

Synchro Studio Training Course

Location

Date

Trafficware



Introduction

- This course and workbook cover the Synchro signal timing and analysis software and the SimTraffic simulation and animation package. The class is broken down into the following modules:
 - Level I
 - Level II

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Introduction

- Objective
 - Introduce Synchro traffic signal coordination software
 - Demonstrate how to develop optimum timing plans
- Upon Completion
 - Understand Input Requirements
 - Know how to Analyze
 - Read Reports and Time-Space Diagrams
 - Use SimTraffic

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Introduction

- What it is
- Overview of the input requirements
- Analysis of isolated intersection operations
- Network analysis and optimization
- Synchro time space and platoon dispersion diagrams
- Program Reports
- Introduction to SimTraffic

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Introduction

○ Synchro

- Software package for modeling and optimizing traffic signal timings.
 - *Capacity Analysis*
 - *Coordination*
 - *Actuated Signals*
 - *Time-Space Diagram*
 - *Integration with SimTraffic, CORSIM, HCS*

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Introduction

○ SimTraffic

- Microscopic simulation and animation model
 - *Simulate a wide variety of traffic control*
 - *Each vehicle individually tracked every 0.1 second*
 - *Vary driver behavior (aggressive to passive)*
 - *Measures queuing and blocking*
 - *Real-world type model*

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Map View Data

- Map View

- To activate the **Map View**, press the **Map View** button or press the [F2] key from anywhere in the program.



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Map View Data



The horizontal row of buttons along the top of Synchro are used to switch between the various input windows within Synchro. These will be discussed in more detail in upcoming sections.

These are zoom control buttons. Use these to control the area of the **MAP** window to view.

These are link and node control buttons. Use these to create links, delete links and nodes and to move nodes. Use the button with the green '+' to create a link. A node is created by crossing two links.

These buttons will display information about the intersection (or link when using the CF buttons). Hold your mouse cursor over the button to show what information will be displayed for each button. For instance, the 'N' button will show the node number for each intersection.

These buttons will display information specific to a movement. For instance, the ϕ button will display the phase number for the particular signalized movement.

When adding a link, watch here to see the link length and angle. Will show the street name when you click on a link.

Node coordinates of cursor

9,558 10,572

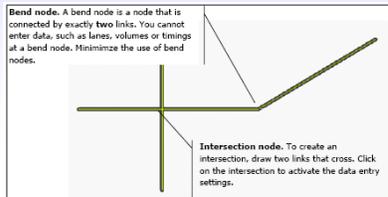
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Map View Data

○ Adding, Moving and Deleting Links and Intersections

- To create a link
- To remove a link from the map
- To remove an intersection from the map

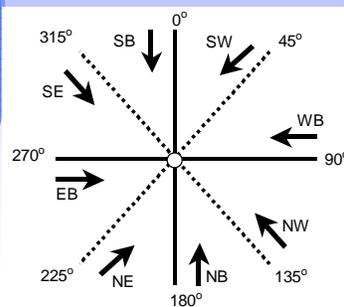


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Map View Data

○ Link Settings



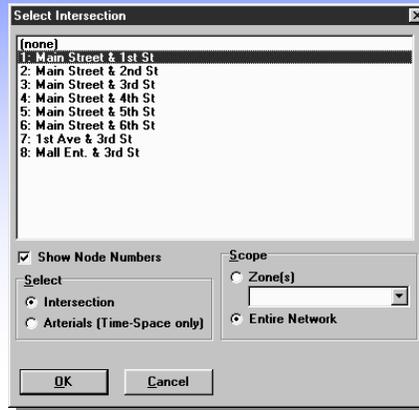
Link Angle	Approach Heading	
	Towards Int.	Away from Int.
326 - 34	SB	NB
35 - 55	SW	NE
56 - 124	WB	EB
125 - 145	NW	SE
146 - 214	NB	SB
215 - 235	NE	SW
236 - 304	EB	WB
305 - 325	SE	NW

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Map View Data

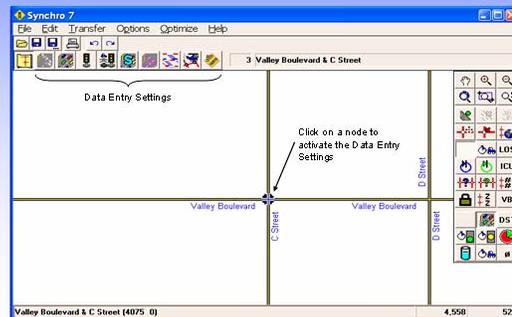
- Select Intersection



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Map View Data

- Data Entry



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Lane Settings Data

- o Lane Information Entry
 - To enter lane data, click the lane input button and enter the appropriate data.

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Synchro 7 - C:\00Projects\Training\Synchro for Managers\Example 6.syn

File Edit Transfer Options Optimize Help

2nd Street &

LANE SETTINGS

LANE SETTINGS	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lanes and Sharing (HRL)												
Traffic Volume (vph)	50	700	50	50	600	50	50	50	50	50	50	50
Street Name							2nd Street			2nd Street		
Link Distance (ft)		300			1075			1014			1013	
Link Speed (mph)		30			30			30			30	
Set Arterial Name and Speed		EB			WB			NB			SB	
Travel Time (s)		6.8			24.4			23.0			23.0	
Ideal Satd. Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0			0			0			0	
Area Type CBD		<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>	
Storage Length (ft)	250		250	250		250	100		0	100		0
Storage Lanes (#)	1		0	1		0	1			1		
Right Turn Channelized			None			None			None			None
Curb Radius (ft)												
Add Lanes (#)												
Lane Utilization Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Right Turn Factor	1.000	0.990		1.000	0.989		1.000	0.925		1.000	0.925	
Left Turn Factor (prot)	0.950	1.000		0.950	1.000		0.950	1.000		0.950	1.000	
Saturated Flow Rate (prot)	1770	1844		1770	1842		1770	1723		1770	1723	
Left Turn Factor (perm)	0.161	1.000		0.143	1.000		0.687	1.000		0.687	1.000	
Right Ped Bike Factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Left Ped Factor	1.000	1.000		1.000	1.000		1.000	1.000		1.000	1.000	
Saturated Flow Rate (perm)	300	1844		266	1842		1280	1723		1280	1723	
Right Turn on Red?		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Saturated Flow Rate (RTOR)	0	8		0	9		0	54		0	54	

button

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Lane Settings Data

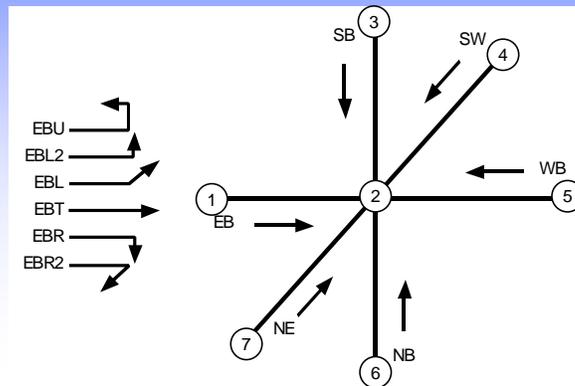
- For the through lane group, specify whether it shares with left or right traffic by pressing [R] or [L] selecting the appropriate configuration from the list.
- To change the name of an approach direction, right click on the column label of the **LANES** View.

