mph
Desired level of service (LOS)		Free-flow speed, FFS	72.2 mph
		Use Speed Curve for	70 mph

## Basic Freeway Segments

### Workshop #14: Model Results

#### RESULTS

Flow rate, vp	1990 pc/h/ln	Free-flow speed	72.2 mph
Number of lanes, N	4	Speed, S	62.8 mph
Level of service, LOS	D	Density, D	31.7 pc/mi/ln

## Basic Freeway Segments

### Workshop #15A: Model Inputs

FLOW RATE		PLANNING DATA	
Volume, V	1950 vph	Average annual daily traffic, AADT	<input type="text"/> vpd
Peak Hour factor, PHF	0.88	Peak-hour proportion of AADT, K	<input type="text"/>
Peak 15-minute volume	554 v	Peak-hour direction proportion, D	<input type="text"/> %
Number of lanes, N	2	<b>FREE-FLOW SPEED</b>	
Terrain:	Level	Free-Flow Speed and Type	
Grade	<input type="text"/> %	<input type="radio"/> Measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
Length	<input type="text"/> mi	<input type="text"/> 75.4 mph	
Trucks and buses	20 %	<b>Speed Adjustments</b>	
$E_T$	1.5	Lane width, LW	11.0 ft
RVs	0 %	$f_{LW}$	1.9 mph
$E_R$	1.2	Right-side lateral clearance, LC	6.0 ft
Heavy vehicle adjustment, $f_{HV}$	0.909	$f_{LC}$	0.0 mph
Driver population adj., $f_P$	1.00	Total ramp density, TRD	0.66 ramps/mi
Flow rate, vp	1219 pc/h/ln	TRD adjustment	2.3 mph
Desired level of service (LOS)	<input type="text"/>	Free-flow speed, FFS	71.2 mph
		Use Speed Curve for	70 mph

## Basic Freeway Segments

### Workshop #15A: Model Results

#### RESULTS

Flow rate, $vp$	1219 pc/h/ln	Free-flow speed	71.2 mph
Number of lanes, $N$	2	Speed, $S$	70.0 mph
Level of service, LOS	B	Density, $D$	17.4 pc/mi/ln

# Basic Freeway Segments

## Workshop #15B: Model Inputs

FLOW RATE		PLANNING DATA	
Volume, DDHV	4180 vph	Average annual daily traffic, AADT	76000 vpd
Peak Hour factor, PHF	0.88	Peak-hour proportion of AADT, K	0.10
Peak 15-minute volume	1178 v	Peak-hour direction proportion, D	55 %
Number of lanes, N	4	<b>FREE-FLOW SPEED</b>	
Terrain:	Level	Free-Flow Speed and Type	
Grade	%	<input type="radio"/> Measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
Length	mi	75.4 mph	
Trucks and buses	20 %	Speed Adjustments	
$E_T$	1.5	Lane width, LW	11.0 ft
RVs	0 %	$f_{LW}$	1.9 mph
$E_R$	1.2	Right-side lateral clearance, LC	6.0 ft
Heavy vehicle adjustment, $f_{HV}$	0.909	$f_{LC}$	0.0 mph
Driver population adj., $f_p$	1.00	Total ramp density, TRD	0.66 ramps/mi
Flow rate, vp	1306 pc/h/ln	TRD adjustment	2.3 mph
Desired level of service (LOS)	C	Free-flow speed, FFS	71.2 mph
		Use Speed Curve for	70 mph

## Basic Freeway Segments

### Workshop #15B: Model Results

#### RESULTS

Flow rate, vp	1306 pc/h/ln	Free-flow speed	71.2 mph
Number of lanes required, N	4	Speed, S	69.9 mph
Level of service, LOS	C	Density, D	18.7 pc/mi/ln

Fewer number of lanes required will not produce the desired LOS.

## Weaving Segments

### Example #8: Model Inputs

**ROADWAY CONDITIONS**

Weaving configuration:  Segment Type:

Number of lanes, N:  ln Terrain:

Weaving segment length,  $L_S$ :  ft Grade:  %

Freeway free-flow speed, FFS:  mi/h Length:  mi

Minimum segment speed,  $S_{MIN}$ :  mi/h

Freeway max capacity,  $c_{FL}$ :  pc/h/ln

**VOLUME**

Volume Components

Non-Weaving Volumes:  $V_{FF}$ ,  $V_{RR}$  Weaving Volumes:  $V_{RF}$ ,  $V_{FR}$

Volume:  $V_{FF}$  6705 veh/h,  $V_{RF}$  705 veh/h,  $V_{FR}$  480 veh/h,  $V_{RR}$  170 veh/h

Peak hour factor, PHF: 0.92

Peak 15-minute volume,  $V_{15}$ : 1822 veh, 192 veh, 130 veh, 46 veh

**Volume Composition and Adjustments**

Trucks and buses	<input type="text" value="7"/> %			
$E_T$	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %			
$E_R$	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, $f_{HV}$	0.966	0.966	0.966	0.966
Driver population adjustment, $f_p$	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, $v$	7543 pc/h	793 pc/h	540 pc/h	191 pc/h

**CONFIGURATION CHARACTERISTICS**

Number of maneuver lanes,  $N_{WL}$ :  ln

Interchange density, ID:  int/mi

Minimum RF lane changes,  $LC_{RF}$ :  lc/pc

Minimum FR lane changes,  $LC_{FR}$ :  lc/pc

Minimum RR lane changes,  $LC_{RR}$ :  lc/pc

Minimum weaving lane changes,  $LC_{MIN}$ : 1333 lc/h

Weaving lane changes,  $LC_W$ : 2263 lc/h

Non-weaving lane changes,  $LC_{NW}$ : 3414 lc/h

Total lane changes,  $LC_{ALL}$ : 5677 lc/h

## Weaving Segments

### Example #8: Model Results

#### RESULTS

Weaving configuration	One-Sided		
Weaving segment flow rate, $v$	9067 pc/h	Weaving intensity factor, $W$	0.406
Weaving segment capacity, $c_w$	11111 veh/h	Weaving segment speed, $S$	52.0 mi/h
Weaving segment $v/c$ ratio	0.788	Average weaving speed, $S_w$	54.1 mi/h
Weaving segment density, $D$	34.8 pc/mi/ln	Average non-weaving speed, $S_{NW}$	51.7 mi/h
Level of service, LOS	D	Maximum weaving length, $L_{MAX}$	4002 ft

## Weaving Segments

### Workshop #16: Model Inputs

**ROADWAY CONDITIONS**

Weaving configuration:  Segment Type:

Number of lanes, N:  ln Terrain:

Weaving segment length,  $L_S$ :  ft Grade:  %

Freeway free-flow speed, FFS:  mi/h Length:  mi

Minimum segment speed,  $S_{MIN}$ :  mi/h

Freeway max capacity,  $c_{IFL}$ :  pc/h/ln

**VOLUME**

Volume Components

Non-Weaving Volumes

$V_{FF}$

$V_{RR}$

Weaving Volumes

$V_{RF}$

$V_{FR}$

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$
Volume	<input type="text" value="6705"/> veh/h	<input type="text" value="950"/> veh/h	<input type="text" value="480"/> veh/h	<input type="text" value="170"/> veh/h
Peak hour factor, PHF	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>
Peak 15-minute volume, $V_{15}$	1822 veh	258 veh	130 veh	46 veh

