

Getting Started: HCS 2010



Version 1.1
January 16, 2013

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MODULE 1: STREETS

McTrans has provided a video tutorial for the Streets module at mctrans.ce.ufl.edu/hcs



1. Open HCS 2010
2. Select the Streets icon *Streets now handles signals and signalized corridors



3. Complete the Quick Start Screen
 - a. Change forward direction to NB
 - b. Change the speed limit to 45

Quick Start

Default Selections

Number of Intersections	1	Cycle Length, s	100
Forward Direction *	NB	Minimum Green, s	5
Number of Periods	1	Yellow Change, s	4.0
Analysis Duration, h	0.25	Red Clearance, s	1.0
Base Saturation Flow, pcphpl	1900	Passage Time, s	2.0
Speed Limit, mi/h	45	Detector Length, ft	40

Template Help ?


* **Forward direction** = this entry typically specifies the direction of "phase 2" in the timing plan. (i.e. the main road). Reversing the [urban street](#) forward direction could cause forward direction segment-specific MOEs (e.g., running speed, travel time) to be reported for the reverse direction, and vice-versa. *you can only change the direction from N to S or from E to W

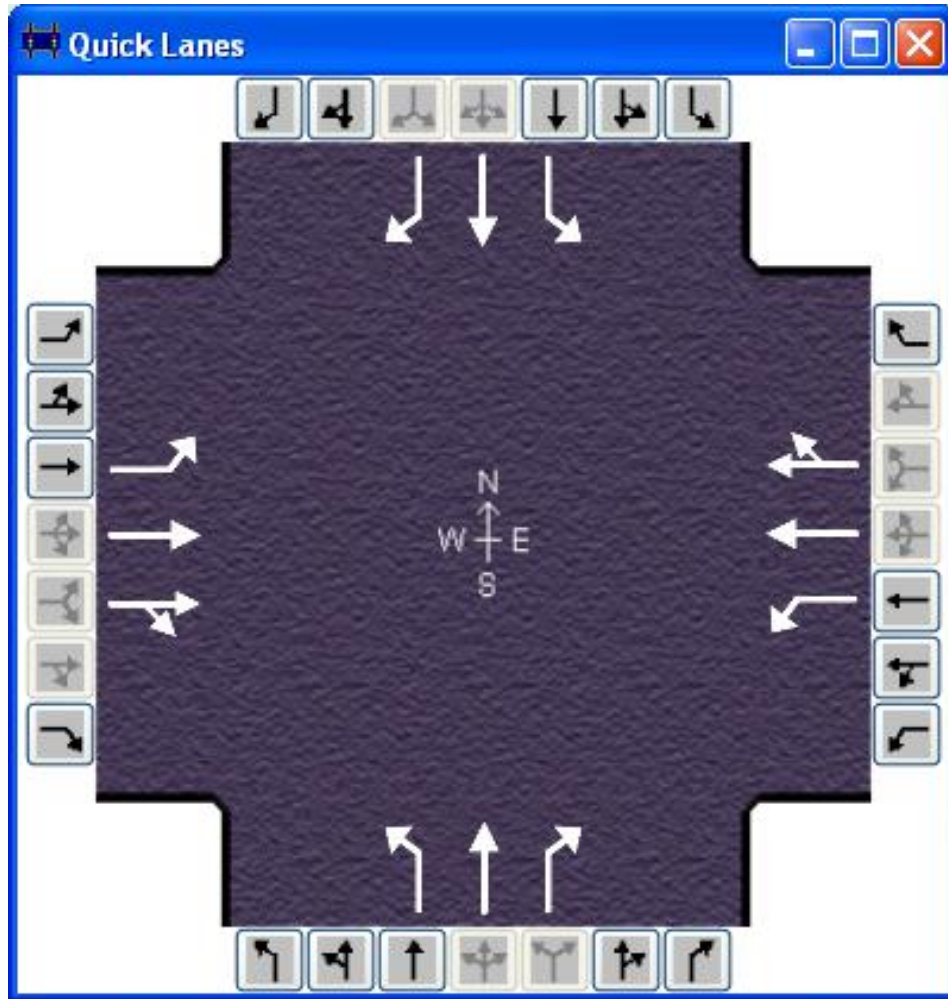
4. Enter Information in the **General** Section
 - a. Street Name
 - b. Intersection
 - c. Description
 - d. PHF (.92 urban .88 rural)

The screenshot shows the 'HCS 2010 Streets - [Streets2.xus *]' window. The 'Classic Mode' tab is selected. Under 'PRIMARY INPUT DATA', the 'General' section is expanded. The fields are filled as follows:

Urban Street	SR 42		
Intersection	SR 42 @ Forest Pkwy		
Description	Existing Geometry Design Year Traffic		
Data File	Streets2.xus		
Forward Direction	NB	Area Type	Other
Segment Length, ft		Duration	0.25
All Segment Lengths		PHF	0.92

5. Enter **Lane Configuration**

- Click  to enlarge the Quick Lanes window
- Remove the right turn arrow from the EB and WB approaches
**To remove a lane from an approach click the white arrow*
- Add a thru/right shared arrow for the EB and WB approaches
**To add a lane to an approach click the black/grey buttons*
- Close the window to return to the main screen




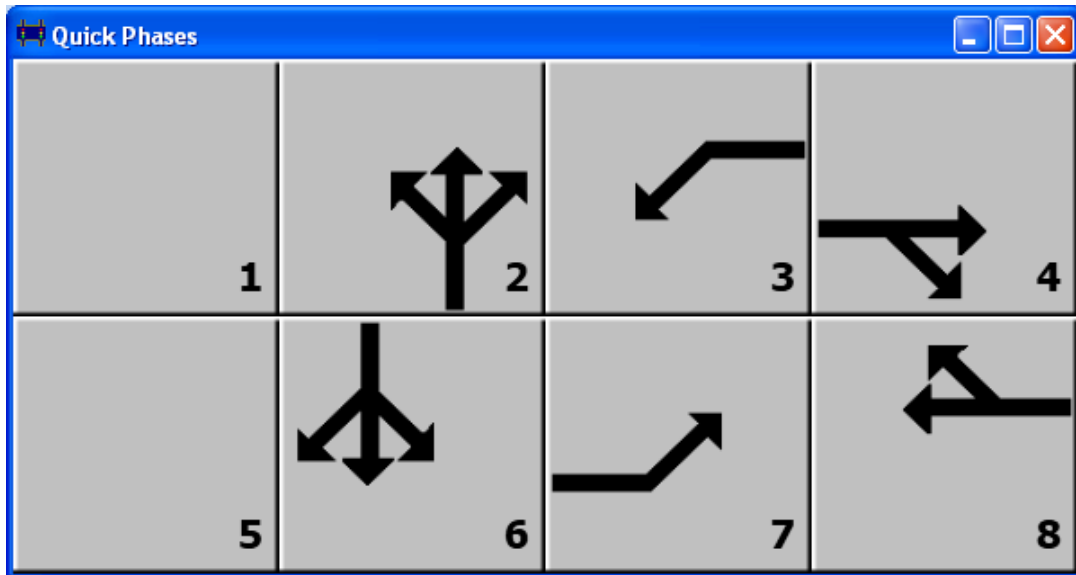
6. Enter **Traffic** Data

- Demand (Traffic Volumes)
- Storage Length (for turn lanes)
- Percent Heavy Vehicles
- Grade
- Speed limit (may need adjusting if side roads have a different speed limit than mainline)

Traffic	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Demand, veh/h	350	1315	285	385	740	125	130	320	240	225	780	310
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	350	0	0	300	0	0	190	0	300	200	0	370
Saturation, pc/h/ln	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy Vehicles, %	10	10	0	10	10	0	10	10	10	10	10	10
Grade, %		-2			1			6			-2	
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)	1EB		1.00	1WB		1.00	1NB		1.00	1SB		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

7. Enter **Phasing** data

- a. Click  to enlarge the **Quick Phases** window
- b. Click each phase box to toggle between allowable movements to reflect the phasing plan below.



8. Enter **Timing** (This is new in 2010)
 - a. Enter times for each Phase Split

NOTE: the reference phases (2&6) will be grayed out

Timing	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	15.0	40.0	15.0	40.0	0.0	45.0	0.0	45.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	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	Off	Off	Off	Off	Mir	Off	Mir
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		

**Notice that the familiar screen from HCS 2000 can be seen above the new Timing window*

Green	40.0	10.0	35.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

9. Enter the **General Data**
 - a. Analyst
 - b. Agency
 - c. Time Period (year & time)
 - d. Jurisdiction (county)
 - e. Queue Length Percentile
(change to 95)

- Analyst
- Agency
- Time Period (year & time)
- Jurisdiction (county)
- Queue Length Percentile
(change to 95)

☐ DETAILED INPUT DATA

General


Analyst	Design Engineer
Agency/Co	GDOT
Date	Thu, April 12, 2012
Time Period	2032 PM
Analysis Year	2012
Jurisdiction	Clayton County

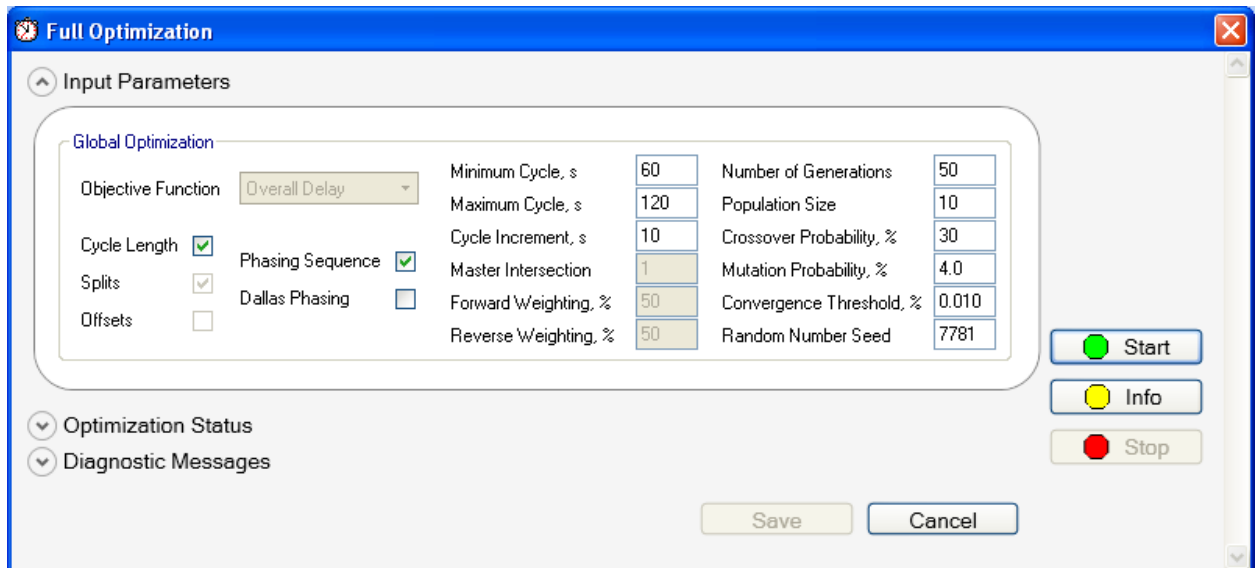
General

Number of Calculation Iterations	15
Critical Merge Gap, s	3.70
Stored Vehicle Lane Length, ft	25.0
Length of Detected Vehicle, ft	17.0
Stored Heavy Vehicle Length, ft	45
Queue Length Percentile	95
Acceleration Rate, ft/s ²	3.50
Stop Threshold Speed, mi/h	5.0
Pedestrians Pushing Button, prop	0.65
Speed Limit to Base FFS Ratio	0.90
Sneakers per Cycle, veh	2.0
Platoon Minimum Headway, s/veh	1.50
Platoon Maximum Headway, s/veh	3.60
Platoon Dispersion Factor	0.138
Demand Growth, %	0