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Lane Settings Data

- Approach Headings



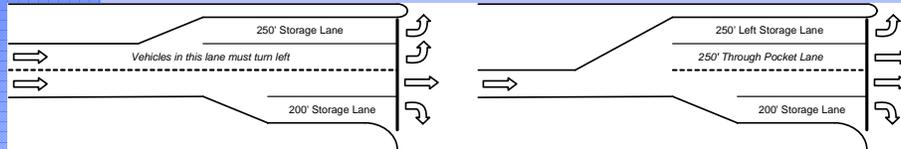
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Lanes



Lane Settings Data

o Storage Length and Lanes



LANE WINDOW	EBL	EBT	EBR
Lanes and Sharing (BRL)	↑	↑	↑
Ideal Satd. Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Grade (%)	—	0	—
Area Type	—	Other	—
Storage Length (ft)	250	—	200
Storage Lanes (#)	1	—	1

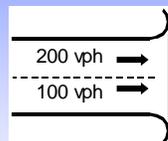
LANE WINDOW	EBL	EBT	EBR
Lanes and Sharing (BRL)	↑	↑↑	↑
Ideal Satd. Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Grade (%)	—	0	—
Area Type	—	Other	—
Storage Length (ft)	250	—	200
Storage Lanes (#)	2	—	1

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Lane Settings Data

o Lane Utilization Factor



$$fLU = \frac{\text{Total App. Vol.}}{(\text{No. of Lanes}) \times (\text{High Lane Vol.})} = \frac{(100 + 200)}{(2 \times 200)} = 0.75$$

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Volume Settings Data

- o Volume Information Entry



- To enter volume data, click the volume input button and enter the appropriate data

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Volume Settings Data

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2 2nd Street &

VOLUME SETTINGS	EBL	EBT	EBR	wBL	wBT	wBR	NBL	NBT	NBR	SBL	SBT	SBR
Lanes and Sharing (HRL)												
Traffic Volume (vph)	50	700	50	50	600	50	50	50	50	50	50	50
Conflicting Peds. (#/hr)	0	—	0	0	—	0	0	—	0	0	—	0
Conflicting Bicycles (#/hr)	—	—	0	—	—	0	—	—	0	—	—	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Adj. Parking Lane?	<input type="checkbox"/>											
Parking Maneuvers (#/hr)	—	—	—	—	—	—	—	—	—	—	—	—
Traffic from mid-block (%)	—	0	—	—	0	—	—	0	—	—	0	—
Link OD Volumes	—	EB	—	—	—	—	—	—	—	—	—	—
Adjusted Flow (vph)	54	761	54	54	652	54	54	54	54	54	54	54
Traffic in shared lane (%)	—	—	—	—	—	—	—	—	—	—	—	—
Lane Group Flow (vph)	54	815	0	54	706	0	54	108	0	54	108	0

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Timing Settings Data

- Timing Settings and Capacity Analysis



- To enter the timing data, click the timing settings button and enter the appropriate data

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Timing Settings Data

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3 Main Street & 3rd St

MODE SETTINGS	TIMING SETTINGS
Node #	Lanes and Sharing (NRL)
Zone	Traffic Volume (vph)
X East (ft)	Turn Type
Y North (ft)	Prohibited Phases
Z Elevation (ft)	Permitted Phases
Description	Detector Phase
Control Type	Switch Phase
Cycle Length (s)	Leading Detector (ft)
Lock Settings	Trailing Detector (ft)
Optimize Cycle Length	Minimum Inhibit (s)
Optimize Split	Minimum Split (s)
Actualized Cycle(s)	Total Split (s)
Natural Cycle(s)	Yellow Time (s)
Max v/c Ratio	AllRed Time (s)
Intersection Delay (s)	Lost Time Adjust (s)
Intersection LOS	Logging Phase?
ICU	Allow Lead/Lag Optimize?
ICU LOS	Recall Mode
Offset (s)	Actualized Eff. Green (s)
Referenced to	Actualized g/C Ratio
Reference Phase	Volume to Capacity Ratio
Main Intersection	Control Delay (s)
Yield Point	

v/c > 1.0 Miss ok

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Phasing Settings Data

- Press the Phasing Settings button to activate the PHASING Settings.



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Synchro 7: C:\Program Files\Trafficware\Fixed Cycle Coordination.syn

File Edit Transfer Options Optimize Help

3 Main Street & 3rd St

NODE SETTINGS	PHASING SETTINGS	↑	↓	↶	↷	↵	↶	↷	↵
		YWB	SEBT	SWB	EWB	SEB	SWB	SEB	SWB
Node #	Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Zone	Minimum Split (s)	8.0	19.0	8.0	19.0	8.0	19.0	8.0	19.0
X East (ft)	Maximum Split (s)	8.0	31.0	19.0	42.0	13.0	26.0	8.0	53.0
Y North (ft)	Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Z Elevation (ft)	All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Description	Lagging Phase?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Control Type	Allow Lead/Lag Optimize?	<input checked="" type="checkbox"/>							
Cycle Length (s)	Vehicle Extension (s)	3.0	4.7	3.0	3.0	3.0	4.7	3.0	3.0
Lock Timing	Minimum Gap (s)	3.0	4.7	3.0	3.0	3.0	4.7	3.0	3.0
Optimize Cycle Length	Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Optimize Split	Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Actuated Cycle 50h (s)	Recall Mode	None	C-Max	None	Min	None	C-Max	None	Min
Actuated Cycle 70h (s)	Pedestrian Phase	<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Actuated Cycle 90h (s)	Walk Time (s)	---	5.0	---	5.0	---	5.0	---	5.0
Actuated Cycle 30h (s)	Flash Done Walk (s)	---	10.0	---	10.0	---	10.0	---	10.0
Actuated Cycle 10h (s)	Pedestrian Call (ft/ft)	---	0	---	0	---	0	---	0
Natural Cycle(s)	Dual Entry?	<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Max v/c Ratio	Inhibit Max?	<input checked="" type="checkbox"/>							
Intersection Delay (s)	90h Side Green Time (s)	4 ms	27 ctd	15 ms	30 hd	9 ms	22 ctd	4 ms	49 ms
Intersection LOS	70h Side Green Time (s)	4 ms	27 ctd	15 ms	30 hd	9 ms	22 ctd	4 ms	49 ms
ICU	50h Side Green Time (s)	4 ms	27 ctd	14 ps	30 hd	9 ms	22 ctd	4 ms	49 ms
ICU LOS	30h Side Green Time (s)	4 ms	27 ctd	12 ps	41 hd	9 ms	22 ctd	4 ms	49 ms
Offset (s)	10h Side Green Time (s)	4 ms	27 ctd	9 ps	45 hd	9 ms	22 ctd	4 ms	49 ms
Referenced to									
Reference Phase									
Master Intersection									
Yield Point									

v/c > 1 Miss ok

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Phasing Data

- Modeling Pedestrians with Actuated Signals
 - In general, split should be long enough for ped timings
 - This does not mean that the full split will be used in analysis
 - Synchro will perform Percentile Scenarios with Peds

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Simulation Settings

- From the MAP view, click on the desired intersection with the Right mouse button and select Simulation Options.

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Synchro 7: C:\Program Files\Trafficware\Fixed Cycle Coordination.syn

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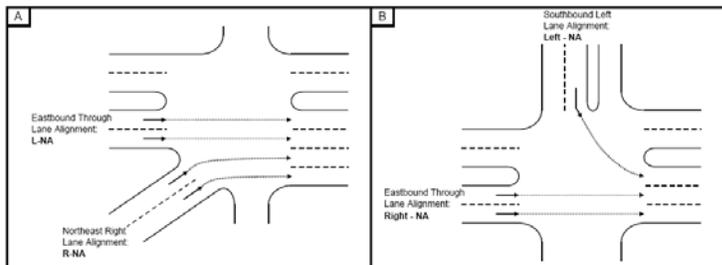
3 Main Street & 3rd St

SIMULATION SETTINGS	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lanes and Sharing (BRFL)	↑↑	↑↑	↑	↑	↑↑	↑↑	↑	↑↑	↑	↑	↑↑	↑↑
Traffic Volume (vph)	350	1000	150	100	700	200	150	2000	250	100	600	250
Storage Length (ft)	250	200	200	250	200	200	150	200	200	150	200	200
Storage Lanes (#)	2	—	1	1	—	1	1	—	1	1	—	1
Taper Length (ft)	25	—	25	25	—	25	25	—	25	25	—	25
Lane Alignment	Left	Left	Right									
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Enter Blocked Intersection	No	No	No									
Median Width (ft)	—	24	—	—	24	—	—	12	—	—	12	—
Link Offset (ft)	—	0	—	—	0	—	—	0	—	—	0	—
Crosswalk Width (ft)	—	16	—	—	16	—	—	16	—	—	16	—
TWLT Median	—	<input type="checkbox"/>	—									
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	—	9	15	—	9	15	—	9	15	—	9
Mandatory Distance (ft)	—	416	—	—	416	—	—	416	—	—	416	—
Positioning Distance (ft)	—	1761	—	—	1761	—	—	1980	—	—	1980	—
Mandatory Distance 2 (ft)	—	1174	—	—	1174	—	—	1320	—	—	1320	—
Positioning Distance 2 (ft)	—	2348	—	—	2348	—	—	2640	—	—	2640	—