**Volume Composition and Adjustments**

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$
Trucks and buses	<input type="text" value="7"/> %			
$E_T$	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %			
$E_R$	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, $f_{HV}$	0.966	0.966	0.966	0.966
Driver population adjustment, $f_p$	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, $v$	7543 pc/h	1069 pc/h	540 pc/h	191 pc/h

**CONFIGURATION CHARACTERISTICS**

Number of maneuver lanes,  $N_{WL}$ :  ln

Interchange density, ID:  int/mi

Minimum RF lane changes,  $LC_{RF}$ :  lc/pc

Minimum FR lane changes,  $LC_{FR}$ :  lc/pc

Minimum RR lane changes,  $LC_{RR}$ :  lc/pc

Minimum weaving lane changes,  $LC_{MIN}$ : 1080 lc/h

Weaving lane changes,  $LC_{W}$ : 2010 lc/h

Non-weaving lane changes,  $LC_{NW}$ : 3414 lc/h

Total lane changes,  $LC_{ALL}$ : 5424 lc/h

## Weaving Segments

### Workshop #16: Model Results

#### RESULTS

Weaving configuration	One-Sided		
Weaving segment flow rate, $v$	9343 pc/h	Weaving intensity factor, $W$	0.392
Weaving segment capacity, $c_w$	11019 veh/h	Weaving segment speed, $S$	53.5 mi/h
Weaving segment $v/c$ ratio	0.819	Average weaving speed, $S_w$	54.5 mi/h
Weaving segment density, $D$	34.9 pc/mi/ln	Average non-weaving speed, $S_{NW}$	53.3 mi/h
Level of service, LOS	D	Maximum weaving length, $L_{MAX}$	4254 ft

## Weaving Segments

### Workshop #17: Model Inputs

**ROADWAY CONDITIONS**

Weaving configuration:  Segment Type:

Number of lanes, N:  ln Terrain:

Weaving segment length,  $L_S$ :  ft Grade:  %

Freeway free-flow speed, FFS:  mi/h Length:  mi

Minimum segment speed,  $S_{MIN}$ :  mi/h

Freeway max capacity,  $c_{FL}$ :  pc/h/ln

---

**VOLUME**

Volume Components

Non-Weaving Volumes

$V_{FF}$

$V_{FR}$

$V_{RF}$

Weaving Volumes

$V_{RR}$

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$
Volume	<input type="text" value="2850"/> veh/h	<input type="text" value="90"/> veh/h	<input type="text" value="880"/> veh/h	<input type="text" value="270"/> veh/h
Peak hour factor, PHF	<input type="text" value="0.90"/>	<input type="text" value="0.90"/>	<input type="text" value="0.90"/>	<input type="text" value="0.90"/>
Peak 15-minute volume, $V_{15}$	792 veh	25 veh	244 veh	75 veh

Volume Composition and Adjustments

	$V_{FF}$	$V_{RF}$	$V_{FR}$	$V_{RR}$
Trucks and buses	<input type="text" value="5"/> %			
$E_T$	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %			
$E_R$	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, $f_{HV}$	0.976	0.976	0.976	0.976
Driver population adjustment, $f_p$	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, $v$	3246 pc/h	103 pc/h	1002 pc/h	308 pc/h

**CONFIGURATION CHARACTERISTICS**

Number of maneuver lanes,  $N_{WL}$ :  ln

Interchange density, ID:  int/mi

Minimum RF lane changes,  $LC_{RF}$ :  lc/pc

Minimum FR lane changes,  $LC_{FR}$ :  lc/pc

Minimum RR lane changes,  $LC_{RR}$ :  lc/pc

Minimum weaving lane changes,  $LC_{MIN}$ : 924 lc/h

Weaving lane changes,  $LC_W$ : 1372 lc/h

Non-weaving lane changes,  $LC_{NW}$ : 1210 lc/h

Total lane changes,  $LC_{ALL}$ : 2582 lc/h

## Weaving Segments

### Workshop #17: Model Results

#### RESULTS

Weaving configuration	Two-Sided		
Weaving segment flow rate, $v$	4659 pc/h	Weaving intensity factor, $W$	0.276
Weaving segment capacity, $c_w$	8070 veh/h	Weaving segment speed, $S$	57.8 mi/h
Weaving segment $v/c$ ratio	0.563	Average weaving speed, $S_w$	58.1 mi/h
Weaving segment density, $D$	20.2 pc/mi/ln	Average non-weaving speed, $S_{NW}$	57.8 mi/h
Level of service, LOS	C	Maximum weaving length, $L_{MAX}$	6346 ft

## Merge/Diverge Segments

### Example #9: Model Inputs

**FREEWAY-RAMP COMPONENTS AND CHARACTERISTICS**

**Freeway Data**

Number of lanes on freeway,  $N$     
 Free-flow speed,  $S_{FF}$   mph   
 Volume,  $V$   vph

**On Ramp Data**

Side of Freeway Ramp Connects:   
 Left  Right   
 Number of lanes on ramp,  $N$     
 Free-flow speed,  $S_{FR}$   mph   
 Volume,  $V_R$   vph   
 Length of first acceleration lane, LA or LA1  ft   
 Length of second acceleration lane, LA2  ft

**Adjacent Ramp Data**

Does one exist?   
 Yes  No   
 Position of Adjacent Ramp:   
 Upstream  Downstream   
 Distance to adjacent ramp  ft   
 Type of Adjacent Ramp:   
 On  Off   
 Volume on adjacent ramp  vph

**VOLUME ADJUSTMENT**

Volume Components:	Freeway	Ramp	Adjacent Ramp
Volume	<input type="text" value="5120"/> vph	<input type="text" value="1030"/> vph	<input type="text" value="0"/> vph
Peak-hour factor, PHF	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>
Peak 15-Minute Volume, $V_{15}$	1362 v	274 v	0 v

Terrain:	Freeway	Ramp	Adjacent Ramp
Terrain:	Grade	Level	Level
Grade	<input type="text" value="1.00"/> %	<input type="text" value="0.00"/> %	<input type="text" value="0.00"/> %
Length	<input type="text" value="0.50"/> mi	<input type="text" value="0.00"/> mi	<input type="text" value="0.00"/> mi

Volume Composition:	Freeway	Ramp	Adjacent Ramp
Trucks and buses	<input type="text" value="6"/> %	<input type="text" value="7"/> %	<input type="text" value="0"/> %
$E_T$	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %	<input type="text" value="0"/> %	<input type="text" value="0"/> %
$E_R$	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, $f_{HV}$	0.971	0.966	1.000
Driver population adjustment, $f_P$	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, vp	5610 pcph	1134 pcph	0 pcph