10. Run **Full Optimization**



- Click the  icon
- Check Cycle Length
- Check Phasing Sequence
- Change Minimum Cycle to 60
- Change Maximum Cycle to 120
- Change Number of Generation to 200
- Change Mutation Probability to 4



The dialog box titled "Full Optimization" contains the following settings:

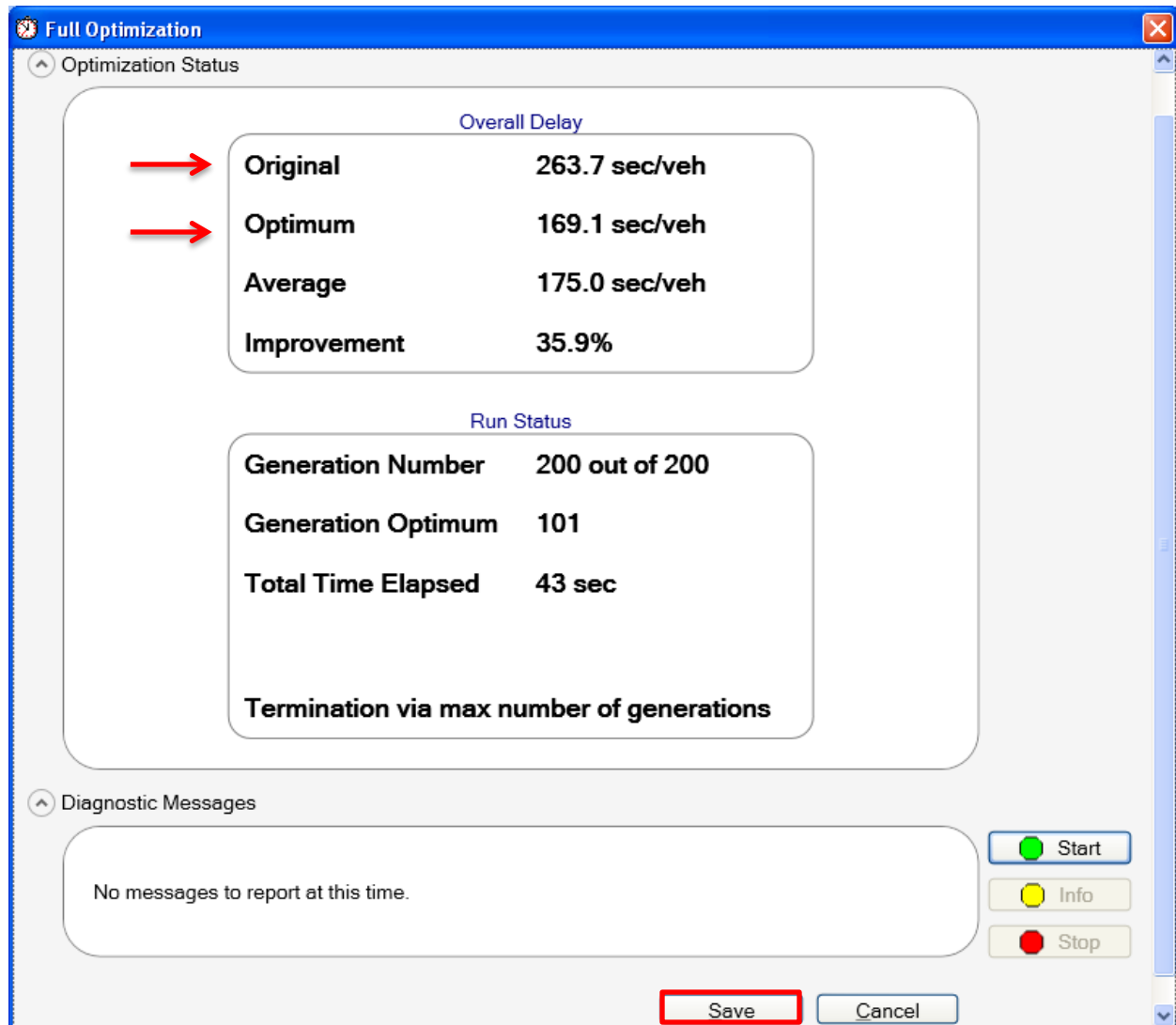
Global Optimization	
Objective Function	Overall Delay
Cycle Length	<input checked="" type="checkbox"/>
Splits	<input checked="" type="checkbox"/>
Offsets	<input type="checkbox"/>
Phasing Sequence	<input checked="" type="checkbox"/>
Dallas Phasing	<input type="checkbox"/>
Minimum Cycle, s	60
Maximum Cycle, s	120
Cycle Increment, s	10
Master Intersection	1
Forward Weighting, %	50
Reverse Weighting, %	50
Number of Generations	50
Population Size	10
Crossover Probability, %	30
Mutation Probability, %	4.0
Convergence Threshold, %	0.010
Random Number Seed	7781

Buttons: Start (green circle), Info (yellow circle), Stop (red circle), Save, Cancel.

Optimization Status
Diagnostic Messages

11. Optimization Results

- a. Shows the original and optimum delay results
**Note be sure to check the Diagnostic Messages*
- b. Click Save to import the optimization results



12. The **Phasing** and **Timing** will have updated

**Note that the Phasing Sequence has changed= An additional phase was added to provide additional time for the eastbound left turn movement.*

Phasing

Cycle, s: 110

Offset, s: 0

Phase 2 Direction: NB

Phase 4 Direction: EB

Reference Phase: 2

Reference Point: End

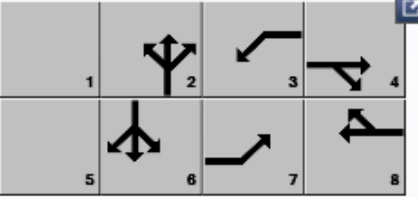
Force Mode: Fixed

Allow Optimization: ☒

Side Street Split Phasing: ☐

Uncoordinated Intersection: ☐

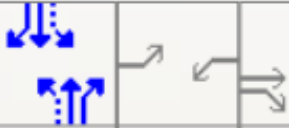
Field-Measured Phase Times: ☐



	1	2	3	4	5	6	7	8
Green	34.0	16.0	6.2	33.8	0.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0

Timing

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Phase Split, s	56.0	50.0	21.0	15.0	0.0	39.0	0.0	39.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	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	Off	Off	Off	Off	Mit	Off	Mit
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		



	1	2	3	4	5	6	7
Green	40.0	10.0	35.0	0.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0	0.0