Storage length for turning bay, in feet

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Simulation Settings



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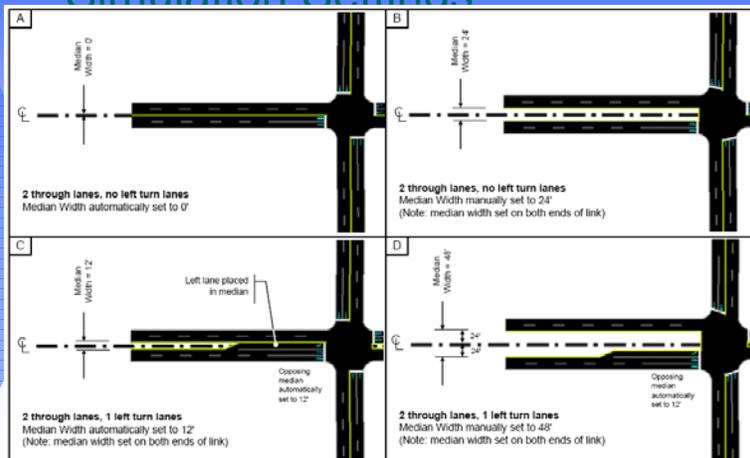
Simulation Settings

- The Enter Blocked Intersection setting controls simulation modeling gridlock avoidance.
- The four options for modeling blocked intersections are "Yes", "No", "1" and "2".
- We suggest that you set Enter Blocked Intersection to "No", for high speed approaches and movements.

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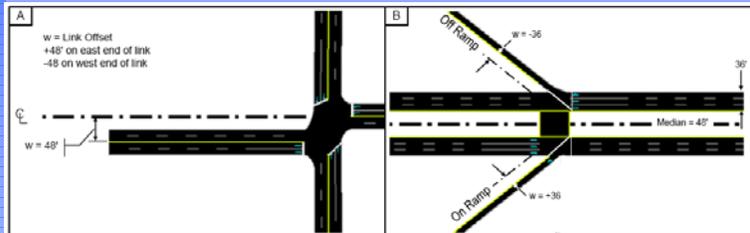
Simulation Settings



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Simulation Settings



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Detector Settings

- From the MAP view, click on the desired intersection with the Right mouse button and select Detector Options.

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3 Main Street & 3rd St

DETECTOR SETTINGS

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lanes and Sharing (BRL)	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑	↑↑
Traffic Volume (vph)	350	1000	150	100	700	200	150	2000	250	100	600	250
Number of Detectors (H)	4	1	1	4	2	1	4	2	1	4	2	1
Detector Phase	5	2	3	1	6	7	3	8	1	7	4	5
Switch Phase	0	0	0	0	0	0	0	0	0	0	0	0
Leading Detector (H)	54	20	20	54	100	20	54	100	20	54	100	20
Trailing Detector (H)	0	0	0	0	0	0	0	0	0	0	0	0
Detector Template	Left	Left	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Add/Update Template												
Detector 1 Position (H)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size (H)	6	20	20	6	6	20	6	6	20	6	6	20
Detector 1 Type	Ch-Ex											
Detector 1 Channels												
Detector 1 Extend	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position (H)	16	--	--	16	94	--	16	94	--	16	94	--
Detector 2 Size (H)	6	--	--	6	6	--	6	6	--	6	6	--
Detector 2 Type	Ch-Ex	--	--	Ch-Ex	Ch-Ex	--	Ch-Ex	Ch-Ex	--	Ch-Ex	Ch-Ex	--
Detector 2 Channels												
Detector 2 Extend	0.0	--	--	0.0	0.0	--	0.0	0.0	--	0.0	0.0	--
Detector 3 Position (H)	32	--	--	32	--	--	32	--	--	32	--	--
Detector 3 Size (H)	6	--	--	6	--	--	6	--	--	6	--	--
Detector 3 Type	Ch-Ex	--	--									
Detector 3 Channels												

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Network Settings

Network Settings

Lanes | Volumes | Timings | Phases | Simulation

Peak Hour Factor: 1.00 Set All

Growth Factor: 1.00 Set All

Heavy Vehicles (%): 2 Set All

Conflicting Pedestrians (#/hr): 0 Set All

Travel Speed (mph): 30 Set All

Pedestrian Walking Speed (ft/s): 4.0

Analysis Period (min): 15

Set All Scope

Zone

Entire Network

Defaults

OK

Close

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Background Timing

○ Controller Types

- A traffic signal controller is a device that controls the signal indications at an intersection. There are basically two types of signal controller units in use today: the **pre-timed** and the **traffic actuated**. Actuated controllers can be further defined as semi-actuated (coordinated or non-coordinated) and fully actuated.

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Background Timing

○ Controller Unit Elements

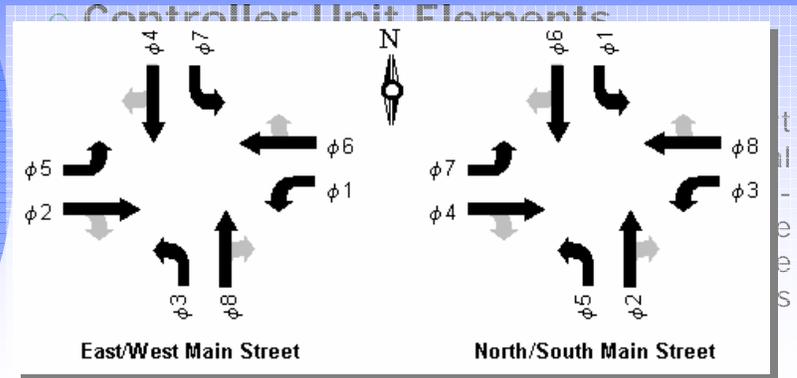
● *Traffic Signal Phasing*

- A traffic signal phase, or split, is the part of the cycle given to an individual movement, or combination of non-conflicting movements during one or more intervals. An interval is a portion of the cycle during which the signal indications do not change.

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Background Timing



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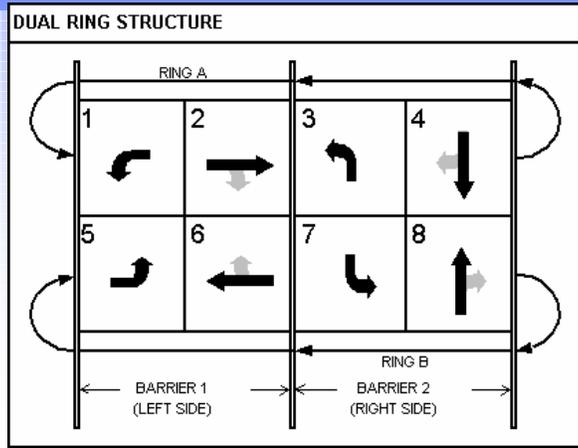
Background Timing

- **Ring**
 - A ring is a term that is used to describe a series of conflicting phases that occur in an established order.
- **Barrier**
 - A barrier (compatibility line) is a reference point in the preferred sequence of a multi-ring controller unit at which all rings are interlocked.

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Background Timing



describe a
occur in

reference
e of a
all rings

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Analysis of Intersections

- Percentile Green Times
 - Traffic volumes for each approach are adjusted up or down to model these percentile scenarios.

90th %ile Green Time (s)	19 mx	28 cd	7 mx	19 gp	11 gp	36 cd	7 mx	19 hd
70th %ile Green Time (s)	18 gp	31 cd	7 mx	16 gp	10 gp	40 cd	7 mx	16 hd
50th %ile Green Time (s)	17 gp	34 cd	7 mx	15 gp	8 gp	43 cd	7 mx	15 hd
30th %ile Green Time (s)	15 gp	38 cd	7 mx	13 gp	7 gp	46 cd	7 mx	13 hd
10th %ile Green Time (s)	13 gp	44 cd	0 sk	20 hd	0 sk	60 cd	7 mx	9 gp

- | | | | |
|----|---|----|--|
| sk | Phase is Skipped | pd | Phase held for pedestrian button or recall |
| mn | Phase shows for Minimum Time | mr | Phase has max-recall |
| gp | Phase gaps-out | dw | Main street phases dwells or green |
| hd | Phase held for other ring to cross barrier. | cd | Coordinated phase |
| mx | Phase maxes out. | | |

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Analysis of Intersections

- Actuated Cycles
 - There are five scenarios modeled. They are called the 90th, 70th, 50th, 30th, and 10th percentiles.