## Merge/Diverge Segments

### Example #9: Model Results

#### RESULTS of MERGE AREA

##### Estimation of $v_{12}$ :

$$P_{FM} = 0.609 \quad \text{Using Equ. 1}$$

$$v_{12} = v_F \cdot P_{FM}$$

$$v_{12} = 3417 \text{ pcph}$$

##### Capacity Checks:

	Actual	Maximum	Violation?
$v_{FO}$	6744	7200	No
$v_{R12}$	4551	4600	No

##### Level of Service Determination (if not LOS F):

$$\text{Compute DR} = 33.4 \text{ pc/mi/ln}$$

$$\text{LOS} = \text{D}$$

Exhibit 13-2

$$\text{Compute SR} = 53 \text{ mph}$$

## Merge/Diverge Segments

### Workshop #18: Model Inputs

#### FREEWAY-RAMP COMPONENTS AND CHARACTERISTICS

##### Freeway Data

Number of lanes on freeway, N

Free-flow speed,  $S_{FF}$   mph

Volume, V  vph

##### On Ramp Data

Side of Freeway Ramp Connects  
 Left  Right

Number of lanes on ramp, N

Free-flow speed,  $S_{FR}$   mph

Volume,  $V_R$   vph

Length of first acceleration lane, LA or LA1  ft

Length of second acceleration lane, LA2  ft

##### Adjacent Ramp Data

Does one exist?  
 Yes  No

Position of Adjacent Ramp  
 Upstream  Downstream

Distance to adjacent ramp  ft

Type of Adjacent Ramp  
 On  Off

Volume on adjacent ramp  vph

#### VOLUME ADJUSTMENT

Volume Components:	Freeway	Ramp	Adjacent Ramp
Volume	<input type="text" value="5120"/> vph	<input type="text" value="1030"/> vph	<input type="text" value="585"/> vph
Peak-hour factor, PHF	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>
Peak 15-Minute Volume, $V_{15}$	1362 v	274 v	156 v
Terrain:	Grade ▾	Level ▾	Level ▾
Grade	<input type="text" value="1.00"/> %	<input type="text" value="0.00"/> %	<input type="text" value="0.00"/> %
Length	<input type="text" value="0.50"/> mi	<input type="text" value="0.00"/> mi	<input type="text" value="0.00"/> mi
Volume Composition:			
Trucks and buses	<input type="text" value="6"/> %	<input type="text" value="7"/> %	<input type="text" value="7"/> %
$E_T$	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %	<input type="text" value="0"/> %	<input type="text" value="0"/> %
$E_R$	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, $f_{HV}$	0.971	0.966	0.966
Driver population adjustment, $f_p$	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, vp	5610 pcph	1134 pcph	644 pcph

## Merge/Diverge Segments

### Workshop #18: Model Results

#### RESULTS of MERGE AREA

Estimation of  $v_{12}$ :

$$P_{FM} = 0.609 \quad \text{Using Equ. 1}$$

$$v_{12} = v_F \cdot P_{FM}$$

$$v_{12} = 3417 \text{ pcph}$$

Capacity Checks:

	Actual	Maximum	Violation?
$v_{FO}$	6744	7200	No
$v_{R12}$	4551	4600	No

Level of Service Determination (if not LOS F):

$$\text{Compute DR} = 33.4 \text{ pc/mi/ln}$$

$$\text{LOS} = \text{D}$$

Exhibit 13-2

$$\text{Compute SR} = 53 \text{ mph}$$

## Merge/Diverge Segments

### Workshop #19: Model Inputs

#### FREEWAY-RAMP COMPONENTS AND CHARACTERISTICS

##### Freeway Data

Number of lanes on freeway, N:

Free-flow speed, S<sub>FF</sub>:  mph

Volume, V:  vph

##### Off Ramp Data

Side of Freeway:  Left  Right

Number of lanes on ramp, N:

Free-flow speed, S<sub>FR</sub>:  mph

Length of first deceleration lane, LD or LD1:  ft

Volume, V<sub>R</sub>:  vph

Length of Second Deceleration Lane, LD2:  ft

##### Adjacent Ramp Data

Does one exist?  Yes  No

Position of Adjacent Ramp:  Upstream  Downstream

Distance to adjacent ramp:  ft

Type of Adjacent Ramp:  On  Off

Volume on adjacent ramp:  vph

#### VOLUME ADJUSTMENT

Volume Components:	Freeway	Ramp	Adjacent Ramp
Volume	<input type="text" value="6150"/> vph	<input type="text" value="585"/> vph	<input type="text" value="0"/> vph
Peak-hour factor, PHF	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>
Peak 15-minute volume, V <sub>15</sub>	1636 <sub>v</sub>	156 <sub>v</sub>	0 <sub>v</sub>
Terrain:	Level	Level	Level
Grade	<input type="text" value="0.00"/> %	<input type="text" value="0.00"/> %	<input type="text" value="0.00"/> %
Length	<input type="text" value="0.00"/> mi	<input type="text" value="0.00"/> mi	<input type="text" value="0.00"/> mi
Volume Composition:			
Trucks and buses	<input type="text" value="6"/> %	<input type="text" value="7"/> %	<input type="text" value="0"/> %
E <sub>T</sub>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %	<input type="text" value="0"/> %	<input type="text" value="0"/> %
E <sub>R</sub>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, f <sub>HV</sub>	0.971	0.966	1.000
Driver population adjustment, f <sub>p</sub>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, vp	6739 pcph	644 pcph	0 pcph

## Merge/Diverge Segments

### Workshop #19: Model Results

#### RESULTS of DIVERGE AREA

##### Estimation of $v_{12}$ :

$P_{FD} = 0.562$  Using Equ. 5

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 4069 \text{ pcph}$$

##### Capacity Checks:

	Actual	Maximum	Violation?
$v_{Fi} = v_F$	6739	7200	No
$v_{12}$	4069	4400	No
$v_{FO} = v_F - v_R$	6095	7200	No
$v_R$	644	2100	No

##### Level of Service Determination (if not LOS F):

Compute DR = 34.9 pc/mi/ln

LOS = D (Exhibit 13-2)

Compute SR = 58.2 mph

## Merge/Diverge Segments

### Workshop #20: Model Inputs

**FREEWAY-RAMP COMPONENTS AND CHARACTERISTICS**

**Freeway Data**

Number of lanes on freeway, N:

Free-flow speed,  $S_{FF}$ :  mph

Volume, V:  vph

**Off Ramp Data**

Side of Freeway:  Left  Right

Number of lanes on ramp, N:

Free-flow speed,  $S_{FR}$ :  mph

Length of first deceleration lane, LD or LD1:  ft

Volume,  $V_R$ :  vph

Length of Second Deceleration Lane, LD2:

**Adjacent Ramp Data**

Does one exist?  Yes  No

Position of Adjacent Ramp:  Upstream  Downstream

Distance to adjacent ramp:  ft

Type of Adjacent Ramp:  On  Off

Volume on adjacent ramp:  vph

**VOLUME ADJUSTMENT**

Volume Components:	Freeway	Ramp	Adjacent Ramp
Volume	<input type="text" value="6150"/> vph	<input type="text" value="585"/> vph	<input type="text" value="1030"/> vph
Peak-hour factor, PHF	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>	<input type="text" value="0.94"/>
Peak 15-minute volume, $V_{15}$	1636 v	156 v	274 v
<b>Terrain:</b>	<input type="text" value="Level"/>	<input type="text" value="Level"/>	<input type="text" value="Level"/>
Grade	<input type="text" value="0.00"/> %	<input type="text" value="0.00"/> %	<input type="text" value="0.00"/> %
Length	<input type="text" value="0.00"/> mi	<input type="text" value="0.00"/> mi	<input type="text" value="0.00"/> mi
<b>Volume Composition:</b>			
Trucks and buses	<input type="text" value="6"/> %	<input type="text" value="7"/> %	<input type="text" value="7"/> %
$E_T$	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>	<input type="text" value="1.5"/>
Recreational vehicles	<input type="text" value="0"/> %	<input type="text" value="0"/> %	<input type="text" value="0"/> %
$E_R$	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>	<input type="text" value="1.2"/>
Heavy vehicle adjustment, $f_{HV}$	0.971	0.966	0.966
Driver population adjustment, $f_p$	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>	<input type="text" value="1.00"/>
Flow rate, vp	6739 pcph	644 pcph	1134 pcph