Previous Phasing

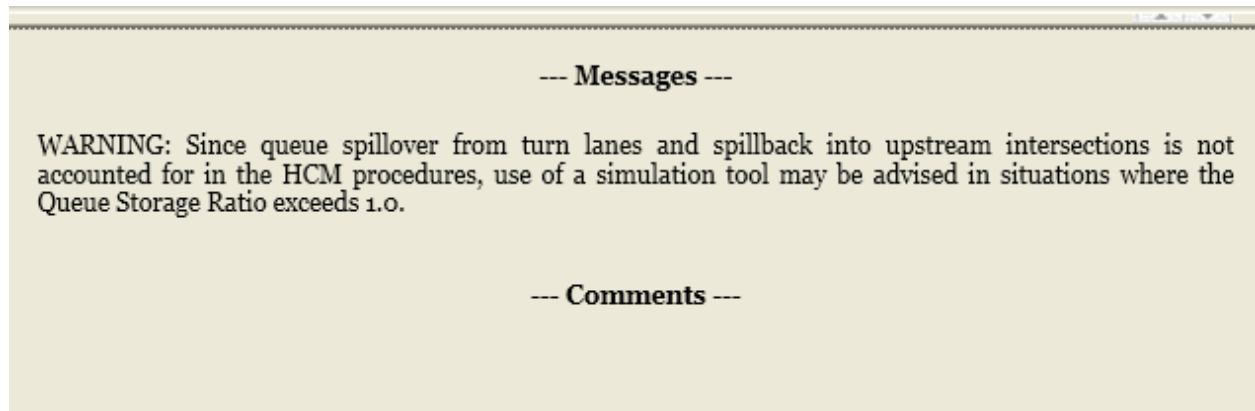
a. Focus on the Movement Group Results

HCS 2010 Signalized Intersection Results Summary																			
General Information								Intersection Information											
Agency		GDOT						Duration, h		0.25									
Analyst		Design Engineer		Analysis Date		Apr 12, 2012		Area Type		Other									
Jurisdiction		Clayton County		Time Period		2032 PM		PHF		0.92									
Intersection		SR 42 @ Forest Pkwy		Analysis Year		2012		Analysis Period		1> 7:00									
File Name		pdt example.xus																	
Project Description								Existing Geometry Design Year Traffic											
Demand Information				EB			WB			NB			SB						
Approach Movement				L	T	R	L	T	R	L	T	R	L	T	R				
Demand (v), veh/h				350	1315	285	385	740	125	130	320	240	225	780	310				
Signal Information																			
Cycle, s		110.0		Reference Phase		2													
Offset, s		0		Reference Point		End													
Uncoordinated		No		Simult. Gap E/W		On		Green			0.0			0.0					
Force Mode		Fixed		Simult. Gap N/S		On		Yellow			0.0			0.0					
								Red			0.0			0.0					
Timer Results				EBL		EBT		WBL		WBT		NBL		NBT		SBL		SBT	
Assigned Phase				7		4		3		8				2				6	
Case Number				2.0		4.0		2.0		4.0				5.0				5.0	
Phase Duration, s				32.2		50.0		21.0		38.8				36.0				36.0	
Change Period, (Y+R), s				5.0		5.0		5.0		5.0				5.0				5.0	
Max Allow Headway (MAH), s				0.0		0.0		0.0		0.0				0.0				0.0	
Queue Clearance Time (q _v), s				0.0		0.0		0.0		0.0				0.0				0.0	
Green Extension Time (g _x), s				0.0		0.0		0.0		0.0				0.0				0.0	
Phase Call Probability				0.00		0.00		0.00		0.00				0.00				0.00	
Max Out Probability				0.00		0.00		0.00		0.00				0.00				0.00	
Movement Group Results				EB			WB			NB			SB						
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				0	0	0	0	0	0	0	0	0	0	0	0				
Adjusted Saturation Flow Rate (s), veh/h/s				0	0	0	0	0	0	0	0	0	0	0	0				
Queue Service Time (q _v), s				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Cycle Queue Clearance Time (q _c), s				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Capacity (c), veh/h				412	714	670	238	527	501	65	518	439	188	539	457				
Volume-to-Capacity Ratio (X)				0.924	1.233	1.282	1.758	0.915	0.915	2.159	0.672	0.664	1.303	1.572	0.737				
Available Capacity (c _a), veh/h				0	0	0	0	0	0	0	0	0	0	0	0				
Back of Queue (Q), veh/in (95th percentile)				15.2	58.8	61.9	47.3	21.1	20.3	21.8	13.5	10.4	22.9	82.4	13.9				
Overflow Queue (Q _o), veh/in				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
Queue Storage Ratio (RQ) (95th percentile)				1.17	0.00	0.00	4.25	0.00	0.00	3.09	0.00	0.94	3.09	0.00	1.01				
Uniform Delay (d _u), s/veh				40.4	32.5	32.5	47.0	36.7	36.7	55.0	33.1	32.2	50.4	38.0	34.0				
Incremental Delay (d _i), s/veh				3.9	116.9	138.0	357.7	20.2	21.0	588.5	6.8	5.8	169.7	266.4	10.2				
Initial Queue Delay (d _i), 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				44.2	149.4	170.5	404.7	56.9	57.7	623.5	39.9	38.0	220.1	304.4	44.2				
Level of Service (LOS)				D	F	F	F	E	E	F	D	D	F	F	D				
Approach Delay, s/veh / LOS				139.1	F		164.3	F		149.2	F		228.6	F					
Intersection Delay, s/veh / LOS				169.1						F									

Movement Group Results	EB			WB			NB			SB		
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	0	0	0	0	0	0	0	0	0	0	0	0
Adjusted Saturation Flow Rate (s), veh/h/ln	0	0	0	0	0	0	0	0	0	0	0	0
Queue Service Time (g_s), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Queue Clearance Time (g_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capacity (c), veh/h	412	714	670	238	527	501	65	518	439	188	539	457
Volume-to-Capacity Ratio (X)	0.924	1.233	1.282	1.758	0.915	0.915	2.159	0.872	0.594	1.303	1.572	0.737
Available Capacity (c_a), veh/h	0	0	0	0	0	0	0	0	0	0	0	0
Back of Queue (Q), veh/ln (95th percentile)	15.2	58.8	61.9	47.3	21.1	20.3	21.8	13.5	10.4	22.9	82.4	13.9
Overflow Queue (Q_o), veh/ln	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio (RQ) (95th percentile)	1.17	0.00	0.00	4.25	0.00	0.00	3.09	0.00	0.94	3.09	0.00	1.01
Uniform Delay (d_1), s/veh	40.4	32.5	32.5	47.0	36.7	36.7	55.0	33.1	32.2	50.4	38.0	34.0
Incremental Delay (d_2), s/veh	3.9	116.9	138.0	357.7	20.2	21.0	568.5	6.8	5.8	169.7	266.4	10.2
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	44.2	149.4	170.5	404.7	56.9	57.7	623.5	39.9	38.0	220.1	304.4	44.2
Level of Service (LOS)	D	F	F	F	E	E	F	D	D	F	F	D
Approach Delay, s/veh / LOS	139.1		F			F	149.2		F		228.6	F
Intersection Delay, s/veh / LOS				169.1						F		

14. View Messages Report

Look for any warnings!!!



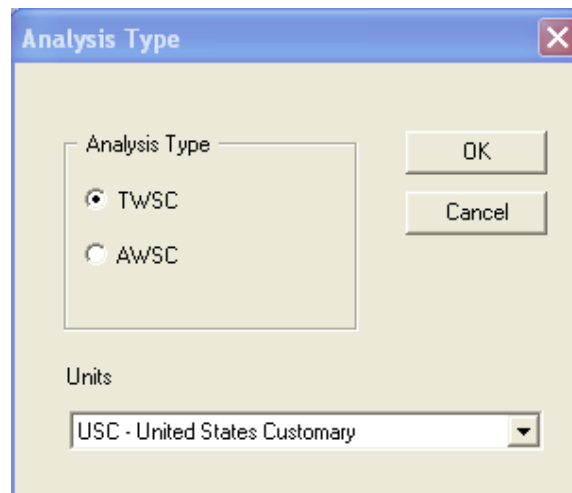
MODULE 2: TWO WAY STOP CONTROL



1. Open HCS 2010
2. Select the **TWSC** module



3. Create a new file. Select TWSC on the **Analysis Type** screen.



4. Complete the **General Information** section.

The screenshot shows the 'HCS Unsignal - [Unsignal1 *]' window. The title bar is blue. Below it is a menu bar with 'File', 'Edit', 'View', 'Reports', 'Window', and 'Help'. A toolbar contains icons for file operations and a dropdown menu currently set to 'Input Quick Jump'. The main area is titled 'UNSIGNALIZED INTERSECTIONS TWO-WAY STOP-CONTROLLED'. It contains a form with the following fields:

Analyst	JBT	Intersection	SR 24 / SR 272
Agency/Co	GDOT	Jurisdiction	Baldwin (D3)
Date	8/31/2011	Units: U. S. Customary	
Time Period Analyzed	2033 PM	Analysis Year	2011
East/West Street Name	SR 24	North/South Street Name	SR 272
Project ID	SR 24 Widening in Baldwin / Washington Counties		

5. Select **Quick Entry** under **Lane Designation, Vehicle Volumes and Adjustments**

The screenshot shows the 'HCS Unsignal - [Unsignal1 *]' window. The title bar is blue. Below it is a menu bar with 'File', 'Edit', 'View', 'Reports', 'Window', and 'Help'. A toolbar contains icons for file operations and a dropdown menu currently set to 'Input Quick Jump'. The main area is titled 'LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS'. It contains a form with the following fields:

Duration: 0.25 hours

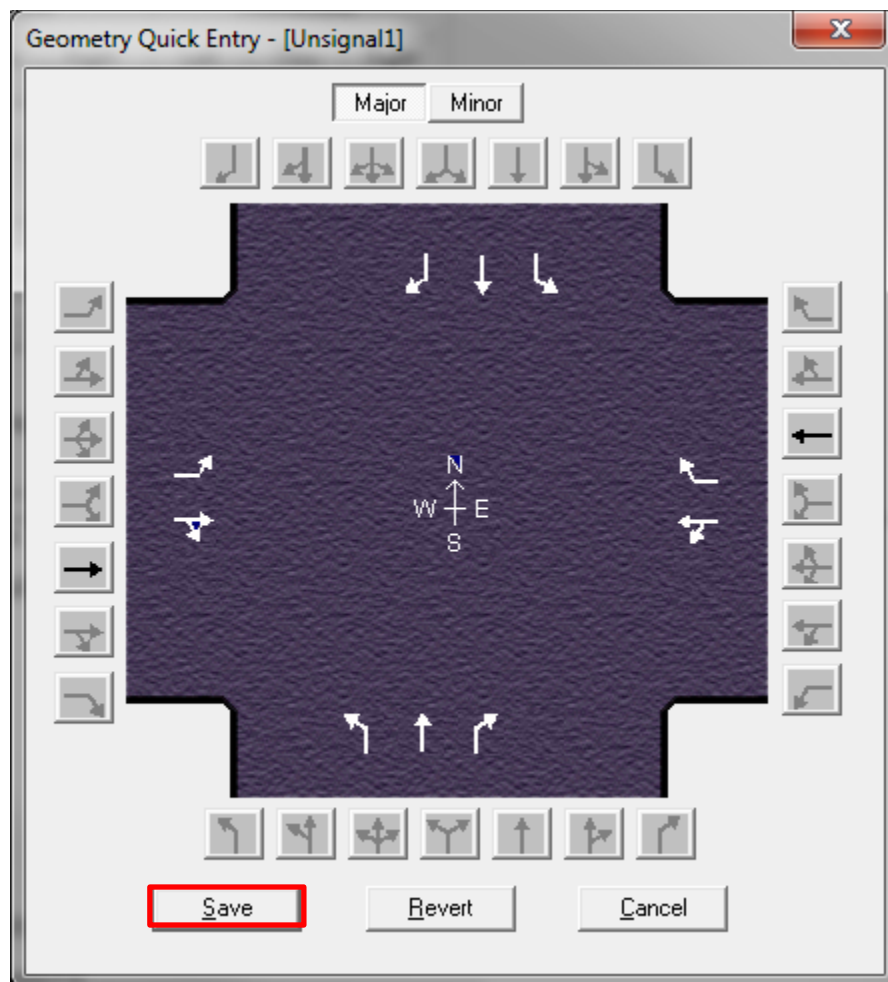
Quick Entry (highlighted with a red box)

Major Street Direction: East-West

Number of Lanes and Usage:

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	0	0	0	0	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		

6. Enter the lane configuration into the **Quick Entry** window. (click the black arrow buttons to add movement. Click the white arrows to remove a movement). Click **Save**.