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Analysis of Intersections

- Actuated cycle length
 - The actuated cycle length (CL) is used in HCM Signal Report delay calculations.
- Natural cycle length
 - Natural cycle length is the shortest cycle length that will give acceptable capacity. In general, intersections have an optimum cycle length that provides the best level of service.

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Analysis of Intersections

- Maximum v/c Ratio
 - This field shows the maximum Volume-to-Capacity ratio
- Intersection Delay
 - The Intersection Delay field shows the average delay for the intersection and it is calculated by taking a volume weighted average of all the delays.

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Analysis of Intersections

- Intersection Level of Service

LOS	Signalized	Unsignalized
	Total Delay Per Vehicle (s)	Control Delay Per Vehicle (s)
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤60
F	>80	>60

Trafficware



Analysis of Intersections

- Intersection Capacity Utilization
 - This is the Intersection Capacity Utilization (ICU) for the intersection.
- ICU LOS
 - The ICU Level of Service (LOS) gives insight into how an intersection is functioning and how much extra capacity is available to handle traffic fluctuations and incidents.

Trafficware



Analysis of Intersections

ICU	Level of Service
0 to 60%	A
>60% to 70%	B
>70% to 80%	C
>80% to 90%	D
>90% to 100%	E
>100% to 110%	F
>110% to 120%	G
>120%	H

Trafficware



Analysis of Intersections

- Actuated Effective Green
 - This value represents the average green time observed while the signal is operating in actuated mode
- Actuated Green to Cycle Ratio
 - This is the average actuated green time divided by the actuated cycle length

Trafficware



Analysis of Intersections

- v/c Ratio
 - The v/c ratio indicates the amount of congestion for each lane group.
- Control Delay
- Queue Delay
- Level of Service
 - The Level of Service for the lane group is calculated by taking the Delay and converting it to a letter, between A and F.

Trafficware



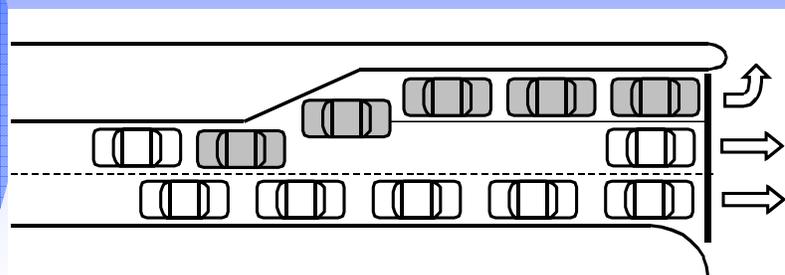
Analysis of Intersections

- Queue Lengths
 - The **Queue Length** rows show the 50th Percentile and 95th Percentile **Maximum Queue** lengths.

Trafficware



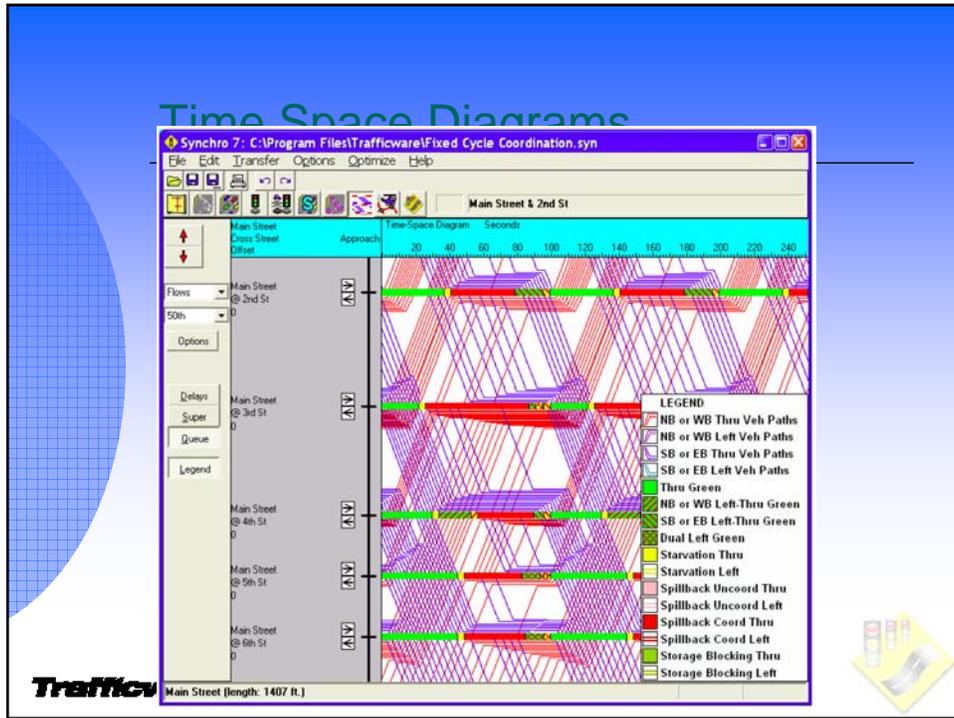
Analysis of Intersections



Trafficware



Time Space Diagrams



Isolated Intersections Opt.

- Optimize-Intersection Splits
 - The **Optimize→Intersection-Splits** command will automatically set the splits for all the phases.
- Optimize-Intersection Cycle Length
 - The **Optimize→Intersection-Cycle-Length** command will set the intersection to the Natural Cycle Length.

Isolated Intersections Opt.

- Optimize-Intersection Offsets
 - To change a single intersection's timing plan so that it works best with its neighbors, click on an intersection to select it, then choose the **Optimize→Intersection-Offsets** command.

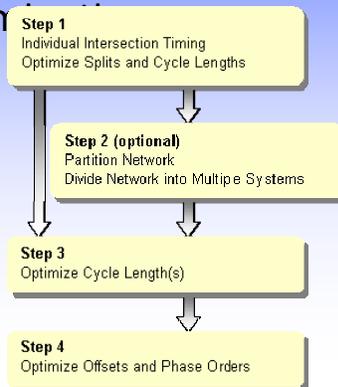
Note This command only changes the selected intersection. It does not make any changes to surrounding intersections. There may be better timing plans available by changing the timings of surrounding intersections, but Optimize-Intersection Offsets and Phasing will not find them.

Trafficware



Network Analysis and Opt.

- Network and multi-system optimization



Trafficware



Network Analysis and Opt.

- Network and multi-system

Step 1

Individual Intersection Timing
Optimize Splits and Cycle Lengths

Step 3
Optimize Cycle Length(s)

Step 4
Optimize Offsets and Phase Orders

Trafficware



Network Analysis and Opt.

- Network and multi-system
optimization

Step 1
Individual Intersection Timing
Optimize Splits and Cycle Lengths

Step 2 (optional)

Partition Network
Divide Network into Multiple Systems

Step 4
Optimize Offsets and Phase Orders

Trafficware



Network Analysis and Opt.

- Network and multi-system optimization

Step 1
Individual Intersection Timing
Optimize Splits and Cycle Lengths

Step 2 (optional)
Partition Network
Divide Network into Multiple Systems

Step 3
Optimize Cycle Length(s)

Step 4
Optimize Offsets and Phase Orders

Trafficware



Network Analysis and Opt.

- Network and multi-system optimization

Step 1
Individual Intersection Timing
Optimize Splits and Cycle Lengths

Step 2 (optional)
Partition Network
Divide Network into Multiple Systems

Step 4
Optimize Offsets and Phase Orders

Trafficware



Program Reports

- Select Reports Window
 - When choosing the **File→Create-Report** command, the **Select Report(s)** window appears. From this window you can select the reports to include and options for each report.

Trafficware



Program Reports

The screenshot shows the 'Select Reports' dialog box. It is divided into two main sections: 'Select Reports' and 'Options'.