## Merge/Diverge Segments

### Workshop #20: Model Results

#### RESULTS of DIVERGE AREA

Estimation of  $v_{12}$ :

$$P_{FD} = 0.562 \quad \text{Using Equ. 5}$$

$$v_{12} = v_R + (v_F - v_R) P_{FD} = 4069 \text{ pcph}$$

Capacity Checks:

	Actual	Maximum	Violation?
$v_{Fi} = v_F$	6739	7200	No
$v_{12}$	4069	4400	No
$v_{FD} = v_F - v_R$	6095	7200	No
$v_R$	644	2100	No

Level of Service Determination (if not LOS F):

$$\text{Compute DR} = 34.9 \text{ pc/mi/ln}$$

$$\text{LOS} = \text{D} \quad (\text{Exhibit 13-2})$$

$$\text{Compute SR} = 58.2 \text{ mph}$$

## Freeway Facilities

### Example #10: Model Inputs

	From	To	Input Segment Type	Length (ft)	Terrain	Edit Segment	Adjusted Demand (veh/h)	% Trucks	% RVs	Number of Lanes	Free-Flow Speed (mi/h)	Adj. On-Ramp Demand (veh/h)	On-Ramp % Trucks	On-Ramp % RVs	On-Ramp Lanes	On-Ramp FFS (mi/h)
1	A	B	Basic Segment	5280	Level	Edit	4100	10.00	0.00	3	70					
2	B	C	Off-Ramp	1500	Level	Edit	4100	10.00	0.00	3	70					
3	C	D	Basic Segment	1500	Level	Edit	2400	10.00	0.00	3	70					
▶ 4	D	E	Weaving	1500	Level	Edit	2600	10.00	0.00	3	70	200	10.00	0.00	1	40
5	E	F	Basic Segment	7000	Level	Edit	2200	10.00	0.00	3	70					
6	F	G	Off-Ramp	1500	Level	Edit	2200	10.00	0.00	3	70					
7	G	H	Basic Segment	3000	Level	Edit	1700	10.00	0.00	3	70					
8	H	I	On-Ramp	1500	Level	Edit	2600	10.00	0.00	3	70	900	10.00	0.00	1	40
9	I	J	Basic Segment	5280	Level	Edit	2600	10.00	0.00	3	70					

	From	To	Input Segment Type	Length (ft)	Terrain	Edit Segment
1	A	B	Basic Segment	5280	Level	Edit
2	B	C	Off-Ramp	1500	Level	Edit
3	C	D	Basic Segment	1500	Level	Edit
▶ 4	D	E	Weaving	1500	Level	Edit
5	E	F	Basic Segment	7000	Level	Edit
6	F	G	Off-Ramp	1500	Level	Edit
7	G	H	Basic Segment	3000	Level	Edit
8	H	I	On-Ramp	1500	Level	Edit
9	I	J	Basic Segment	5280	Level	Edit

Adj. Off-Ramp Demand (veh/h)	Off-Ramp % Trucks	Off-Ramp % RVs	Off-Ramp Lanes	Off-Ramp FFS (mi/h)
1700	10.00	0.00	1	40
400	10.00	0.00	1	40
500	10.00	0.00	1	40

## Freeway Facilities

### Example #10: Model Inputs: Ramp Segments

Ramp Segment Data

Segment # 2: From B to C

Note: The mainline roadway % Trucks, % RVs, and Demand inputs can only be modified for the first segment.

**Mainline Roadway**

	Time Period	Number of Lanes	Free Flow Speed (mi/h)	Capacity Adj. Fact.
▶	1	3	70	1.000

**Ramp Roadway**

	Time Period	Accel/Decel Length (ft)	Number of Lanes	Free Flow Speed (mi/h)	% Trucks	% RVs	Demand (veh/h)	Demand Adj. Fact.
▶	1	850	1	40	10.00	0.00	1700	1.00

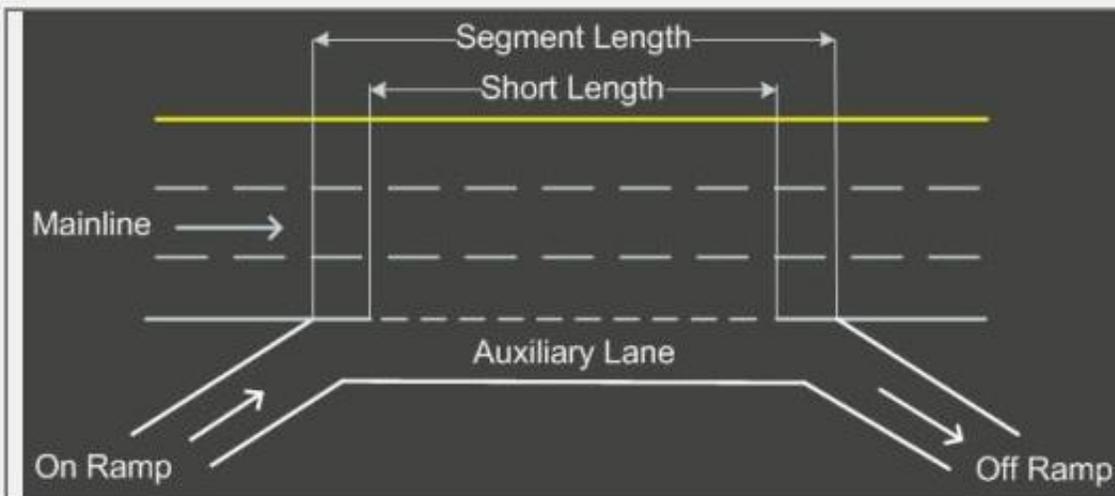
OK Cancel

Segment # 4: From D to E

Note: The % Trucks, % RVs, and Demand inputs can only be modified for the

Note: # Lanes include Aux Lanes.

## Exam



### Weave Configuration

One-Sided     Two-Sided

Short Length (ft)

# of Weaving Lanes

Min. Lane Changes Freeway-Ramp

Min. Lane Changes Ramp-Freeway

Min. Lane Changes Ramp-Ramp

### On-Ramp Roadway

### Off-Ramp Roadway

	Time Period	Free Flow Speed (mi/h)	% Trucks	% RVs	Demand (veh/h)	Demand Adj. Fact.	Ramp To Ramp Prop.	Free Flow Speed (mi/h)	% Trucks	% RVs	Demand (veh/h)	Demand Adj. Fact.
▶	1	40	10.00	0.00	200	1.00	0.01	40	10.00	0.00	400	1.00