7. Complete the **Lane Designation, Vehicle Volumes and Adjustments** Section
 - a. Select a Major Street Direction (the free flowing direction)
 - b. Notice that the Number of Lanes and Usage is filled in from the Quick Entry
 - c. If applicable, designate channelized right turns for each approach (*This button is activated only when the right-turning traffic from the major road is separated by a triangular island and has to comply with a stop or yield sign.*)
 - d. Select Flared Minor Street Approach and Storage* (*The number of spaces for right-turning passenger cars that can queue at the stop line without obstructing the access to the stop line for other movements*). NOTE: for use when there is room for sneaker right turners to squeeze through at an approach.
 - e. Select a Median Type for the Major approach (Undivided, Raised Curb or TWLTL) If type is Raised Curb or TWLTL then input the storage (for two stage left turners from the minor street)

HCS Unsignal - [Unsignal1 *]

File Edit View Reports Window Help

Input Quick Jump Report Quick Jump

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
<p><u>Major Street Direction</u> North-South</p> <p>Number of Lanes and Usage</p> <p>1 1 0 0 1 1 1 1 1 1 1 1</p> <p>Shared Shared Shared Shared Shared Shared Shared Shared</p> <p>Right Turn Channelized Right Turn Channelized Right Turn Channelized Right Turn Channelized</p> <p>Flared Minor-Street Approach and Storage</p> <p><input type="checkbox"/> Yes Storage 0 <input type="checkbox"/> Yes Storage 0 <input type="checkbox"/> Yes Storage <input type="checkbox"/> <input type="checkbox"/> Yes Storage <input type="checkbox"/></p> <p>Median Type</p> <p>Undivided Median Storage Undivided Median Storage 1</p>											

8. Continue to complete the **Lane Designation, Vehicle Volumes and Adjustments**

- Enter the Volume for each movement
- Enter the Peak Hour Factor for each movement
- Enter the Percent Heavy Vehicle for each movement
- Enter the Percent Grade for each approach

L						TR		LT		R		L			T		R	
Volume (vph), Increment 10 <input type="text" value="10"/> % <input type="text" value="+"/> <input type="text" value="-"/>																		
<input type="text" value="30"/>	<input type="text" value="50"/>	<input type="text" value="25"/>	<input type="text" value="25"/>	<input type="text" value="70"/>	<input type="text" value="50"/>	<input type="text" value="80"/>	<input type="text" value="250"/>	<input type="text" value="100"/>	<input type="text" value="100"/>	<input type="text" value="250"/>	<input type="text" value="75"/>							
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"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<input type="text" value="0.92"/>	<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)																		
<input type="text" value="8"/>	<input type="text" value="14"/>	<input type="text" value="7"/>	<input type="text" value="7"/>	<input type="text" value="19"/>	<input type="text" value="14"/>	<input type="text" value="22"/>	<input type="text" value="68"/>	<input type="text" value="27"/>	<input type="text" value="27"/>	<input type="text" value="68"/>	<input type="text" value="20"/>							
Percent Heavy Vehicles (%)																		
<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"/>	<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"/>	
Percent Grade (%)																		
<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"/>	<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"/>	
Hourly Flow Rate (vph)																		
<input type="text" value="32"/>	<input type="text" value="54"/>	<input type="text" value="27"/>	<input type="text" value="27"/>	<input type="text" value="76"/>	<input type="text" value="54"/>	<input type="text" value="86"/>	<input type="text" value="271"/>	<input type="text" value="108"/>	<input type="text" value="108"/>	<input type="text" value="271"/>	<input type="text" value="81"/>							
Saturation Flow Rate (vph)																		
<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>	<input type="text" value="1700"/>							
Percent Thrus Using Shared Lane (%)																		
<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="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>							

9. Scroll down to review the **Results** (results are calculated for every movement and approach)

Minor Street						Major Street					
Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Volume (vph)											
32		81		103	54	86				108	
Movement Capacity											
105		220		201	777	1201				1174	
Shared Lane Capacity											
		220		201							
Movement v/c Ratio											
0.30		0.37		0.51	0.07	0.07				0.09	
95% Queue Length											
1.17		1.60		2.60	0.22	0.23				0.30	
Control Delay (sec/veh)											
53.7		30.6		40.3	10.0	8.2				8.4	
Movement Level of Service											
F		D		E	A	A				A	
Approach Delay (sec/veh)											
		37.1			29.9						
Approach Level of Service											
		E			D						

10. Select Two Way Stop Control Summary from the **Report Quick Jump** to view (or print) the results

Report Quick Jump

- Two-Way Stop Control Summary
- Delay, Queue Length, & LOS
- Two-Way Stop Control Analysis
- Vehicle Volumes & Adjustments
- Ped Volumes & Adjustments
- Upstream Signal Data
- Major Street Delay Data
- Critical Gap & Follow-up
- Upstream Signals
- Impedance and Capacity
- Two-stage Gap Acceptance
- Shared Lane Calculations
- Flared Approaches
- Delay, Queue & LOS
- Major LT Delay

Two-WAY STOP CONTROL

Analyst:
 Agency/Co.:
 Date Performed: 8/27/2012
 Analysis Time Period:
 Intersection:
 Jurisdiction:
 Units: U. S. Customary
 Analysis Year:
 Project ID:
 East/West Street:
 North/South Street:
 Intersection Orientation: NS

Major Street:	Approach	Vehicle Volumes and Adj	Northbound	Southbound
	Movement	1	2	3
		L	T	R

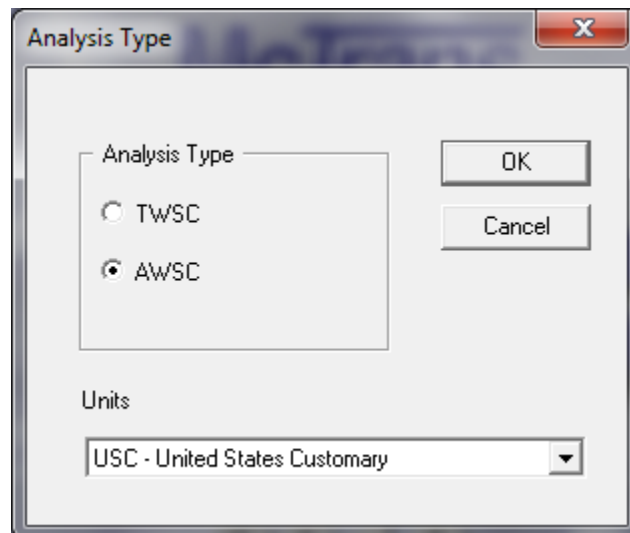
MODULE 3: ALL WAY STOP CONTROL



1. Open HCS 2010
2. Select the **AWSC** module



3. Create a new file. Select AWSC on the **Analysis Type** screen.



4. Complete the **General Information** section.

The screenshot shows the 'HCS Unsignal - [Unsignal1 *]' window. The menu bar includes File, Edit, View, Reports, Window, and Help. The toolbar has icons for file operations and a dropdown menu currently set to 'Input Quick Jump'. The main title bar of the form is 'UNSIGNALIZED INTERSECTIONS TWO-WAY STOP-CONTROLLED'. The form contains the following fields:

Analyst	JBT	Intersection	SR 24 / SR 272
Agency/Co	GDOT	Jurisdiction	Baldwin (D3)
Date	8/31/2011	Units: U. S. Customary	
Time Period Analyzed	2033 PM	Analysis Year	2011
East/West Street Name	SR 24	North/South Street Name	SR 272
Project ID	SR 24 Widening in Baldwin / Washington Counties		

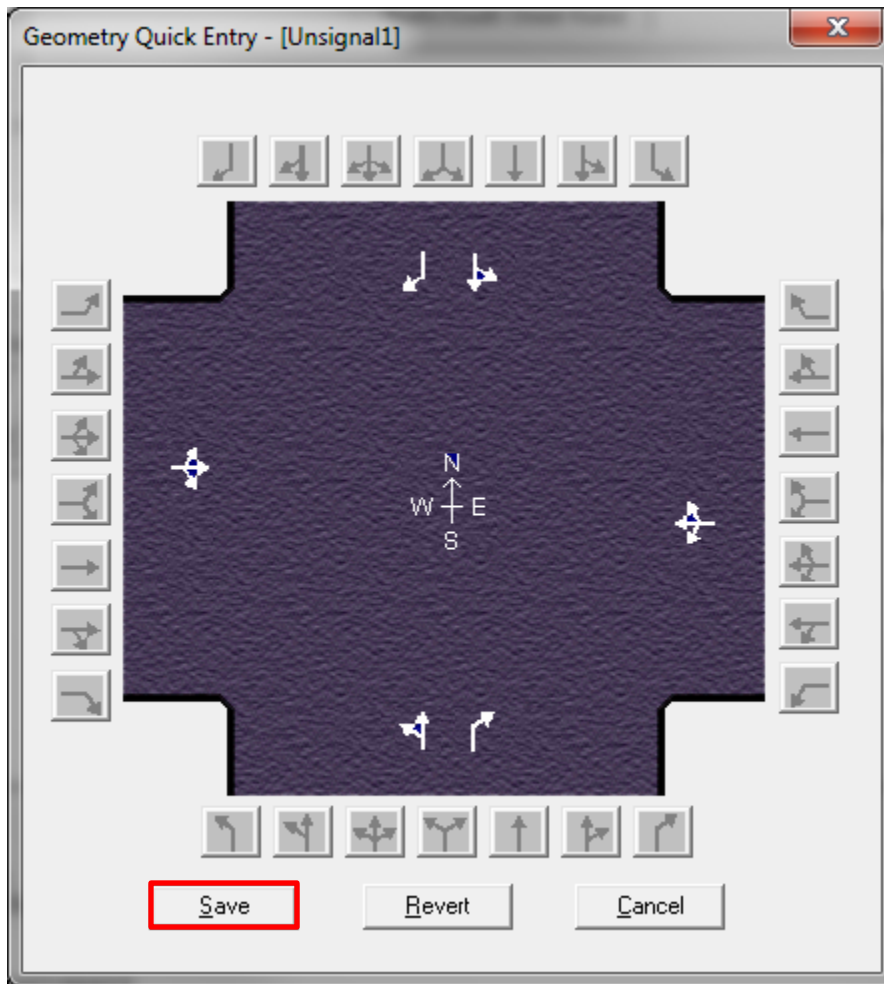
5. Select **Quick Entry** under **Lane Designation, Vehicle Volumes and Adjustments**

The screenshot shows the 'HCS Unsignal - [Unsignal1]' window. The menu bar includes File, Edit, View, Reports, Window, and Help. The toolbar has icons for file operations and a dropdown menu currently set to 'AWSC Report Quick Jump'. The main title bar of the form is 'LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS'. The form contains the following fields:

Analyst		Intersection	
Agency/Co.		Jurisdiction	
Date Performed	8/28/2012	Units: U. S. Customary	
Time Period Analyzed		Analysis Year	
East/West Street Name		North/South Street Name	
Project ID			

Below the form, there is a section titled 'LANE DESIGNATION, VEHICLE VOLUMES AND ADJUSTMENTS'. The 'Quick Entry' button is highlighted with a red box. The 'Duration' is set to 0.25 hours. The section includes four columns for lane designations: Eastbound, Westbound, Northbound, and Southbound. Each column has three sub-columns: Left, Thru, and Right. Below these columns, there are spinners for 'Number of Lanes and Usage' and 'Shared' buttons for each lane type.

6. Enter the lane configuration into the **Quick Entry** window. (click the black arrow buttons to add movement. Click the white arrows to remove a movement). Click **Save**.