Select Reports: A list of report categories and sub-items. The top item is 'Int: Lanes, Volumes, Timings', which is expanded to show sub-items: 'Int: Lanes', 'Int: Volumes', 'Int: Timings', 'Int: Phasings', 'Int: Queues', 'Intersection Capacity (ICU)', 'HCM Signals', 'HCM Unsignalized', 'Arterial Level of Service', 'Summary Network MOEs', 'Detailed Network MOEs', 'Summary MultiFile Comparison', 'Detailed MultiFile Comparison', 'Phases: Timings', and 'Actuated: Green Bars'.

Options: A section titled 'Data To Include' with a list of items: 'Lane Inputs', 'Lane Outputs', 'Volume Inputs', 'Volume Outputs', 'Level of Service Info', 'Timing Inputs', 'V/C Ratios, Delays', 'Actuated Inputs', 'Actuated Green Times', 'Stops, Fuel, Emissions', 'Queues', and 'Skip Unused Items'.

Buttons: 'Header...', 'Graphics...', 'Save Text', 'Print', 'Preview', 'Print Setup', and 'Cancel'.

Scope: Radio buttons for 'Single Intersection', 'Zone', and 'Entire Network' (which is selected). Each radio button is followed by a dropdown menu.

Trafficware



Program Reports

The screenshot shows the 'Select Reports' dialog box with the following content:

- Select Reports:** A list of report categories including 'Int: Lanes, Volumes, Timings', 'Int: Lanes', 'Int: Volumes', 'Int: Timings', 'Int: Phasings', 'Int: Queues', 'Intersection Capacity (LOS)', 'HCM Signalized', 'HCM Unsignalized', 'Arterial Level of Service', 'Summary Network MOEs', 'Detailed Network MOEs', 'Summary MultiFile Comparison', 'Detailed MultiFile Comparison', 'Phases: Timings', and 'Actuated: Green Bars'.
- Data To Include:** A list of specific data items including 'Lane Inputs', 'Lane Outputs', 'Volume Inputs', 'Volume Outputs', 'Level of Service Info', 'Timing Inputs', 'V/C Ratios, Delays', 'Actuated Inputs', 'Actuated Green Times', 'Stops, Fuel, Emissions', 'Queues', and 'Skip Unused Items'.
- Buttons:** 'Save Text', 'Print', 'Preview', 'Print Setup', and 'Cancel'.
- Scope:** Radio buttons for 'Zone' and 'Entire Network' (selected).

A callout box with the text 'Seven Intersection Reports' points to the 'Data To Include' list.

Program Reports

The screenshot shows the 'Options' dialog box with the following content:

- Data To Include:** A list of specific data items including 'Lane Inputs', 'Lane Outputs', 'Volume Inputs', 'Volume Outputs', 'Level of Service Info', 'Timing Inputs', 'V/C Ratios, Delays', 'Actuated Inputs', 'Actuated Green Times', 'Stops, Fuel, Emissions', 'Queues', and 'Skip Unused Items'.
- Buttons:** 'Header...', 'Graphics...', 'Save Text', 'Print', 'Preview', 'Print Setup', and 'Cancel'.
- Scope:** Radio buttons for 'Single Intersection', 'Zone', and 'Entire Network' (selected).

A callout box with the text 'Customize Reports in This Window' points to the 'Data To Include' list.

Program

3: Valley Boulevard & CC:\Program Files\Synchro 4\Class Files\Prob 1, Enter Timing Data.svb
 \$:00 rpt Baseline 11/25/0999

Lanes, Volumes, Timings

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Storage Length (ft)	325		0	350		0	200		0	250		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Fit Protected		0.971		0.982		0.942		0.942		0.956		0.956
Fit Protected	0.950			0.950		0.950		0.950		0.950		0.950
Satd. Flow (prot)	1770	3437	0	1770	3476	0	1770	3334	0	1770	3383	0
Fit Perm.		0.971		0.982		0.942		0.942		0.956		0.956
Fit Perm.	0.950			0.950		0.950		0.950		0.950		0.950
Satd. Flow (perm)	1770	3437	0	1770	3476	0	1770	3334	0	1770	3383	0
Right Turn on Red		Yes			Yes			Yes		Yes		Yes
Satd. Flow (RTOR)		31			13			130		56		56
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Volume (vph)	375	850	200	300	375	50	200	475	300	150	600	250
Confl. Peds. (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%				0%
Adj. Flow (vph)	375	850	200	300	375	50	200	475	300	150	600	250
Lane Group Flow (vph)	375	1050	0	300	425	0	200	775	0	150	850	0
Turn Type	Prot	Prot		Prot	Prot		Prot	Prot		Prot	Prot	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Detector Phases	5	2		1	6		3	8		7	4	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	10.0	20.0		10.0	20.0		10.0	20.0		10.0	20.0	
Total Split (s)	35.0	38.0	0.0	23.0	26.0	0.0	18.0	26.0	0.0	13.0	21.0	0.0
Total Split (%)	35%	38%	0%	23%	26%	0%	18%	26%	0%	13%	21%	0%
Maximum Green (s)	31.0	34.0		19.0	22.0		14.0	22.0		9.0	17.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	

Program Reports

- o Footnotes
 - * User Entered Value
 - ~ Volume exceeds capacity, queue is theoretically infinite
 - # 95th percentile volume exceeds capacity
 - dl Defacto Left Lane
 - dr Defacto Right Lane
 - ! Phase conflict between lane groups
 - @ Some critical lane groups may be at other intersections sharing controller

13

Program Reports

Select Reports

Select Reports: Int: Lanes, Volumes, Timings, Int: Lanes, Int: Volumes, Int: Timings, Int: Phasings, **Int: Queues**, Intersection Capacity (ICU), HCM Signals, HCM Unsignalized, Arterial Level of Service, Summary Network MOEs, Detailed Network MOEs, Summary MultiFile Comparison, Detailed MultiFile Comparison, Phases: Timings, Actuated: Green Bars

Options: Data To Include: Lane Inputs, Lane Outputs, Volume Inputs, Volume Outputs, Level of Service Info, Timing Inputs, V/C Ratios, Delays, Actuated Inputs, Actuated Green Times, Stops, Fuel, Emissions, Queues, Skip Unused Items

Buttons: Header..., Graphics..., Save Text, Print, Preview, Print Setup, Cancel

Scope: Single Intersection, Zone, Entire Network

Trafficware



Program Reports

Main Street & 5th St
6/20/1999 Baseline 6/28/1999

Queues

Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	100	1500	200	1100	400	200	400
Queue Length 50th (ft)	48	480	132	113	246	107	178
Queue Length 95th (ft)	88	#620	#259	147	#429	187	248
Link Length (ft)		665		664	634	655	
50th Up Block Time %							
95th Up Block Time %							
Turn Bay Length (ft)	100		100				
50th Bay Block Time %		34%	47%	41%			
95th Bay Block Time %	2%	48%	74%	50%			
Queuing Penalty (veh)		41	334	91			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Trafficware



Program Reports

Select Reports

Select Reports

- Int: Lanes, Volumes, Timings
- Int: Lanes
- Int: Volumes
- Int: Timings
- Int: Phasings
- Int: Queues
- Intersection Capacity (ICU)
- HCM Signals
- HCM Signalized
- Arterial Level of Service**
- Commuter Method - MOE
- Detailed Network MOEs
- Summary MultiFile Comparison
- Detailed MultiFile Comparison
- Phases: Timings
- Actuated: Green Bars

Options

Arterial(s) to Evaluate

- C Street
- Valley Boulevard

Header... Graphics... Save Text Print Preview Print Setup Cancel

Scope

- Single Intersection
- Zone
- Entire Network

Trafficware

Program Reports

C:\Program Files\Synchro 4\Fixed Cycle Coordination.sy6

08/16/1999 Baseline 08/24/1999

Arterial Level of Service: SB 3rd St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Mall Ent.	II	45	10.2	22.1	32.3	0.1	14	E
1st Ave	II	45	10.8	8.0	18.8	0.1	26	C
Main Street	II	45	17.3	15.8	33.1	0.2	24	C
Total	II	45	38.3	45.9	84.2	0.5	20	D