## Freeway Facilities

### Example #10: Model Results

	Segment	Input Segment Type	Analysis Segment Type	Maximum d/c Ratio	Average Speed (mi/h)	Average Density (pc/mi/ln)	Average Density (veh/mi/ln)	Avg. Travel Time (min/veh)	Free-Flow Travel Time (min/veh)	VMT Demand (veh-mi)	VMT Volume (veh-mi)	VHT (veh-hrs)	VHD (veh-hrs)
▶ 1	A-B	Basic	Basic	0.60	69.4	20.7	19.7	0.87	0.86	1,025.0	1,025.0	14.8	.1
2	B-C	OffRamp	OffRamp	0.60	59.5	24.1	23.0	0.29	0.24	291.2	291.2	4.9	.7
3	C-D	Basic	Basic	0.35	69.1	12.2	11.6	0.25	0.24	170.5	170.5	2.5	.0
4	D-E	Weaving	Weaving	0.44	59.9	15.2	14.5	0.28	0.24	184.7	184.7	3.1	.4
5	E-F	Basic	Basic	0.32	70.0	11.0	10.5	1.14	1.14	729.2	729.2	10.4	.0
6	F-G	OffRamp	OffRamp	0.32	62.2	12.4	11.8	0.27	0.24	156.3	156.3	2.5	.3
7	G-H	Basic	Basic	0.25	69.8	8.5	8.1	0.49	0.49	241.5	241.5	3.5	.0
8	H-I	OnRamp	OnRamp	0.38	63.4	14.1	13.4	0.27	0.24	184.7	184.7	2.9	.3
9	I-J	Basic	Basic	0.38	70.0	13.0	12.4	0.86	0.86	650.0	650.0	9.3	.0
10	Facility				67.5	14.2	13.5	4.71	4.56	3,632.9	3,632.9	53.8	1.9

# Freeway Facilities

## Workshop #21: Model Inputs

	From	To	Input Segment Type	Length (ft)	Terrain	Edit Segment	Adjusted Demand (veh/h)	% Trucks	% RVs	Number of Lanes	Free-Flow Speed (mi/h)	Adj. On-Ramp Demand (veh/h)	On-Ramp % Trucks	On-Ramp % RVs	On-Ramp Lanes	On-Ramp FFS (mi/h)
▶ 1	A	B	Basic Segment ▼	2500	Level ▼	Edit	5550	8.00	0.00	3	75					
2	B	C	Off-Ramp ▼	1500	Level ▼	Edit	5550	8.00	0.00	3	75					
3	C	D	Basic Segment ▼	2000	Level ▼	Edit	5000	8.55	0.00	3	75					
4	D	E	On-Ramp ▼	1500	Level ▼	Edit	6000	7.63	0.00	3	75	1000	3.00	0.00	1	40
5	E	F	Basic Segment ▼	9000	Level ▼	Edit	6000	7.63	0.00	3	75					
6	F	G	Off-Ramp ▼	1500	Level ▼	Edit	6000	7.63	0.00	3	75					
7	G	H	Basic Segment ▼	1000	Level ▼	Edit	5750	7.83	0.00	3	75					
8	H	I	On-Ramp ▼	1500	Level ▼	Edit	6750	7.11	0.00	3	75	1000	3.00	0.00	1	40
9	I	J	Basic Segment ▼	2500	Level ▼	Edit	6750	7.11	0.00	3	75					

	From	To	Input Segment Type	Length (ft)	Terrain	Edit Segment
▶ 1	A	B	Basic Segment ▼	2500	Level ▼	Edit
2	B	C	Off-Ramp ▼	1500	Level ▼	Edit
3	C	D	Basic Segment ▼	2000	Level ▼	Edit
4	D	E	On-Ramp ▼	1500	Level ▼	Edit
5	E	F	Basic Segment ▼	9000	Level ▼	Edit
6	F	G	Off-Ramp ▼	1500	Level ▼	Edit
7	G	H	Basic Segment ▼	1000	Level ▼	Edit
8	H	I	On-Ramp ▼	1500	Level ▼	Edit
9	I	J	Basic Segment ▼	2500	Level ▼	Edit

Adj. Off-Ramp Demand (veh/h)	Off-Ramp % Trucks	Off-Ramp % RVs	Off-Ramp Lanes	Off-Ramp FFS (mi/h)
550	3.00	0.00	1	40
250	3.00	0.00	1	40

## Freeway Facilities

### Workshop #21: Model Inputs: Ramp Segments

**Ramp Segment Data**

Segment # 2: From B to C

Note: The mainline roadway % Trucks, % RVs, and Demand inputs can only be modified for the first segment.

**Mainline Roadway**

	Time Period	Number of Lanes	Free Flow Speed (mi/h)	Capacity Adj. Fact.
▶	1	3	75	1.000

**Ramp Roadway**

	Time Period	Accel/Decel Length (ft)	Number of Lanes	Free Flow Speed (mi/h)	% Trucks	% RVs	Demand (veh/h)	Demand Adj. Fact.
▶	1	450	1	40	3.00	0.00	550	1.00

## Freeway Facilities

### Workshop #21: Model Results

	Segment	Input Segment Type	Analysis Segment Type	Maximum d/c Ratio	Average Speed (mi/h)	Average Density (pc/mi/ln)	Average Density (veh/mi/ln)	Avg. Travel Time (min/veh)	Free-Flow Travel Time (min/veh)	VMT Demand (veh-mi)	VMT Volume (veh-mi)	VHT (veh-hrs)	VHD (veh-hrs)
▶ 1	A-B	Basic	Basic	0.80	65.5	29.4	28.2	0.43	0.38	657.0	657.0	10.0	1.3
2	B-C	OffRamp	Basic	0.80	66.6	28.9	27.8	0.26	0.23	394.2	394.2	5.9	.7
3	C-D	Basic	Basic	0.72	69.0	25.2	24.2	0.33	0.30	473.5	473.5	6.9	.6
4	D-E	OnRamp	Basic	0.87	61.6	33.6	32.4	0.28	0.23	426.1	426.1	6.9	1.2
5	E-F	Basic	Basic	0.87	62.2	33.4	32.2	1.64	1.36	2,556.8	2,556.8	41.1	7.0
6	F-G	OffRamp	Basic	0.87	67.1	31.0	29.8	0.25	0.23	426.1	426.1	6.4	.7
7	G-H	Basic	Basic	0.83	64.1	31.1	29.9	0.18	0.15	272.3	272.3	4.2	.6
8	H-I	OnRamp	Basic	0.97	58.0	40.1	38.7	0.29	0.23	479.4	479.4	8.3	1.9
9	I-J	Basic	Basic	0.97	55.4	42.0	40.6	0.51	0.38	799.0	799.0	14.4	3.8
10	Facility				62.3	33.1	31.9	4.18	3.48	6,484.4	6,484.4	104.1	17.7

## Multi-Lane Highways

### Example #11: Model Inputs

FREE-FLOW SPEED		Direction 1	Direction 2
Free-flow speed:	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
		65.0 mph	65.0 mph
Median type	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided	
		F M 0.0 mph	F M 0.0 mph
Lane width, LW	12.0 ft	12.0 ft	
	F LW 0.0 mph	F LW 0.0 mph	
Lateral clearance:			
Right edge	6.0 ft	6.0 ft	
Left edge	6.0 ft	6.0 ft	
Total lateral clearance	12.0 ft	12.0 ft	
	F LC 0.0 mph	F LC 0.0 mph	
Access points/mile	2	3	
	F A 0.5 mph	F A 0.8 mph	
Free-flow speed, FFS		64.5 mph	64.3 mph
Use Speed curve for:		0.0 mph	0.0 mph

VOLUME		Direction 1	Direction 2
Volume, V		260	220
Peak-hour factor, PHF		0.88	0.88
Peak 15-minute volume, v15	74 veh/h		63 veh/h
Number of lanes, N		2	2
Terrain:	Level	Level	
Grade	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	
Trucks and buses	12 %	16 %	
	ET 1.5	ET 1.5	
Recreational vehicles	0 %	0 %	
	ER 1.2	ER 1.2	
Heavy vehicle adjustment	fHV 0.943	fHV 0.926	
Driver population factor	fP 1.00	fP 1.00	
Flow rate, vp		156 pc/h/ln	135 pc/h/ln