7. Complete the **Lane Designation, Vehicle Volumes and Adjustments** Section
 - a. Notice that the Number of Lanes and Usage is filled in from the Quick Entry
 - b. Enter the Volume for each movement
 - c. If applicable, enter the Percent Thrus using Left Lane for each leg
 - d. Enter the Peak Hour Factor for each movement
 - e. Enter the Percent Heavy Vehicle for each movement

HCS Unsignal - [Unsignal1 *]

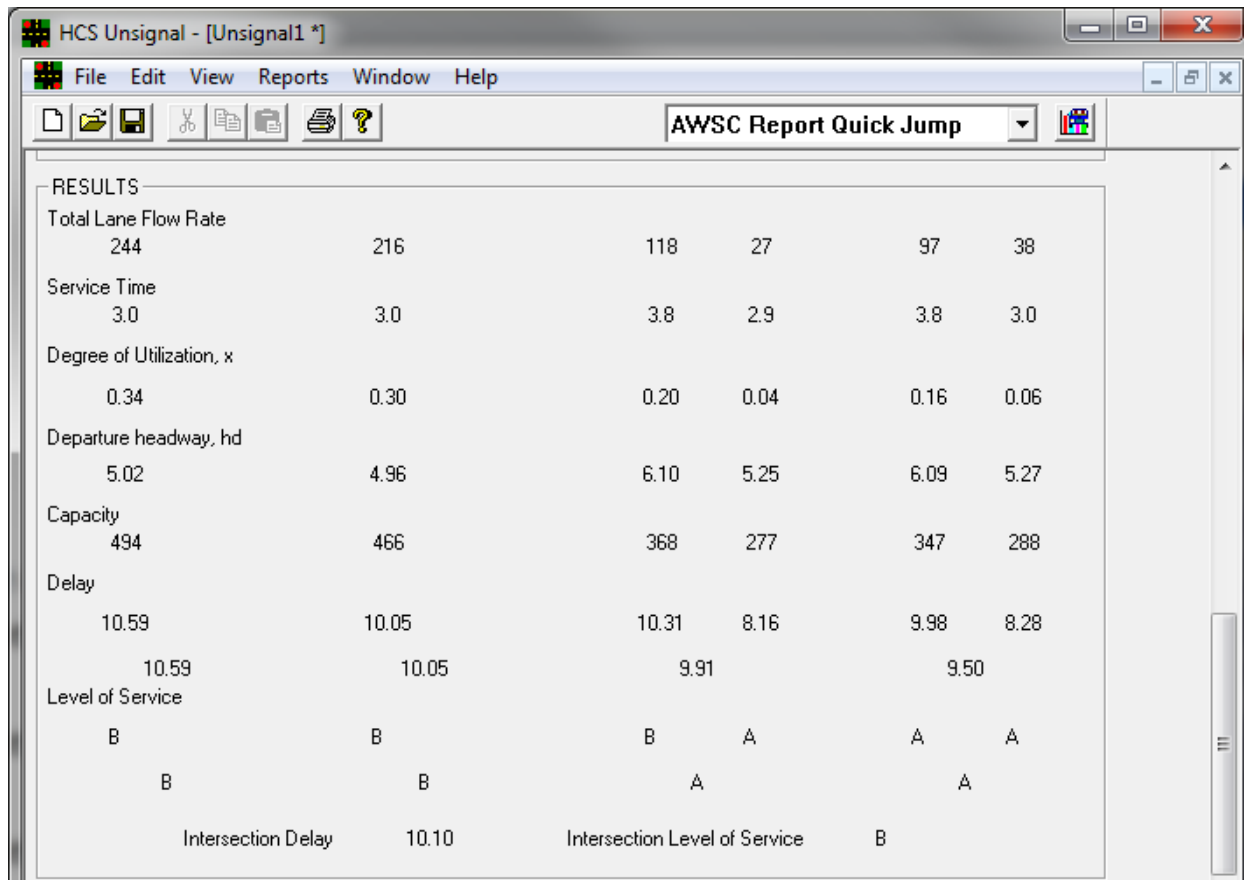
File Edit View Reports Window Help

AWSC Report Quick Jump

Quick Entry

Eastbound			Westbound			Northbound			Southbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage			Number of Lanes and Usage			
0	1	0	0	1	0	0	1	1	0	1	1	
Shared		Shared	Shared		Shared	Shared		Shared	Shared		Shared	
Volume (vph)												
50	150	25	25	125	50	30	80	25	20	70	35	
Percent Thrus Using Left Lane, %												
50			50			50			50			
Lane 1		Lane 2	Lane 1		Lane 2	Lane 1		Lane 2	Lane 1		Lane 2	
LTR			LTR			LT		R	LT		R	
Peak Hour Factor, PHF												
0.92		1.00	0.92		1.00	0.92		0.92	0.92		0.92	
Percent Heavy Vehicles (%)												
3		0	3		0	3		3	3		3	
Hourly Flow Rate (vph)												
244			216			118			27	97		38

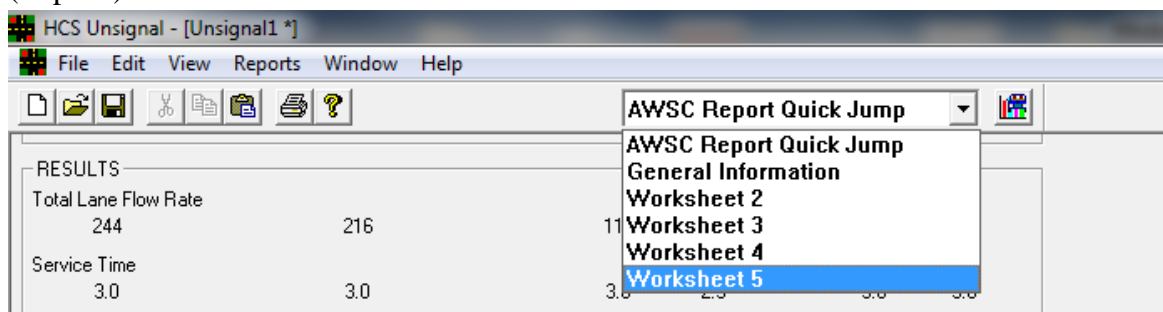
8. Scroll down to review the **Results**



The screenshot shows the HCS Unsignal software interface. The menu bar includes File, Edit, View, Reports, Window, and Help. The toolbar contains icons for file operations and a help icon. The 'AWSC Report Quick Jump' menu is open, showing options: AWSC Report Quick Jump, General Information, Worksheet 2, Worksheet 3, Worksheet 4, and Worksheet 5. The 'Results' section displays a table of traffic performance metrics.

Metric	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Total Lane Flow Rate	244	216	118	27	97	38
Service Time	3.0	3.0	3.8	2.9	3.8	3.0
Degree of Utilization, x	0.34	0.30	0.20	0.04	0.16	0.06
Departure headway, hd	5.02	4.96	6.10	5.25	6.09	5.27
Capacity	494	466	368	277	347	288
Delay	10.59	10.05	10.31	8.16	9.98	8.28
Level of Service	B	B	B	A	A	A
Intersection Delay	10.10		Intersection Level of Service		B	

9. Select Two Way Stop Control Summary from the **AWSC Report Quick Jump** to view (or print) the results



The screenshot shows the HCS Unsignal software interface with the 'AWSC Report Quick Jump' menu open. The 'Worksheet 5' option is highlighted. The 'Results' section displays a table of traffic performance metrics.

Metric	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6
Total Lane Flow Rate	244	216	118	27	97	38
Service Time	3.0	3.0	3.8	2.9	3.8	3.0

MODULE 4: ROUNDABOUTS



1. Open HCS 2010
2. Select the **Roundabout** module



3. Open a New File
4. Enter the **General Information**

HCS 2010 Roundabouts - [Roundabouts1 *]

File Edit View Reports Window Help

HCS 2010 ROUNDABOUTS

Analyst	USER	Intersection	US1 @ SR 2
Agency/Co.	GDOT	Jurisdiction	Fulton
Date	8/23/2011	Units: U. S. Customary	
Time Period Analyzed	AM	Analysis Year	2020
East/West Street Name	SR 2	North/South Street Name	US 1
Project ID	123456		

5. Complete the **Lane Designations** section

- a. Enter the lane configuration for each approach

For a one-lane roundabout entry, enter one thru lane and select both the left "shared" button and the right "shared" button. For a two-lane roundabout entry, enter one of the following combinations based on the entry lanes' pavement markings: 1) two thru lanes and select both "shared" buttons, one left lane and one thru lane and select the right "shared" button, or 2) one thru lane and one left lane and select the left "shared" button.

- b. If a multilane enter the Percent of Entry Vehicles using Left Lane

- c. Enter the number of Conflicting Lanes on Entry

The number of lanes that pass directly in front of the approach entry.

- d. If applicable, designate a Right Turn Bypass Lane

- i. Yielding -right-turning traffic yields to exiting roundabout traffic

- ii. Non-Yielding - right-turning traffic enters a new lane on exit leg

For roundabout entries with right turn bypass lanes, the user should enter one thru lane, select both the left "shared" button and the right "shared button", and select the type of bypass lane in the "Right-Turn Bypass" field.

- e. If applicable, designate the number of Conflicting Lanes on Bypass Entry

The number of lanes that pass directly in front of the yielding bypass lane.

HCS 2010 Roundabouts - [Roundabouts1 *]

File Edit View Reports Window Help

Duration 0.25 hours

Eastbound			Westbound			Northbound			Southbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	1	0	0	1	0	0	1	0	0	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			Conflicting Lanes on Entry			Conflicting Lanes on Entry			Conflicting Lanes on Entry		
1			1			1			1		
Right-Turn Bypass											
None			None			Yielding			None		
Conflicting Lanes on Bypass Entry											
1			1			1			1		
No. of Pedestrians Crossing Entry											
0			0			0			0		

This is an example of a single lane RAB with a right bypass lane on the South Leg

6. Complete the **Vehicle Volumes** section
 - a. Enter Vehicle Volumes for each approach movement
 - b. Enter Peak Hour Factor
 - c. Enter Percent Heavy Vehicles

The screenshot shows the 'HCS 2010 Roundabouts - [Roundabouts1 *]' window. The 'Volume (vph)' section contains 12 input fields with values: 50, 215, 25, 75, 245, 45, 170, 270, 190, 150, 225, 165. The 'Peak Hour Factor, PHF, All' is set to 0.92. The 'Percent Heavy Vehicles, (%), All' is set to 3. Below these are four sections for 'Eastbound U-Turn', 'Westbound U-Turn', 'Northbound U-Turn', and 'Southbound U-Turn'. Each section has three input fields for 'Vol (vph)', 'PHF', and '% HV'. The values for these fields are: Eastbound (0, 1.00, 3), Westbound (0, 1.00, 3), Northbound (0, 1.00, 3), and Southbound (0, 1.00, 3).

7. Scroll down to review the **Results**

The screenshot shows the 'RESULTS' section of the software. It displays a table of performance metrics for four approaches: Eastbound, Westbound, Northbound, and Southbound. The table is organized into columns for 'Left', 'Right', and 'Bypass' movements for each approach. The metrics include Entry Lane Flow (pc/h), Entry Lane Capacity (pc/h), Lane v/c Ratio, Critical Lane, Lane Control Delay (sec/veh), Lane Level of Service, Approach Delay (sec/veh), 95th-percentile Queue (veh), Intersection Delay (sec/veh), and Intersection LOS.