Fixed Cycle Problem Synchro Report
 Synchro User Page-2

Trafficware

Program Reports

Select Reports

Select Reports	Options	Level(s) Of Detail
Int: Lanes, Volumes, Timings	Measure(s) of Effectiveness	
Int: Lanes	Percentile Delays / Vehicle	By Lane Group
Int: Volumes	Total Percentile Delays	By Approach
Int: Timings	Stops / Vehicle	By Intersection
Int: Phasings	Total Stops	By Arterial
Int: Queues	Avg Speed	Network/Zone Total
Intersection Capacity (ICU)	Fuel Consumption	
HCM Signals	Emissions	Arterial(s) to Evaluate
HCM Unsignalized	Unserviced Vehicles	C Street
Arterially Serviced	Yellow Cutoff Vehicles	Valley Boulevard
Summary Network MOEs	Queueing Penalty	
Detailed Network MOEs		
Summary MultiFile Comparison		
Detailed MultiFile Comparison		
Phases: Timings		
Actuated: Green Bars		

Header... Graphics... Save Text Print Preview Print Setup Cancel

Scope

Single Intersection
 Zone
 Entire Network

Trafficware



Program Reports

Detailed Measures of Effectiveness C:\Program Files\Synchro 4\Fixed Cycle Coordination.sy6
 08/16/1999 Baseline 08/24/1999

Network Totals

Number of Intersections	8
Percentile Signal Delay / Veh (s)	27
Total Percentile Signal Delay (hr)	250
Stops / Veh	0.82
Stops	27356
Average Speed (mph)	15
Total Travel Time (hr)	418
Distance Traveled (mi)	6185
Fuel Consumed (gal)	653
Fuel Economy (mpg)	9.5
CO Emissions (kg)	45.64
NOx Emissions (kg)	8.88
VOC Emissions (kg)	10.58
Unserviced Vehicles (#)	220
Vehicles in dilemma zone (#)	1333
Queueing Penalty (veh)	2346
Performance Index	390.8

Fixed Cycle Problem Synchro Report
 Synchro User Page-1

Trafficware



Program Reports

Select Reports

Select Reports

- Int: Lanes, Volumes, Timings
- Int: Lanes
- Int: Volumes
- Int: Timings
- Int: Phasings
- Int: Queues
- Intersection Capacity (ICU)
- HCM Signals
- HCM Unsignalized
- Arterial Level of Service
- Commuter Method - MOE
- Detailed Network MOEs**
- Summary MultiFile Comparison
- Detailed MultiFile Comparison

Options

Measure(s) of Effectiveness

- Percentile Delays / Vehicle
- Total Percentile Delays
- Stops / Vehicle
- Total Stops
- Avg Speed
- Fuel Consumption
- Emissions
- Unserviced Vehicles
- Yellow Cutoff Vehicles
- Queueing Penalty

Level(s) Of Detail

- By Arterial
- Network/Zone Total

Arterial(s) to Evaluate

- C Street
- Valley Boulevard

Phases: Timings

Actuated: Green Bars

Header... Graphics... Save Text Print Preview Print Setup Cancel

Scope

- Single Intersection
- Zone
- Entire Network

Trafficware



Program Reports

Alternative Comparisons Multiple

08/16/1999 Baseline 08/24/1999

Network Totals

Scenario #	1	2	3
Number of Intersections	8	8	8
Most Popular Cycle (s)	95	100	105
Alternative	Baseline	Baseline	Baseline
Timing Plan ID	PM PEAK	PM PEAK	PM PEAK
Data Time			
Total Percentile Signal Delay (hr)	293	278	271
Stops	26487	25413	25190
Average Speed (mph)	13	14	14
Total Travel Time (hr)	462	446	439
Distance Traveled (mi)	6185	6185	6185
Fuel Consumed (gal)	683	657	652
Fuel Economy (mpg)	9.1	9.4	9.5
Unserviced Vehicles (#)	492	402	303
Vehicles in dilemma zone (#)	1664	1553	1437
Queueing Penalty (veh)	2572	2754	2806
Performance Index	438.4	425.1	418.9

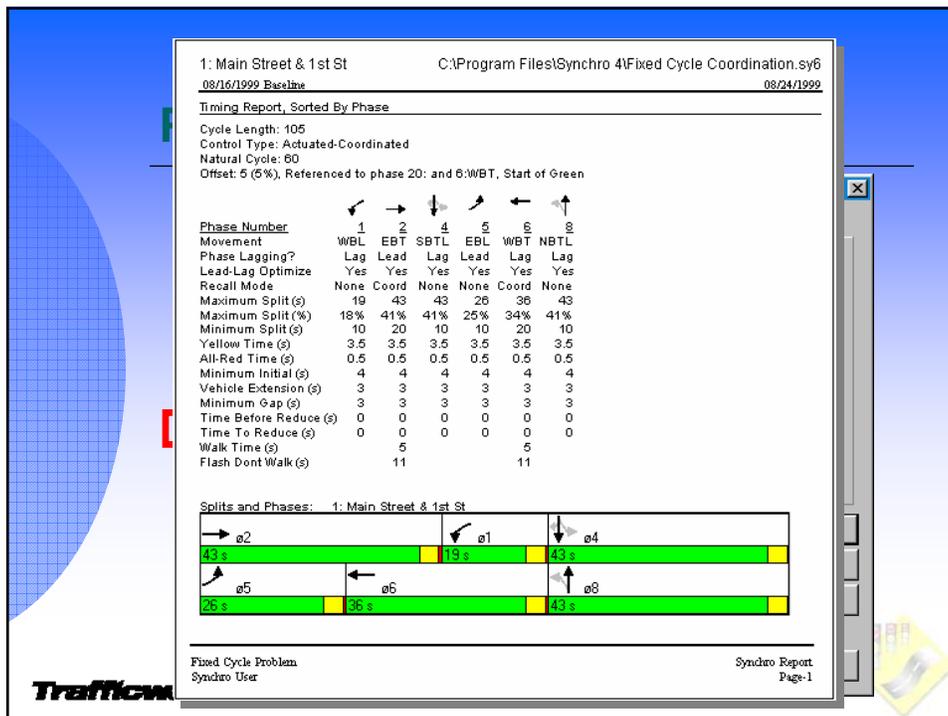
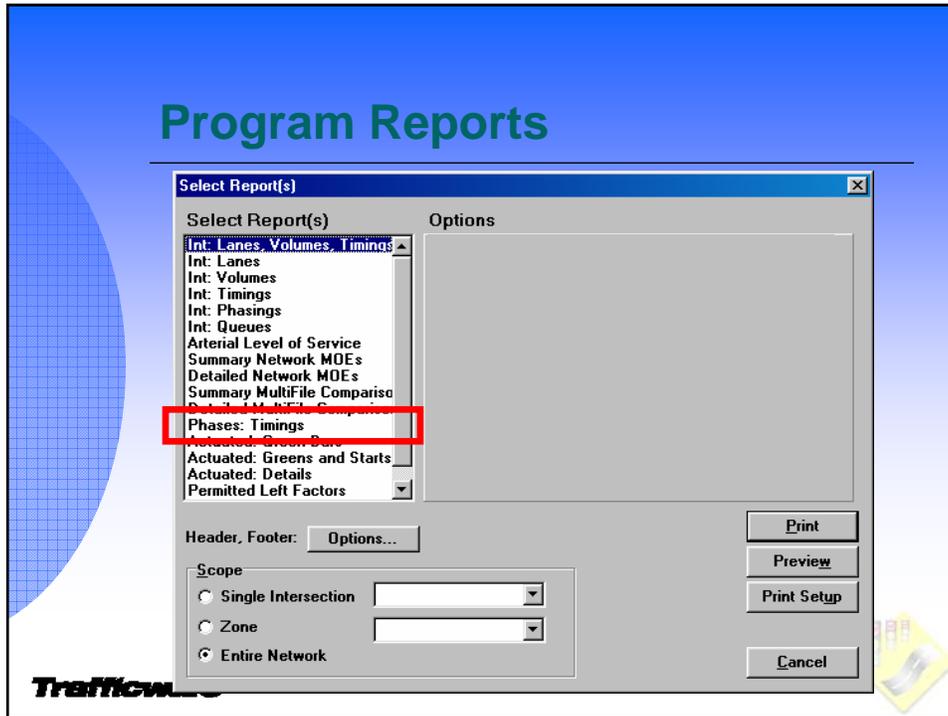
Fixed Cycle Problem Synchro Report

Synchro User Page-3

Traff



Program Reports



Program Reports

Select Report(s)