## Multi-Lane Highways

### Example #11: Model Results

RESULTS		
Direction	1	2
Flow rate, vp	156 pc/h/ln	135 pc/h/ln
Free-flow speed, FFS	64.5 mph	64.3 mph
Average passenger-car travel speed, S	mph	mph
Level of Service, LOS	F	F
Density, D	pc/mi/ln	pc/mi/ln

## Multi-Lane Highways

### Workshop #22: Model Inputs

FREE-FLOW SPEED		
Direction	1	2
Free-flow speed:	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS
	55.0 mph	55.0 mph
Median type	<input type="radio"/> Divided <input checked="" type="radio"/> Undivided	<input type="radio"/> Divided <input checked="" type="radio"/> Undivided
	F M 1.6 mph	F M 1.6 mph
Lane width, LW	12.0 ft	12.0 ft
	F LW 0.0 mph	F LW 0.0 mph
Lateral clearance:		
Right edge	0.0 ft	0.0 ft
Left edge	0.0 ft	0.0 ft
Total lateral clearance	6.0 ft	6.0 ft
	F LC 1.3 mph	F LC 1.3 mph
Access points/mile	30	35
	F A 7.5 mph	F A 8.8 mph
Free-flow speed, FFS	44.6 mph	43.3 mph
Use Speed curve for:	45.0 mph	45.0 mph

VOLUME		
Direction	1	2
Volume, V	765	975
Peak-hour factor, PHF	0.92	0.85
Peak 15-minute volume, v15	208 veh/h	287 veh/h
Number of lanes, N	2	2
Terrain:	Level	Level
Grade	0.00 %	0.00 %
Length	0.00 mi	0.00 mi
Trucks and buses	5 %	2 %
	ET 1.5	ET 1.5
Recreational vehicles	0 %	0 %
	ER 1.2	ER 1.2
Heavy vehicle adjustment	fHV 0.976	fHV 0.990
Driver population factor	fP 1.00	fP 1.00
Flow rate, vp	426 pc/h/ln	579 pc/h/ln

BICYCLE LEVEL OF SERVICE		
Posted speed limit, Sp	50 mph	50 mph
Percent of segment with occupied on-highway parking	0	0
Pavement Rating, P	5	5

## Multi-Lane Highways

### Workshop #22: Model Results

RESULTS			
Direction	1	2	
Flow rate, vp	426 pc/h/ln	579 pc/h/ln	
Free-flow speed, FFS	44.6 mph	43.3 mph	
Average passenger-car travel speed, S	45.0 mph	45.0 mph	
Level of Service, LOS	A	B	
Density, D	9.5 pc/mi/ln	12.9 pc/mi/ln	
BICYCLE LEVEL OF SERVICE			
Posted speed limit, Sp	<input type="text" value="50"/>	mph	<input type="text" value="50"/>
Percent of segment with occupied on-highway parking	<input type="text" value="0"/>		<input type="text" value="0"/>
Pavement Rating, P	<input type="text" value="5"/>		<input type="text" value="5"/>
Flow rate in outside lane, $V_{OL}$	415.8 veh/h		573.5 veh/h
Effective width of outside lane, $W_o$	12.00 ft		12.00 ft
Effective Speed factor, St	4.62		4.62
Bicycle LOS Score, BLOSS	4.81		4.19
Bicycle LOS	E		D

## Multi-Lane Highways

### Workshop #23: Model Inputs

FREE-FLOW SPEED		
Direction	1	2
Free-flow speed:	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS
	45.0 mph	45.0 mph
Median type	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided
	F M 0.0 mph	F M 0.0 mph
Lane width, LW	12.0 ft	12.0 ft
	F LW 0.0 mph	F LW 0.0 mph
Lateral clearance:		
Right edge	6.0 ft	6.0 ft
Left edge	0.0 ft	0.0 ft
Total lateral clearance	6.0 ft	6.0 ft
	F LC 1.3 mph	F LC 1.3 mph
Access points/mile	18	23
	F A 4.5 mph	F A 5.8 mph
Free-flow speed, FFS	39.2 mph	38.0 mph
Use Speed curve for:	0.0 mph	0.0 mph

VOLUME		
Direction	1	2
Volume, V	690	890
Peak-hour factor, PHF	0.94	0.90
Peak 15-minute volume, v15	184 veh/h	247 veh/h
Number of lanes, N	2	2
Terrain:	Level	Level
Grade	0.00 %	0.00 %
Length	0.00 mi	0.00 mi
Trucks and buses	11 %	13 %
ET	1.5	1.5
Recreational vehicles	0 %	0 %
ER	1.2	1.2
Heavy vehicle adjustment	iHV 0.948	iHV 0.939
Driver population factor	iP 1.00	iP 1.00
Flow rate, vp	387 pc/h/ln	526 pc/h/ln

BICYCLE LEVEL OF SERVICE		
Posted speed limit, Sp	40 mph	40 mph
Percent of segment with occupied on-highway parking	0	0
Pavement Rating, P	4	4

## Multi-Lane Highways

### Workshop #23: Model Results

RESULTS			
Direction	1	2	
Flow rate, vp	387 pc/h/ln	526 pc/h/ln	
Free-flow speed, FFS	39.2 mph	38.0 mph	
Average passenger-car travel speed, S	mph	mph	
Level of Service, LOS			
Density, D	pc/mi/ln	pc/mi/ln	
BICYCLE LEVEL OF SERVICE			
Posted speed limit, Sp	<input type="text" value="40"/> mph	<input type="text" value="40"/> mph	
Percent of segment with occupied on-highway parking	<input type="text" value="0"/>	<input type="text" value="0"/>	
Pavement Rating, P	<input type="text" value="4"/>	<input type="text" value="4"/>	
Flow rate in outside lane, $V_{OL}$	367.0 veh/h	494.4 veh/h	
Effective width of outside lane, $W_o$	24.00 ft	24.00 ft	
Effective Speed factor, St	4.17	4.17	
Bicycle LOS Score, BLOSS	4.43	5.36	
Bicycle LOS	D	E	

## Multi-Lane Highways

### Workshop #24: Model Inputs

FREE-FLOW SPEED		
Direction	1	2
Free-flow speed:	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS
	50.0 mph	50.0 mph
Median type	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided
	FM 0.0 mph	FM 0.0 mph
Lane width, LW	11.0 ft	11.0 ft
	FLW 1.9 mph	FLW 1.9 mph
Lateral clearance:		
Right edge	0.0 ft	0.0 ft
Left edge	6.0 ft	6.0 ft
Total lateral clearance	6.0 ft	6.0 ft
	F LC 1.3 mph	F LC 1.3 mph
Access points/mile	11	15
	F A 2.8 mph	F A 3.8 mph
Free-flow speed, FFS	44.0 mph	43.0 mph
Use Speed curve for:	45.0 mph	45.0 mph

VOLUME		
Direction	1	2
Volume, V	1840	1130
Peak-hour factor, PHF	0.84	0.78
Peak 15-minute volume, v15	548 veh/h	362 veh/h
Number of lanes, N	2	2
Terrain:	Level	Level
Grade	0.00 %	0.00 %
Length	0.00 mi	0.00 mi
Trucks and buses	9 %	20 %
	ET 1.5	ET 1.5
Recreational vehicles	0 %	0 %
	ER 1.2	ER 1.2
Heavy vehicle adjustment	fHV 0.957	fHV 0.909
Driver population factor	fP 0.90	fP 0.90
Flow rate, vp	1271 pc/h/ln	885 pc/h/ln