	Eastbound			Westbound			Northbound			Southbound		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Lane Flow (pc/h)	325			408			492			605		
Entry Lane Capacity (pc/h)	683			653			710			653		
Lane v/c Ratio	0.48			0.62			0.69			0.93		
Critical Lane	*			*						*		
Lane Control Delay (sec/veh)	12.6			17.8			19.6	0.0		45.2		
Lane Level of Service	B			C			C			E		
Approach Delay (sec/veh)	12.64			17.78			13.70			45.16		
95th-percentile Queue (veh)	2.6			4.4			5.6			12.2		
Intersection Delay (sec/veh)				23.65								
Intersection LOS												C

8. Print the Report
 - a. Go to the **Reports** Menu and select **Formatted Report**
 - b. View in bottom of split screen
 - c. Go to File > Print to print

HCS 2010 Roundabouts - [Roundabouts1 *]

File Edit View Reports Window Help

ROUNDABOUT REPORT

General Information					Site Information				
Analyst					Intersection				
Agency or Co.					E/W Street Name				
Date Performed 8/31/2012					N/S Street Name				
Time Period					Analysis Year				
Project ID									

Project Description:

Volume Adjustment and Site Characteristics

	EB				WB				NB				SB			
	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R	U
Number of Lanes(N)	0	1	0		0	1	0		0	1	0		0	1	0	
Volume (V), veh/h		215		0		245		0		270		0		225		0
Heavy Veh. Adj. (f_{HV}), %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
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	0.92	0.92	0.92	0.92
No. of Pedestrians Crossing Entry	0				0				0				0			

Critical and Follow-Up Headway Adjustment

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929	5.1929
Follow-Up Headway (sec)	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858	3.1858

Flow Computations

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Circulating Flow (V_c), pc/h	504			548			465			548		
Exiting Flow (V_{ex}), pc/h	409			649			408			364		
Entry Flow (V_e), pc/h		325			408			492	213		605	
Entry Volume veh/h		316			396			478	207		587	

Capacity and v/c Ratios

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Capacity (C_{PCE}), pc/h		683			653			710			653	
Capacity (c), veh/h		663			634			689			634	
v/c Ratio (X)		0.48			0.62			0.69			0.93	

Delay and Level of Service

	EB			WB			NB			SB		
	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.6			17.8			19.6	0.0		45.2	
Lane LOS		B			C			C			E	
Lane 95% Queue		2.6			4.4			5.6			12.2	
Approach Delay, s/veh		12.64			17.78			13.70			45.16	

Set All PHF: [0.92] ---Range: 0.25 to: 1.00 ---

Ready NUM

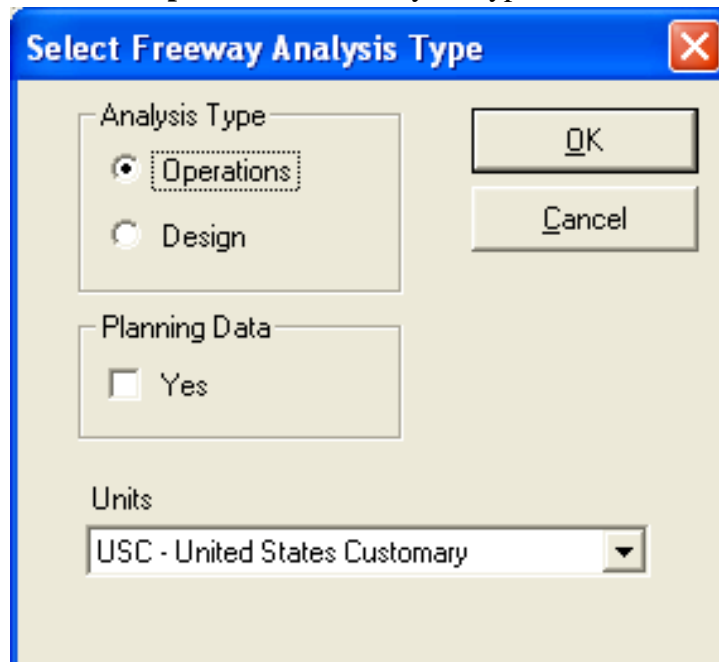
MODULE 5: FREEWAY



1. Open **HCS 2010**
2. Select the **Freeways** module



3. Open a **New File** and select **Operations** for Analysis Type



4. Enter the **General Information**

The screenshot shows the 'HCS 2010 Freeways - [Freeways1 *]' window. The title bar includes standard Windows controls. The menu bar contains 'File', 'Edit', 'View', 'Reports', 'Window', and 'Help'. Below the menu bar is a toolbar with icons for file operations and help. The main area is titled 'BASIC FREEWAY SEGMENTS OPERATIONAL ANALYSIS'. It contains several input fields for project information:

Analyst	INT	Freeway/Direction	I 20 E
Agency or Company	GDOT	From/To	Exit 31 to Exit 35
Date	9/4/2012	Units: U. S. Customary	Jurisdiction
Analysis Time Period	2012 AM	Analysis Year	2012
Project Description	1234567 No Build		

5. Complete the **Flow Rate and Free Flow Speed** Section

- Volume
- Peak Hour Factor
- Number of Lanes
- Terrain (Level, Rolling, Mountainous, Grade or Composite)
 - Level, Rolling and Mountainous - defined in HCM see pg 11-14
 - Grade - allows the entrance of a specific grade and length
 - Composite - produces a dialog list to enter grades for several lengths
- Truck Percentage
- RV Percentage
- Driver populations adjustment

**the Driver Population Factor is normally 1.00, unless the population is dominated by unfamiliar users in which case a value from 0.85-1.00 may be used.*

The screenshot shows the 'FLOW RATE' dialog box. It contains the following fields and values, with some highlighted in red:

Volume, V	4515	vph
Peak Hour factor, PHF	0.80	
Peak 15-minute volume	1411	v
Number of lanes, N	2	
Terrain:	Level	
Grade		%
Length		mi
Trucks and buses	24	%
E_T	1.5	
RVs	0	%
E_R	1.2	
Heavy vehicle adjustment, f_{HV}	0.893	
Driver population adj., f_P	1.00	
Flow rate, vp	3160	pc/h/ln

6. Complete the **Free Flow Speed** Section

- Enter the Lane width
- Enter the Right-side lateral clearance
- Enter Total ramp Density *the number of ramps within 3 miles in each direction on one side of the freeway divided by six*

FREE-FLOW SPEED

Free-Flow Speed and Type

☐ Measured, FFS ☒ Base FFS, BFFS

75.4 mph 75.4 mph

Speed Adjustments

Lane width, LW ft

f_{LW} mph

Right-side lateral clearance, LC ft

f_{LC} mph

Total ramp density, TRD ramps/mi

TRD adjustment mph

Free-flow speed, FFS 73.6 mph

Use Speed Curve for 75 mph

7. Scroll down to view the **Results**

RESULTS			
Flow rate, vp	3160 pc/h/ln	Free-flow speed	73.6 mph
Number of lanes, N	2	Speed, S	23.4 mph
Level of service, LOS	F	Density, D	135.3 pc/mi/ln

8. Go to the **Reports** menu then **Basic Freeway Worksheet** to print the report.

HCS 2010 Freeways - [Freeways1 *]

File Edit View Reports Window Help

BASIC FREEWAY SEGMENTS WORKSHEET

General Information				Site Information			
Analyst				Highway/Direction of Travel			
Agency or Company				From/To			
Date Performed 9/5/2012				Jurisdiction			
Analysis Time Period				Analysis Year			
Project Description							
<input checked="" type="checkbox"/> Oper. (LOS) <input type="checkbox"/> Des. (N) <input type="checkbox"/> Planning Data							
Flow Inputs							
Volume, V	4515	veh/h		Peak-Hour Factor, PHF	0.80		
AADT		veh/day		% Trucks and Buses, P _T	24		
Peak-Hr Prop. of AADT, K				% RVs, P _R	0		
Peak-Hr Direction Prop, D				General Terrain:	Level		
DDHV = AADT x K x D		veh/h		Grade %	Length mi		
				Up/Down %			
Calculate Flow Adjustments							
f _p	1.00			E _R	1.2		
E _T	1.5			f _{HV} = 1/[1+P _T (E _T - 1) + P _R (E _R - 1)]	0.893		
Speed Inputs				Calc Speed Adj and FFS			
Lane Width	12.0	ft		f _{LW}	0.0	mph	
Rt-Side Lat. Clearance	6.0	ft		f _{LC}	0.0	mph	
Number of Lanes, N	2			TRD Adjustment	1.8	mph	
Total Ramp Density, TRD	0.50	ramps/mi		FFS	73.6	mph	
FFS (measured)		mph					
Base free-flow Speed, BFFS	75.4	mph					
LOS and Performance Measures				Design (N)			
Operational (LOS)				Design (N)			
v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)				Design LOS			
	3160	pc/h/ln		v _p = (V or DDHV) / (PHF x N x f _{HV} x f _p)			
S	23.4	mph		S			
D = v _p / S	135.3	pc/mi/ln		D = v _p / S			
LOS	F			Required Number of Lanes, N			

MODULE 6: WEAVING



1. Open **HCS 2010**
2. Select the **Weaving** module



3. Open a **New File** and select **USC** for Unit Type



4. Enter the General Information

The screenshot shows the 'FREeway WEAVING OPERATIONAL ANALYSIS' section of the HCS 2010 Weaving software. The interface includes a menu bar (File, Edit, View, Reports, Window, Help) and a toolbar with icons for file operations and a 'Report Quick Jump' dropdown. The main form contains the following fields:

Analyst	JBT	Freeway/Direction	North/South
Agency/Company	GDOT	Weaving Segment	SR 20 / SR 5 Business
Date	7/19/2011	Units:	U. S. Customary
Analysis Time Period	20 years	Analysis Year	2027
Project Description	I-575 Auxilliary Lane Project Between SR 20 & SR 5 Business		

5. Complete the **Roadway Conditions** section

a. Weaving configuration

- i. One sided – *no weaving maneuver requires more than two lane changes*
- ii. Two-sided – *at least one weaving maneuver requires three or more lane changes or were a single lane on ramp is followed closely by a single lane off ramp on the opposite side of the freeway.*

The screenshot shows the 'ROADWAY CONDITIONS' section of the HCS 2010 Weaving software. The interface includes a menu bar (File, Edit, View, Reports, Window, Help) and a toolbar with icons for file operations and a 'Report Quick Jump' dropdown. The main form contains the following fields:

Weaving configuration	One-Sided	Segment Type	Freeway
Number of lanes, N	3 ln	Terrain	Rolling
Weaving segment length, L_S	1200 ft	Grade	%
Freeway free-flow speed, FFS	70 mi/h	Length	mi
Minimum segment speed, S_{MIN}	15 mi/h		
Freeway max capacity, c_{IFL}	2400 pc/h/ln		

6. Complete the **Volume** section

HCS 2010 Weaving - [Weaving1 *]

File Edit View Reports Window Help

Report Quick Jump

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	1650 veh/h	500 veh/h	720 veh/h	135 veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90
Peak 15-minute volume, V_{15}	458 veh	139 veh	200 veh	38 veh

7. Completed the **Vehicle Composition and Adjustment** section

**the Driver Population Factor is normally 1.00, unless the population is dominated by unfamiliar users in which case a value from 0.85-1.00 may be used.*