Select Report(s) Options

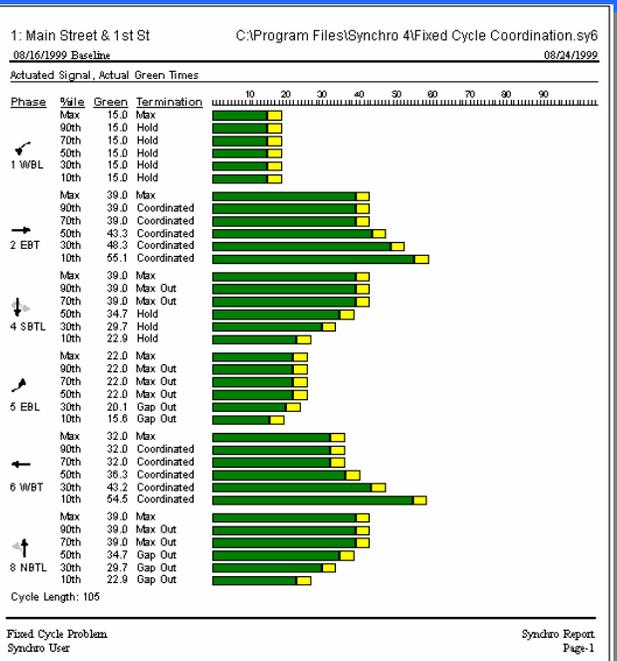
Int: Lanes, Volumes, Timings
 Int: Lanes
 Int: Volumes
 Int: Timings
 Int: Phasings
 Int: Queues
 Arterial Level of Service
 Summary Network MOEs
 Detailed Network MOEs
 Summary MultiFile Comparison
 Detailed MultiFile Comparison
 Actuated: Green Bars
 Actuated: Green and Start
 Actuated: Details
 Permitted Left Factors

Header, Footer: Options...

Print
 Preview
 Print Setup
 Cancel

Scope
 Single Intersection
 Zone
 Entire Network

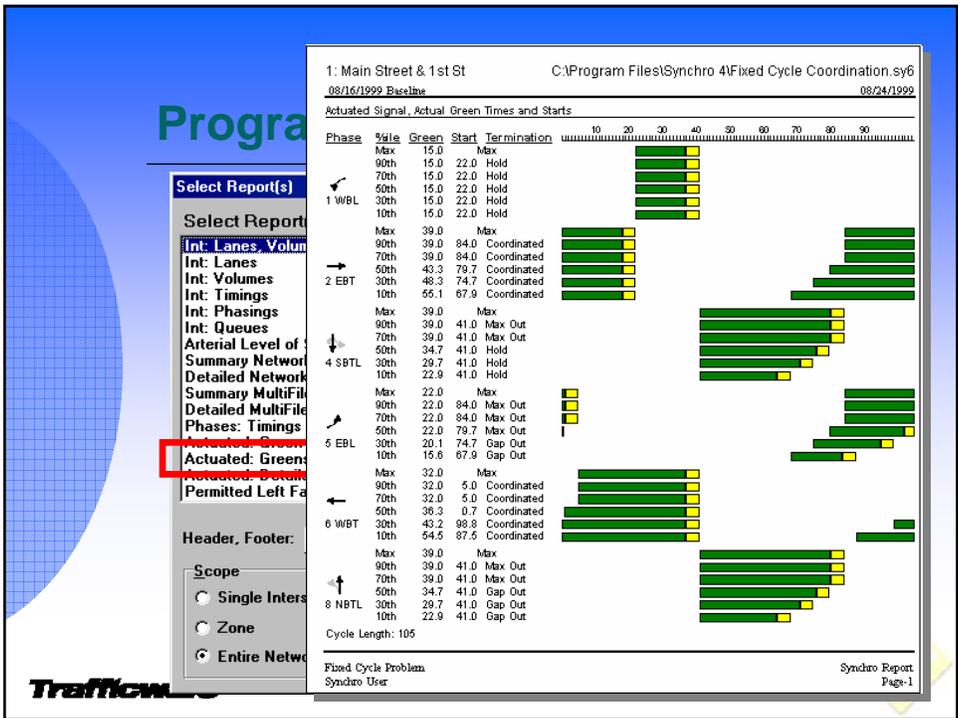
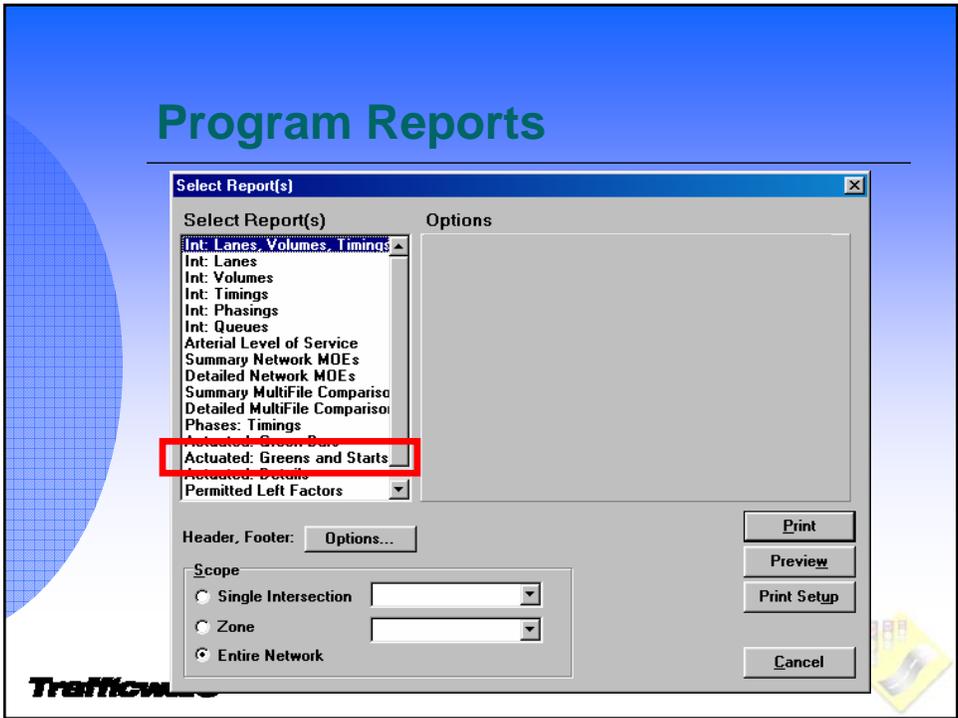
Trafficw...



Trafficw...



Program Reports



Program Reports

Select Report(s)

Select Report(s) Options

- Int: Lanes, Volumes, Timings
- Int: Lanes
- Int: Volumes
- Int: Timings
- Int: Phasings
- Int: Queues
- Arterial Level of Service
- Summary Network MOEs
- Detailed Network MOEs
- Summary MultiFile Comparison
- Detailed MultiFile Comparison
- Phases: Timings
- Actuated: Green Bars
- Actuated: Green and Start**
- Actuated: Details**
- Permitted Left Factors

Header, Footer: Options...

Scope

- Single Intersection
- Zone
- Entire Network

Print Preview Print Setup Cancel

1: Main Street & 1st St C:\Program Files\Synchro 4\Fixed Cycle Coordination.sy6

08/16/1999 Baseline 08/24/1999

Actuated Signal, Phase Details

Phase	Queue	Gap-Out	Green	Termination	
90th	24.4	4.0	15.0	Hold	
70th	18.8	3.0	15.0	Hold	
50th	14.8	3.0	15.0	Hold	
1 WBL	30th	11.9	3.0	15.0	Hold
10th	8.1	3.0	15.0	Hold	
90th	45.6	1.9	39.0	Coordinated	
70th	38.7	1.9	39.0	Coordinated	
50th	34.2	0.9	43.3	Coordinated	
30th	30.1	0.9	48.3	Coordinated	
10th	24.7	0.9	55.1	Coordinated	
2 EBT	90th	56.0	11.0	39.0	Max Out
70th	38.2	8.0	39.0	Max Out	
50th	28.3	6.0	34.7	Hold	
4 SBTL	30th	22.9	5.0	29.7	Hold
10th	17.2	3.0	22.9	Hold	
90th	29.9	3.0	22.0	Max Out	
70th	24.5	3.0	22.0	Max Out	
50th	20.7	3.0	22.0	Max Out	
5 EBL	30th	17.1	3.0	20.1	Gap Out
10th	12.6	3.0	15.6	Gap Out	
90th	35.4	7.9	32.0	Coordinated	
70th	24.1	7.9	32.0	Coordinated	
50th	16.9	7.9	38.3	Coordinated	
6 WBT	30th	9.8	7.9	43.2	Coordinated
10th	13.1	3.9	54.5	Coordinated	
90th	42.6	8.0	39.0	Max Out	
70th	33.9	6.0	39.0	Max Out	
50th	29.7	5.0	34.7	Gap Out	
8 NBTL	30th	25.7	4.0	29.7	Gap Out
10th	19.9	3.0	22.9	Gap Out	