BICYCLE LEVEL OF SERVICE		
Posted speed limit, Sp	45 mph	45 mph
Percent of segment with occupied on-highway parking	0	0
Pavement Rating, P	3	3

## Multi-Lane Highways

### Workshop #24: Model Results

RESULTS			
Direction	1	2	
Flow rate, vp	1271 pc/h/ln	885 pc/h/ln	
Free-flow speed, FFS	44.0 mph	43.0 mph	
Average passenger-car travel speed, S	45.0 mph	45.0 mph	
Level of Service, LOS	D	C	
Density, D	28.2 pc/mi/ln	19.7 pc/mi/ln	
BICYCLE LEVEL OF SERVICE			
Posted speed limit, Sp	<input type="text" value="45"/> mph	<input type="text" value="45"/> mph	
Percent of segment with occupied on-highway parking	<input type="text" value="0"/>	<input type="text" value="0"/>	
Pavement Rating, P	<input type="text" value="3"/>	<input type="text" value="3"/>	
Flow rate in outside lane, $V_{OL}$	1095.2 veh/h	724.4 veh/h	
Effective width of outside lane, $W_o$	11.00 ft	11.00 ft	
Effective Speed factor, St	4.42	4.42	
Bicycle LOS Score, BLOSS	7.09	11.93	
Bicycle LOS	F	F	

## Multi-Lane Highways

### Workshop #25: Model Inputs

FREE-FLOW SPEED			
Direction	1	2	
Free-flow speed:	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	
	55.0 mph	55.0 mph	
Median type	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided	<input checked="" type="radio"/> Divided <input type="radio"/> Undivided	
	F M 0.0 mph	F M 0.0 mph	
Lane width, LW	12.0 ft	12.0 ft	
	F LW 0.0 mph	F LW 0.0 mph	
Lateral clearance:			
Right edge	6.0 ft	6.0 ft	
Left edge	6.0 ft	6.0 ft	
Total lateral clearance	12.0 ft	12.0 ft	
	F LC 0.0 mph	F LC 0.0 mph	
Access points/mile	8	8	
	F A 2.0 mph	F A 2.0 mph	
Free-flow speed, FFS	53.0 mph	53.0 mph	
Use Speed curve for:	55.0 mph	55.0 mph	

VOLUME			
Direction	1	2	
Volume, V	1845	1845	
Peak-hour factor, PHF	0.92	0.92	
Peak 15-minute volume, v15	501 veh/h	501 veh/h	
Number of lanes, N	3	3	
Terrain:	Level	Level	
Grade	0.00 %	0.00 %	
Length	0.00 mi	0.00 mi	
Trucks and buses	9 %	9 %	
	ET 1.5	ET 1.5	
Recreational vehicles	0 %	0 %	
	ER 1.2	ER 1.2	
Heavy vehicle adjustment	fHV 0.957	fHV 0.957	
Driver population factor	fP 1.00	fP 1.00	
Flow rate, vp	698 pc/h/ln	698 pc/h/ln	

BICYCLE LEVEL OF SERVICE			
Posted speed limit, Sp	50 mph	50 mph	
Percent of segment with occupied on-highway parking	0	0	
Pavement Rating, P	4	4	

## Multi-Lane Highways

### Workshop #25: Model Results

RESULTS			
Direction	1	2	
Flow rate, vp	698 pc/h/ln	698 pc/h/ln	
Free-flow speed, FFS	53.0 mph	53.0 mph	
Average passenger-car travel speed, S	55.0 mph	55.0 mph	
Level of Service, LOS	B	B	
Density, D	12.7 pc/mi/ln	12.7 pc/mi/ln	
BICYCLE LEVEL OF SERVICE			
Posted speed limit, Sp	<input type="text" value="50"/> mph	<input type="text" value="50"/> mph	
Percent of segment with occupied on-highway parking	<input type="text" value="0"/>	<input type="text" value="0"/>	
Pavement Rating, P	<input type="text" value="4"/>	<input type="text" value="4"/>	
Flow rate in outside lane, $V_{OL}$	668.5 veh/h	668.5 veh/h	
Effective width of outside lane, $W_o$	24.00 ft	24.00 ft	
Effective Speed factor, St	4.62	4.62	
Bicycle LOS Score, BLOSS	4.37	4.37	
Bicycle LOS	D	D	

## Two-Lane Highways

### Example #12: Model Inputs

**Input Data**

Data for the analysis direction only.

Terrain:

Percent Trucks Crawling:  TCS Difference:  mi/h

Shoulder Width:  ft

Lane Width:  ft

Segment Length:  mi

Grade:  % Length:  mi

Peak Hour Factor, PHF:

Trucks and Buses:  %

Recreational Vehicles:  %

Percent No-Passing Zones:  %

Access-Point Density:  /mi

Class I Highway  Class II Highway  Class III Highway

Analysis Direction Volume:  vph

Opposing Direction Volume:  vph

**Average Travel Speed**

	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.2"/>	<input type="text" value="1.4"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.0"/>	<input type="text" value="1.0"/>
Heavy-vehicle Adjustment Factor, fHV	0.988	0.977
Grade Adjustment Factor, fg	1.00	1.00
Directional Flow Rate, vi	529 pc/h	356 pc/h

**Free-Flow Speed**

Measured  Estimated

Field Measured Speed, SFM:  mi/h

Base Free-Flow Speed, BFFS:  mi/h

Observed Total Demand, v:  veh/h

Adj. for Lane and Shoulder Width, fLS:  mi/h

Adj. for Access Point Density:  mi/h

Free-Flow Speed, FFS: 49.9 mi/h

Adj for No-Passing Zones, fnp:  mi/h

Average travel speed, ATSD: 40.1 mi/h

Percent Free Flow Speed, PFFS: 80.4 %

## Two-Lane Highways

### Example #12: Model Results

Percent Time Spent Following		
	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.0"/>	<input type="text" value="1.1"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.0"/>	<input type="text" value="1.0"/>
Heavy-vehicle Adjustment Factor, fHV	1.000	0.994
Grade Adjustment Factor, fg	1.00	1.00
Directional Flow Rate, vi	522 pc/h	350 pc/h
Base Percent Time-Spent-Following, BPTSF		50.1 %
Adjustment for no-passing zone, fnp		38.9
Percent Time-Spent-Following, PTSF		73.4 %

Level of Service and Other Performance Measures	
Level of Service, LOS	D
Volume-to-Capacity Ratio, v/c	0.31
Peak 15-minute Vehicle Travel	784 veh-mi
Peak-Hour Vehicle Travel	2664 veh-mi
Peak 15-minute Total Travel Time, TT	19.6 veh-hr

## Two-Lane Highways

### Workshop #26: Model Inputs

**Input Data**

Data for the analysis direction only.