HCS 2010 Weaving - [Weaving1 *]

File Edit View Reports Window Help

Report Quick Jump

Volume Composition and Adjustments

Trucks and buses	12 %	5 %	5 %	5 %
E_T	2.5	2.5	2.5	2.5
Recreational vehicles	0 %	0 %	0 %	0 %
E_R	2.0	2.0	2.0	2.0
Heavy vehicle adjustment, f_{HV}	0.847	0.930	0.930	0.930
Driver population adjustment, f_P	1.00	1.00	1.00	1.00
Flow rate, v	2163 pc/h	597 pc/h	860 pc/h	161 pc/h

8. Complete the **Configuration Characteristics** section
 - a. Number of Maneuver Lanes – the number of lanes from which a weaving maneuver may be made with one or no lane changes
 - b. Interchange Density - *average number of interchanges per mile from a distance 3 miles upstream to 3 miles downstream of the midpoint of the weaving segment. The subject weaving segment should be counted as one interchange.*
 - c. Minimum RF Lane changes – *minimum number of lane changes that must be made by a single weaving vehicle moving from the on-ramp to the freeway*
 - d. Minimum FR Lane changes – *minimum number of lane changes that must be made by a single weaving vehicle moving from the freeway to the off-ramp*
 - e. Minimum RR Lane changes – *minimum number of lane changes that must be made by a single weaving vehicle moving from ramp to ramp. *two sided only*

HCS 2010 Weaving - [Module 2 - Lesson 3 (Weaving).xhw *]

File Edit View Reports Window Help

CONFIGURATION CHARACTERISTICS

Number of maneuver lanes, N_{WL}	2	ln		
Interchange density, ID	0.42	int/mi	Minimum weaving lane changes, LC_{MIN}	1457 lc/h
Minimum RF lane changes, LC_{RF}	1	lc/pc	Weaving lane changes, LC_W	1556 lc/h
Minimum FR lane changes, LC_{FR}	1	lc/pc	Non-weaving lane changes, LC_{NW}	312 lc/h
Minimum RR lane changes, LC_{RR}		lc/pc	Total lane changes, LC_{ALL}	1868 lc/h

9. View the **Results**

HCS 2010 Weaving - [Module 2 - Lesson 3 (Weaving).xhw *]

File Edit View Reports Window Help

RESULTS

Weaving configuration	One-Sided		
Weaving segment flow rate, v	3781 pc/h	Weaving intensity factor, W	0.460
Weaving segment capacity, c_W	4981 veh/h	Weaving segment speed, S	53.1 mi/h
Weaving segment v/c ratio	0.643	Average weaving speed, S_W	52.7 mi/h
Weaving segment density, D	23.7 pc/mi/ln	Average non-weaving speed, S_{NW}	53.5 mi/h
Level of service, LOS	C	Maximum weaving length, L_{MAX}	6517 ft

10. Go to the **Reports** menu and select **Freeway Weaving Worksheet** to view and print report

MODULE 7: RAMPS



1. Open **HCS 2010**
2. Select the **Ramps** module



3. Open a **New File** and select **Merge** (On/Entering Ramp) or **Diverge** (Off/Exiting Ramp) Junction type



4. Complete the General Information Section

HCS 2010 Ramps - [Ramps1 *]

File Edit View Reports Window Help

Freeway DIVERGE SEGMENTS ANALYSIS

Analyst: JBT Freeway/Direction: North/South

Agency/Company: GDOT Junction: Cook County (D4)

Date: 8/29/2011 Units: U. S. Customary Jurisdiction:

Analysis Time Period: 2026 Analysis Year: 2011

Project Description: I-75 Widening & reconstruction (NB I-575 Exit Ramp @ CR 253)

5. Complete the **Freeway Data** and **Off Ramp Data** of the **Freeway-Ramp Components and Characteristics**

- Enter the number of freeway lanes, freeway free flow speed, and freeway volume.
- Select the side of the freeway the ramp is located
- Enter the free flow ramp speed, the ramp volume, the number of lanes on the ramp and the length of the deceleration lane

HCS 2010 Ramps - [Ramps1 *]

File Edit View Reports Window Help

FREEWAY-RAMP COMPONENTS AND CHARACTERISTICS

Freeway Data

Number of lanes on freeway, N: 3 Free-flow speed, S FF: 70.0 mph

Volume, V: 2890 vph

Off Ramp Data

Side of Freeway: ☐ Left ☒ Right

Free-flow speed, S FR: 45.0 mph

Volume, V R: 60 vph

Number of lanes on ramp, N: 1

Length of first deceleration lane, LD or LD1: 622 ft

Length of Second Deceleration Lane, LD2:

6. If there is an adjacent ramp within 8,000 ft of the analysis ramp, the complete the **Adjacent Ramp Data** section. *If both upstream and downstream adjacent ramps exist, the analysis must be run twice.*

7. Complete the **Volume Adjustment** section
- Enter the Peak Hour Factor
 - Select the Terrain Type
 - Enter the Truck Percentage
 - Enter the Driver Populations Adjustment factor

8. View the Results

HCS 2010 Ramps - [Ramps1 *]

File Edit View Reports Window Help

RESULTS of DIVERGE AREA

Estimation of v_{12} :

$P_{FD} = 1.000$ Using Equ. Spec

$v_{12} = v_R + (v_F - v_R)P_{FD} = 3333$ pcph

Capacity Checks:

	Actual	Maximum	Violation?
$v_{Fi} = v_F$	3333	4500	No
v_{12}	3333	4400	No
$v_{FO} = v_F - v_R$	2222	4500	No
v_R	1111	2000	No

Level of Service Determination (if not LOS F):

Compute DR = 28.4 pc/mi/ln LOS = D (Exhibit 13-2)

Compute SR = 48.1 mph

9. Go to the **Reports** Menu. Select **Ramps and Ramp Junctions Worksheet** and **Print** the report.

HCS 2010 Ramps - [Ramps1 *]

File Edit View Reports Window Help

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information				Site Information			
Analyst				Freeway/Dir of Travel			
Agency or Company				Junction			
Date Performed 9/11/2012				Jurisdiction			
Analysis Time Period				Analysis Year			
Project Description							
Inputs							
Upstream Adj Ramp		Number of Lanes, N		2		Downstream Adj Ramp	
<input type="checkbox"/> Yes <input type="checkbox"/> On		Acceleration Lane Length, L_A				<input type="checkbox"/> Yes <input type="checkbox"/> On	
<input checked="" type="checkbox"/> No <input type="checkbox"/> Off		Deceleration Lane Length L_D		500		<input checked="" type="checkbox"/> No <input type="checkbox"/> Off	
$L_{up} =$ ft		Freeway Volume, V_F		3000		$L_{down} =$ ft	
$V_u =$ veh/h		Ramp Volume, V_R		1000		$V_D =$ veh/h	
		Freeway Free-Flow Speed, S_{FF}		55.0			
		Ramp Free-Flow Speed, S_{FR}		35.0			
Conversion to pc/h Under Base Conditions							
(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p
Freeway	3000	0.90	Level	0	0	1.000	1.00
Ramp	1000	0.90	Level		0	1.000	1.00
UpStream							
DownStream							
Merge Areas				Diverge Areas			
Estimation of v_{12}				Estimation of v_{12}			
$V_{12} = V_F (P_{FM})$				$V_{12} = V_R + (V_F - V_R)P_{FD}$			
(Equation 13-6 or 13-7)				(Equation 13-12 or 13-13)			
$P_{FM} =$ using Equation (Exhibit 13-6)				$P_{FD} = 1.000$ using Equation (Exhibit 13-7)			
$V_{12} =$ pc/h				$V_{12} = 3333$ pc/h			

Percent Trucks and Buses on Ramp: [0] ---Range: 0 to: 100 ---

For Help, press F1

NUM

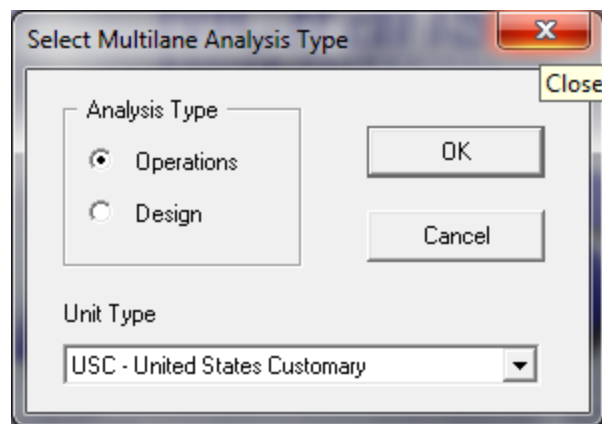
MODULE 7: MULTILANE



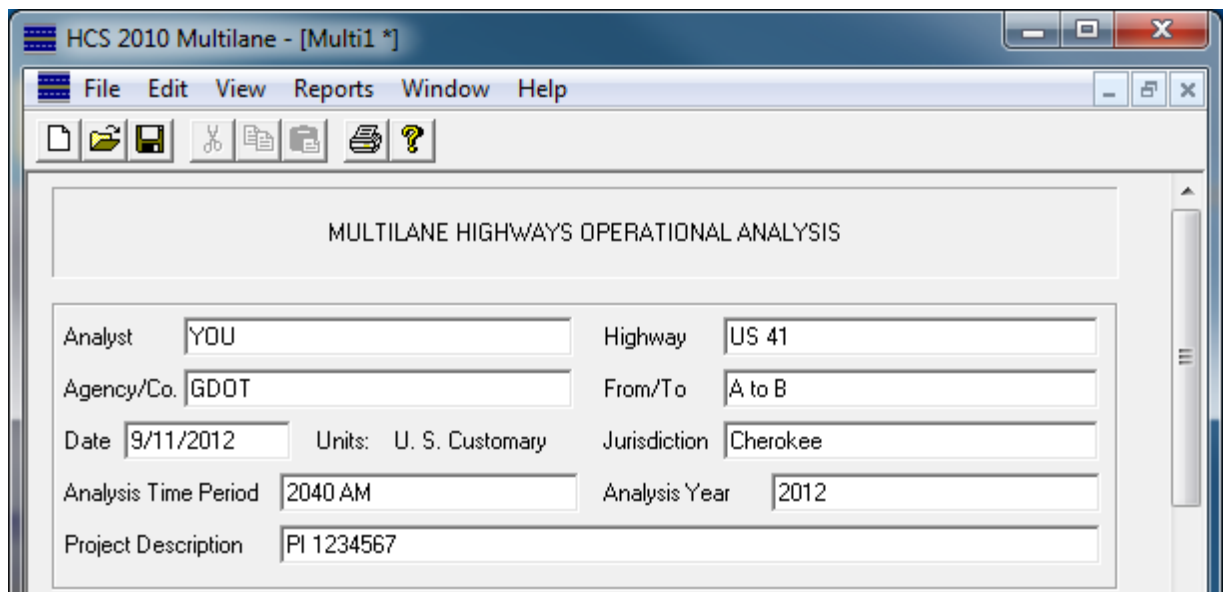
1. Open **HCS 2010**
2. Select the **Multilane** module



3. Open a **New File** and select **Operations** Analysis Type



4. Enter the General information



The screenshot shows the 'HCS 2010 Multilane - [Multi1 *]' application window. The menu bar includes File, Edit, View, Reports, Window, and Help. The toolbar contains icons for file operations and help. The main form is titled 'MULTILANE HIGHWAYS OPERATIONAL ANALYSIS' and contains the following fields:

Analyst	YOU	Highway	US 41
Agency/Co.	GDOT	From/To	A to B
Date	9/11/2012	Units:	U. S. Customary
		Jurisdiction	Cherokee
Analysis Time Period	2040 AM	Analysis Year	2012
Project Description	PI 1234567		

5. Complete the **Free Flow Speed** Section
 - a. Select Base FFS for the Free Flow Speed
 - b. Select the Median Type
 - c. Enter the Lane Width
 - d. Enter the Lateral Clearance for the right and left side
 - e. Enter the Access points/mile

The screenshot shows the 'FREE-FLOW SPEED' section of the HCS 2010 Multilane software. The window is titled 'HCS 2010 Multilane - [Multi1 *]' and has a menu bar with 'File', 'Edit', 'View', 'Reports', 'Window', and 'Help'. Below the menu bar is a toolbar with icons for file operations and help. The main area is divided into two columns for 'Direction 1' and 'Direction 2'.