Cycle Length: 105

Fixed Cycle Problem
Synchro User

Synchro Report
Page-1

Program Reports

Select Reports

Select Reports

- Int: Lanes
- Int: Volumes
- Int: Timings
- Int: Phasings
- Int: Queues
- Arterial Level of Service
- Summary Network MOEs
- Detailed Network MOEs
- Summary MultiFile Comparison
- Detailed MultiFile Comparison
- Phases: Timings
- Actuated: Green Bars
- Actuated: Greens and Starts
- Permitted Left Factors
- Coordinability Factors

Options

Header, Footer:

Scope

Single Intersection

Zone

Entire Network

Traffic



Pro

1: Main Street & 1st St C:\Program Files\Synchro 4\Fixed Cycle Coordination.sy6
 08/16/1999 Baseline 08/24/1999

Supplemental Worksheet For Permitted Left Turns

	NBL	SBL
Lane Group		
Cycle Length (s)	105	105
Actual Green	39	39
Eff. Green	40	40
Opp. Eff. Green	40	40
Lanes	1	1
Opp. Lanes	1	1
Adj. LT Flow	100	100
Prop Left Turns	1.00	1.00
Prop LT Opp.	0.00	0.00
Adj. Opp. Flow	200	600
Total Lost Time	3.0	3.0
LTC	2.92	2.92
Volc	5.83	14.58
Rpo	1.00	1.00
gf	0.00	0.00
qro	0.62	0.62
gq	5.12	22.00
gu	34.88	18.00
n	0	0
PTHo	1.00	1.00
EL1	1.00	2.10
PL	1.00	1.00
fmin	0.10	0.10
fm		
EL2	0.00	0.00
odiff	0.00	0.00
rLT	0.54	0.21

Select

Select Reports

- Int: L
- Int: V
- Int: T
- Int: P
- Int: Q
- Arterial
- Summ
- Detail
- Summ
- Detail
- Phase
- Actua
- Actua
- Permi
- Coord

Header

Scope

S

Z

E

Fixed Cycle Problem
 Synchro User

Synchro Report
 Page-1

Traffic



Program Reports

Select Report(s)

Select Report(s) Options

Int: Lanes, Volumes, Timings

Int: Lanes

Int: Volumes

Int: Timings

Int: Phasings

Int: Queues

Arterial Level of Service

Summary Network MOEs

Detailed Network MOEs

Summary MultiFile Comparison

Detailed MultiFile Comparison

Phases: Timings

Actuated: Green Bars

Actuated: Greens and Starts

Actuated: Details

Coordinatability Factors

Arterial(s) to Evaluate

Main Street

Header, Footer: Options...

Print

Preview

Print Setup

Cancel

Scope

Single Intersection

Zone

Entire Network

Coordinatability Analysis Using CurC:\Program Files\Synchro 4\Fixed Cycle Coordination.sy6

08/16/1999 Baseline 08/24/1999

Link: Main Street, 1st St to 2nd St

Variable	Value	Comments
Travel Time (s)	31	Travel Time okay For Coordination
CF1	64	
Traffic / Storage Space	0.22	Storage Space is adequate
CF2	22	
Proportion of Traffic In Platoon	0.90	Traffic heavily platooned, coordination is appropriate
Ap, platoon adjustment	5	
Main Street Volume (vph)	2200	High Volumes, coordination is high priority
Av, volume adjustment	20	
Cycle Length	105	at 1st St
Cycle Length	105	at 2nd St
Combined Cycle Length	105	
Cycle Length Increase	0	
Ac, Cycle Adjustment	0	
CF, Coordinatability Factor	89	Coordination definitely recommended

Link: Main Street, 2nd St to 3rd St

Variable	Value	Comments
Travel Time (s)	24	Travel Time okay For Coordination
CF1	74	
Traffic / Storage Space	0.32	Storage Space is adequate
CF2	32	
Proportion of Traffic In Platoon	0.79	Traffic moderately platooned
Ap, platoon adjustment	-1	
Main Street Volume (vph)	2600	High Volumes, coordination is high priority
Av, volume adjustment	20	
Cycle Length	105	at 2nd St
Cycle Length	105	at 3rd St
Combined Cycle Length	105	
Cycle Length Increase	0	
Ac, Cycle Adjustment	0	
CF, Coordinatability Factor	93	Coordination definitely recommended

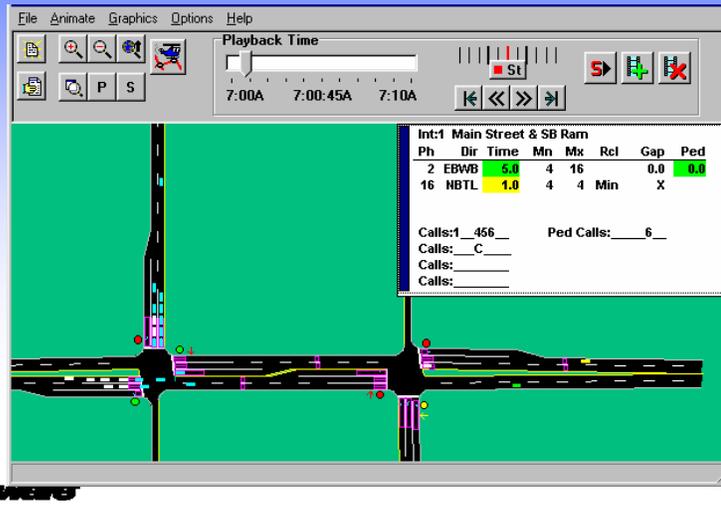
Fixed Cycle Problem

Synchro User

Synchro Report

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SimTraffic



SimTraffic

- SimTraffic
 - Microscopic Simulation/Animation Model
 - FHWA Driver/Vehicle Parameters
 - Coded with Synchro
 - Complete Reports

Trafficware

SimTraffic

- SimTraffic Operation
 - Select *File-Open* button or the **File→Open** command to load in SimTraffic
 - Use the *SimTraffic-Animation* button or press [Ctrl]+[G] within Synchro

Trafficware



SimTraffic

- Seeding Network
 - After a file is loaded, the network is seeded
- Simulation Recording
 - Recorded and played back, or
 - Simulate While Playing
- Playback
 - Use Speed Control E 

Trafficware



SimTraffic

- History Files
 - Records the animation data into a history file
 - Normally has the same name as the SYN file but has the extension HST
 - Preserved so that animations can be displayed later without reseeding and re-recording
- Analyzing Part of a Network
 - Use the Synchro Save-Part command

Trafficware



SimTraffic

- Signal Status
 - Click with mouse in the intersection
 - Displays the status of the signal
 - Press [Delete] to hide while in focus

Int:3 Truck Facility & 1st St CL:55 Clk:36.0								
Ph	Dir	Time	Mn	F0	Rel	Cap	Pcd	
4	SBTL	10.0	4	51	Max		6.0	
8	HBTL	10.0	1	51	Max		6.0	

Trafficware



SimTraffic

- Vehicle Status
 - Click with mouse on a vehicle
 - Shows status of vehicle
 - Press [Delete] to hide while in focus

Vehicle ID#:	26	Next Turn:	Thru
Vehicle Type:	Car1	2nd Turn:	Exit
Driver Type:	7	Speed (ft/s):	36.2
Node:	3	Accel (ft/s2):	-4.0
Upstream Node:	1	Current Lane:	2
Dist to SBar (ft):	222	Dest Lane:	2

Trafficware



3D Viewer

- 3D file Created from SimTraffic
- Create Digital Video
- Add Building and Scenery

Trafficware