Terrain:

Percent Trucks Crawling:  TCS Difference:  mi/h

Shoulder Width:  ft

Lane Width:  ft

Segment Length:  mi

Grade:  % Length:  mi

Peak Hour Factor, PHF:

Trucks and Buses:  %

Recreational Vehicles:  %

Percent No-Passing Zones:  %

Access-Point Density:  /mi

Class I Highway  Class II Highway  Class III Highway

Analysis Direction Volume:  vph

Opposing Direction Volume:  vph

**Average Travel Speed**

	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.1"/>	<input type="text" value="1.2"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.0"/>	<input type="text" value="1.0"/>
Heavy-vehicle Adjustment Factor, fHV	0.996	0.992
Grade Adjustment Factor, fg	1.00	1.00
Directional Flow Rate, vi	763 pc/h	511 pc/h

**Free-Flow Speed**

Measured  Estimated

Field Measured Speed, SFM:  mi/h

Observed Total Demand, v:  veh/h

Base Free-Flow Speed, BFFS:  mi/h

Adj. for Lane and Shoulder Width, fLS:  mi/h

Adj. for Access Point Density:  mi/h

Free-Flow Speed, FFS: 47.0 mi/h

Adj for No-Passing Zones, fnp:  mi/h

Average travel speed, ATSD: 35.3 mi/h

Percent Free Flow Speed, PFFS: 75.0 %

## Two-Lane Highways

### Workshop #26: Model Results

#### Level of Service and Other Performance Measures

Level of Service, LOS	C
Volume-to-Capacity Ratio, v/c	0.45
Peak 15-minute Vehicle Travel	3363 veh-mi
Peak-Hour Vehicle Travel	12107 veh-mi
Peak 15-minute Total Travel Time, TT	95.3 veh-hr

## Two-Lane Highways

### Workshop #27: Model Inputs

**Input Data**

Data for the analysis direction only.

Terrain		Level	
Percent Trucks Crawling	0.0	TCS Difference	0.0 mi/h
Shoulder Width	6.0 ft	Grade	+ % Length
Lane Width	12.0 ft	Peak Hour Factor, PHF	0.88
Segment Length	14.5 mi	Trucks and Buses	7 %
<input type="radio"/> Class I Highway	<input checked="" type="radio"/> Class II Highway	Recreational Vehicles	0 %
<input type="radio"/> Class III Highway		Percent No-Passing Zones	62 %
Analysis Direction Volume	353 vph	Access-Point Density	13 /mi
Opposing Direction Volume	182 vph		

## Two-Lane Highways

### Workshop #27: Model Results

#### Percent Time Spent Following

	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.0"/>	<input type="text" value="1.1"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.0"/>	<input type="text" value="1.0"/>
Heavy-vehicle Adjustment Factor, fHV	1.000	0.993
Grade Adjustment Factor, fg	1.00	1.00
Directional Flow Rate, vi	401 pc/h	208 pc/h
Base Percent Time-Spent-Following, BPTSF	37.6 %	
Adjustment for no-passing zone, fnp	46.4	
Percent Time-Spent-Following, PTSF	68.2 %	

#### Level of Service and Other Performance Measures

Level of Service, LOS	C
Volume-to-Capacity Ratio, v/c	0.24
Peak 15-minute Vehicle Travel	1454 veh-mi
Peak-Hour Vehicle Travel	5119 veh-mi
Peak 15-minute Total Travel Time, TT	30.1 veh-hr

## Two-Lane Highways

### Workshop #28: Model Inputs

**Input Data**

Data for the analysis direction only.

Terrain:

Percent Trucks Crawling:  TCS Difference:  mi/h

Shoulder Width:  ft

Lane Width:  ft

Segment Length:  mi

Grade:  % Length:  mi

Peak Hour Factor, PHF:

Trucks and Buses:  %

Recreational Vehicles:  %

Percent No-Passing Zones:  %

Access-Point Density:  /mi

Class I Highway   
  Class II Highway   
  Class III Highway

Analysis Direction Volume:  vph

Opposing Direction Volume:  vph

**Average Travel Speed**

	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.2"/>	<input type="text" value="1.5"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.0"/>	<input type="text" value="1.0"/>
Heavy-vehicle Adjustment Factor, fhv	0.996	0.990
Grade Adjustment Factor, fg	1.00	1.00
Directional Flow Rate, vi	469 pc/h	202 pc/h

**Free-Flow Speed**

Measured   
  Estimated

Field Measured Speed, SFM:  mi/h

Observed Total Demand, v:  veh/h

Base Free-Flow Speed, BFFS:  mi/h

Adj. for Lane and Shoulder Width, fLS:  mi/h

Adj. for Access Point Density:  mi/h

Free-Flow Speed, FFS: 45.8 mi/h

Adj for No-Passing Zones, fnp:  mi/h

Average travel speed, ATSD: 36.7 mi/h

Percent Free Flow Speed, PFFS: 80.3 %

## Two-Lane Highways

### Workshop #28: Model Results

#### Level of Service and Other Performance Measures

Level of Service, LOS	C
Volume-to-Capacity Ratio, v/c	0.28
Peak 15-minute Vehicle Travel	1750 veh-mi
Peak-Hour Vehicle Travel	6300 veh-mi
Peak 15-minute Total Travel Time, TT	47.6 veh-hr

## Two-Lane Highways

### Workshop #29: Model Inputs

**Input Data**

Data for the analysis direction only.

Terrain:

Percent Trucks Crawling:  TCS Difference:  mi/h

Shoulder Width:  ft Grade:  % Length:  mi

Lane Width:  ft

Segment Length:  mi

Class I Highway
  Class II Highway
  Class III Highway

Peak Hour Factor, PHF:

Trucks and Buses:  %

Recreational Vehicles:  %

Percent No-Passing Zones:  %

Access-Point Density:  /mi

Analysis Direction Volume:  vph

Opposing Direction Volume:  vph

**Average Travel Speed**

	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.5"/>	<input type="text" value="2.1"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.1"/>	<input type="text" value="1.1"/>
Heavy-vehicle Adjustment Factor, fHV	0.985	0.968
Grade Adjustment Factor, fg	0.98	0.84
Directional Flow Rate, vi	768 pc/h	391 pc/h

**Free-Flow Speed**

Measured
  Estimated

Field Measured Speed, SFM:  mi/h

Base Free-Flow Speed, BFFS:  mi/h

Observed Total Demand, v:  veh/h

Adj. for Lane and Shoulder Width, fLS:  mi/h

Adj. for Access Point Density:  mi/h

Free-Flow Speed, FFS: 44.5 mi/h

Adj for No-Passing Zones, fnp:  mi/h

Average travel speed, ATSD: 33.5 mi/h

Percent Free Flow Speed, PFFS: 75.2 %

## Two-Lane Highways

### Workshop #29: Model Results

Percent Time Spent Following		
	Analysis Direction	Opposing Direction
Passenger-Car Equivalents for Trucks, ET	<input type="text" value="1.0"/>	<input type="text" value="1.6"/>
Passenger-Car Equivalents for RVs, ER	<input type="text" value="1.0"/>	<input type="text" value="1.0"/>
Heavy-vehicle Adjustment Factor, fHV	1.000	0.982
Grade Adjustment Factor, fg	0.99	0.86
Directional Flow Rate, vi	749 pc/h	376 pc/h
Base Percent Time-Spent-Following, BPTSF		62.6 %
Adjustment for no-passing zone, fnp		26.5
Percent Time-Spent-Following, PTSF		80.2 %
Level of Service and Other Performance Measures		
Level of Service, LOS		D
Volume-to-Capacity Ratio, v/c		0.44
Peak 15-minute Vehicle Travel		463 veh-mi
Peak-Hour Vehicle Travel		1575 veh-mi
Peak 15-minute Total Travel Time, TT		13.8 veh-hr

## Wrap-Up

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