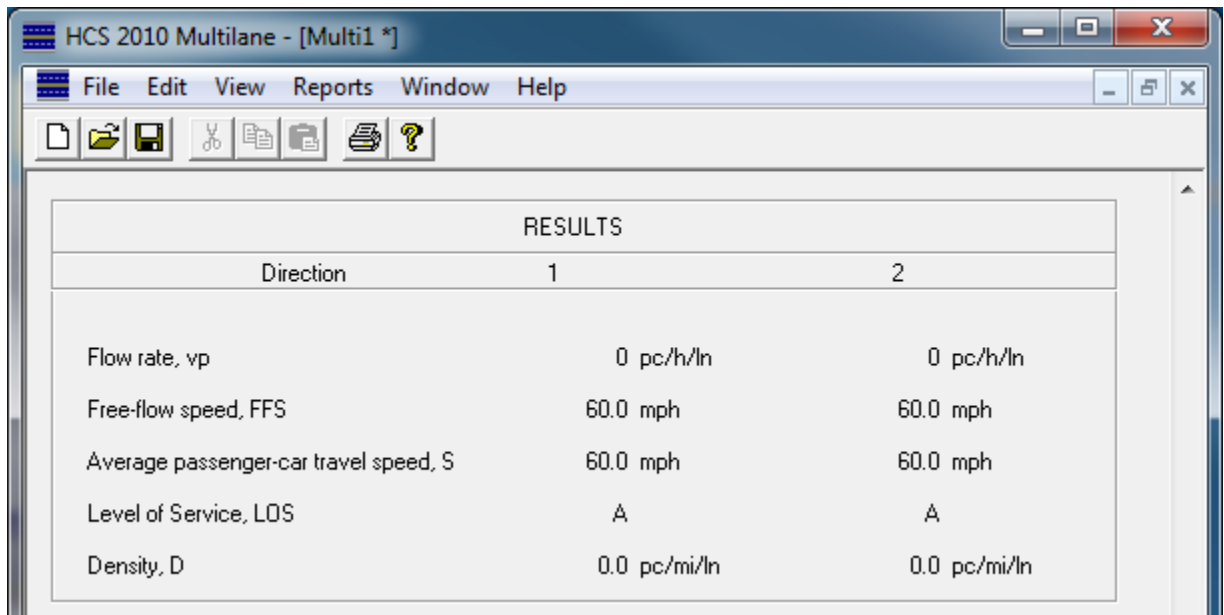
	Direction 1	Direction 2
Free-flow speed:	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS	<input type="radio"/> Field measured, FFS <input checked="" type="radio"/> Base FFS, BFFS
	60.0 mph	60.0 mph
Median type	<input checked="" type="radio"/> Divided <input type="radio"/> 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	0	0
	F A 0.0 mph	F A 0.0 mph
Free-flow speed, FFS	60.0 mph	60.0 mph
Use Speed curve for:	60.0 mph	60.0 mph

6. Complete the **Volume** section
 - a. Enter the Volume for both directions
 - b. Enter the Peak Hour Factor
 - c. Enter the Number of Lanes
 - d. Select the Terrain type
 - e. Enter the Truck Percentage
 - f. Enter the Driver Populations Factor

The screenshot shows the 'HCS 2010 Multilane - [Multi1 *]' window. The 'VOLUME' section is active, displaying input fields for two directions (1 and 2). The fields are organized as follows:

Direction	1	2
Volume, V	0	0
Peak-hour factor, PHF	0.92	0.92
Peak 15-minute volume, v15	0 veh/h	0 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 %	5 %
ET	1.5	1.5
Recreational vehicles	0 %	0 %
ER	1.2	1.2
Heavy vehicle adjustment	fHV 0.976	fHV 0.976
Driver population factor	fP 1.00	fP 1.00
Flow rate, vp	0 pc/h/ln	0 pc/h/ln

7. View the **results**.



The screenshot shows the 'HCS 2010 Multilane - [Multi1 *]' window. The menu bar includes File, Edit, View, Reports, Window, and Help. The toolbar contains icons for opening files, saving, cutting, copying, pasting, and printing. The main area displays a table titled 'RESULTS' with columns for Direction, 1, and 2. The table lists five metrics: Flow rate, vp; Free-flow speed, FFS; Average passenger-car travel speed, S; Level of Service, LOS; and Density, D. All values for both directions are identical.

RESULTS		
Direction	1	2
Flow rate, vp	0 pc/h/ln	0 pc/h/ln
Free-flow speed, FFS	60.0 mph	60.0 mph
Average passenger-car travel speed, S	60.0 mph	60.0 mph
Level of Service, LOS	A	A
Density, D	0.0 pc/mi/ln	0.0 pc/mi/ln

8. Go to the **Reports** menu to select the Multilane Worksheet for both directions and print.

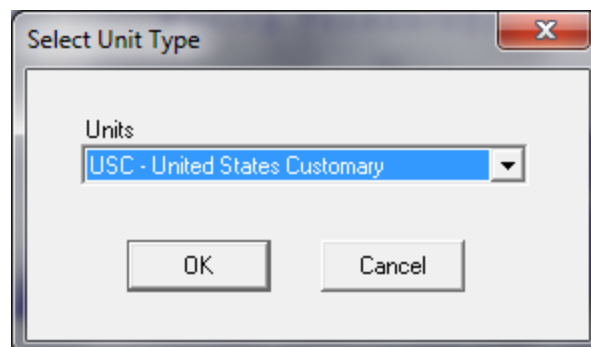
MODULE 7: TwoLANE



1. Open **HCS 2010**
2. Select the **TwoLane** module



3. Open a **New File** and confirm Unit Type



4. Enter General Information

The screenshot shows a software window titled "HCS 2010 TwoLane - [TwoLane1]". The menu bar includes "File", "Edit", "View", "Reports", "Window", and "Help". The toolbar contains icons for file operations and a help icon. The main area is titled "DIRECTIONAL TWO-LANE HIGHWAY SEGMENT ANALYSIS". Below this title is a section labeled "General Information" which contains several input fields:

Analyst	<input type="text"/>	Highway	<input type="text"/>	
Agency/Co.	<input type="text"/>	From/To	<input type="text"/>	
Date	<input type="text" value="9/11/2012"/>	Units: U. S. Customary	Jurisdiction	<input type="text"/>
Analysis Time Period	<input type="text"/>	Analysis Year	<input type="text"/>	
Project Description	<input type="text"/>			

5. Complete the **Input Data** Section -*Analyze one direction at a time*
 - a. Select a Terrain type
 - b. Enter the shoulder width, lane width and segment length of the area to be analyzed
 - c. Select the Class of highway *see page 15-3 of HCM 2010*
 - d. Enter the volumes for the analysis direction and the opposing direction
 - e. Enter the peak hour factor keep .88 if unknown
 - f. Enter Truck Percentage
 - g. Enter the Percent No-Passing Zone *is entered based on Exhibit 15-5 HCM2010*
 - h. Enter the Access-Point Density *divide the total number of unsignalized intersections and driveways on **both** sides of the roadway segment by the length of the segment*

HCS 2010 TwoLane - [TwoLane1 *]

File Edit View Reports Window Help

Directional Report G

Input Data

Data for the analysis direction only.

Terrain: Level

Percent Trucks Crawling: 0.0 TCS Difference: 0.0 mi/h

Shoulder Width: 10.0 ft Grade: + % Length: mi

Lane Width: 12.0 ft

Segment Length: 2.0 mi

☒ Class I Highway ☐ Class II Highway

☐ Class III Highway

Analysis Direction Volume: 1500 vph

Opposing Direction Volume: 800 vph

Peak Hour Factor, PHF: 0.88

Trucks and Buses: 6 %

Recreational Vehicles: 4 %

Percent No-Passing Zones: 20 %

Access-Point Density: 8 /mi

6. The **Average Travel Speed** section is calculated by HCS
7. Complete the **Free-Flow Speed** Section
 - a. Select Estimated
 - b. Enter the Base Free Flow speed

Note: all the adjustments are calculated by HCS

HCS 2010 TwoLane - [TwoLane1 *]

File Edit View Reports Window Help

Free-Flow Speed

☐ Measured ☒ Estimated

Field Measured Speed, SFM	<input type="text"/>	mi/h	Base Free-Flow Speed, BFFS	<input type="text" value="60.0"/>	mi/h
Observed Total Demand, v	<input type="text"/>	veh/h	Adj. for Lane and Shoulder Width, fLS	<input type="text" value="0.0"/>	mi/h
			Adj. for Access Point Density	<input type="text" value="2.0"/>	mi/h
Free-Flow Speed, FFS	58.0 mi/h				
Adj for No-Passing Zones, fnp	<input type="text" value="0.6"/>	mi/h			
Average travel speed, ATSD	37.2 mi/h				
			Percent Free Flow Speed, PFFS	64.1 %	

8. The **Percent Time Spent Following** section is calculated by HCS
9. View the Results

HCS 2010 TwoLane - [TwoLane1 *]

File Edit View Reports Window Help

Level of Service and Other Performance Measures

Level of Service, LOS	F
Volume-to-Capacity Ratio, v/c	1.00
Peak 15-minute Vehicle Travel	852 veh-mi
Peak-Hour Vehicle Travel	3000 veh-mi
Peak 15-minute Total Travel Time, TT	22.9 veh-hr

10. Select either the **Directional** and **Directional Passing Lane** report to print.