

Estimating and Implementing Road User Costs in ABC Selection Decisions

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Existing Decision-Making Tools

Qualitative Tools

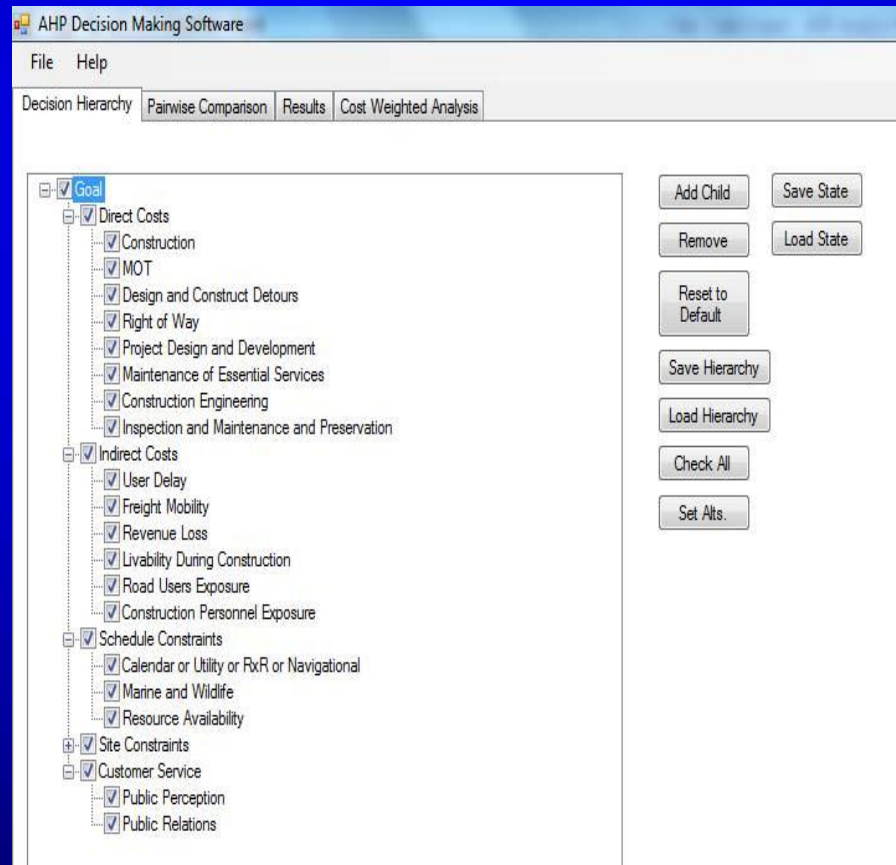
- Decision Matrix
- Flow Chart
- Questionnaire

% Weight	Category	Decision-Making Item	Possible Points	Points Allocated	Scoring Guidance
17%	Disruptions (on/under Bridge)	Railroad on Bridge?	8	<input type="text"/>	0 No railroad track on bridge 4 Minor railroad track on bridge 8 Major railroad track on bridge
		Railroad under Bridge?	3	<input type="text"/>	0 No railroad track under bridge 1 Minor railroad track under bridge 3 Major railroad track(s) under Bridge
		Over Navigation Channel that needs to remain open?	6	<input type="text"/>	0 No navigation channel that needs to remain open 3 Minor navigation channel that needs to remain open 6 Major navigation channel that needs to remain open
8%	Urgency	Emergency Replacement?	8	<input type="text"/>	0 Not emergency replacement 4 Emergency replacement on minor roadway 8 Emergency replacement on major roadway

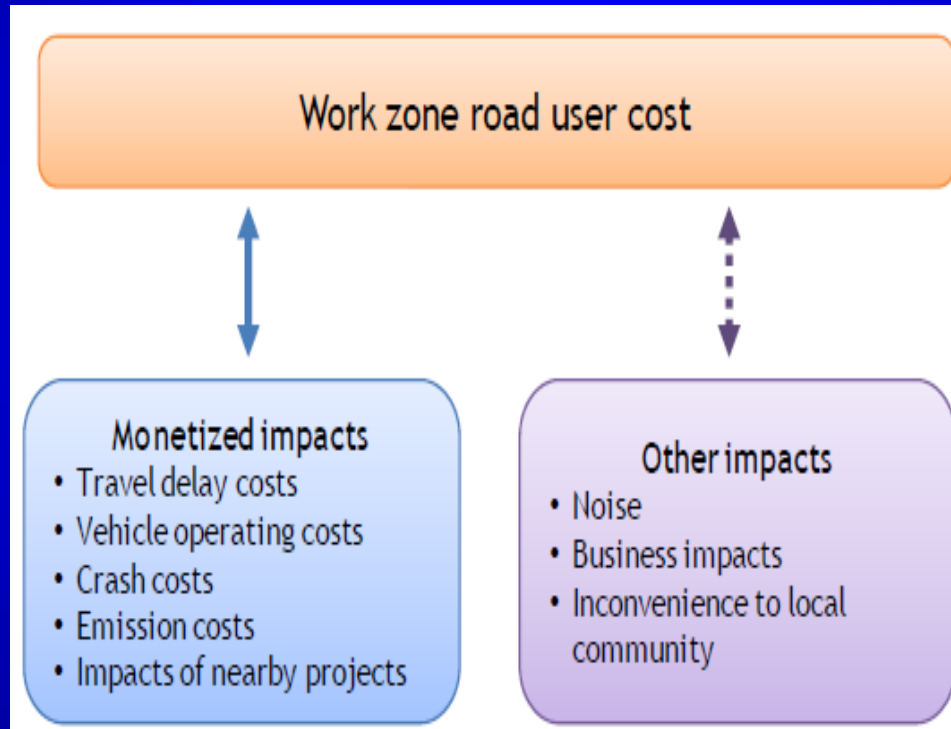
Existing Decision-Making Tools

Quantitative Tools

- Oregon ABC AHP Analysis Tool

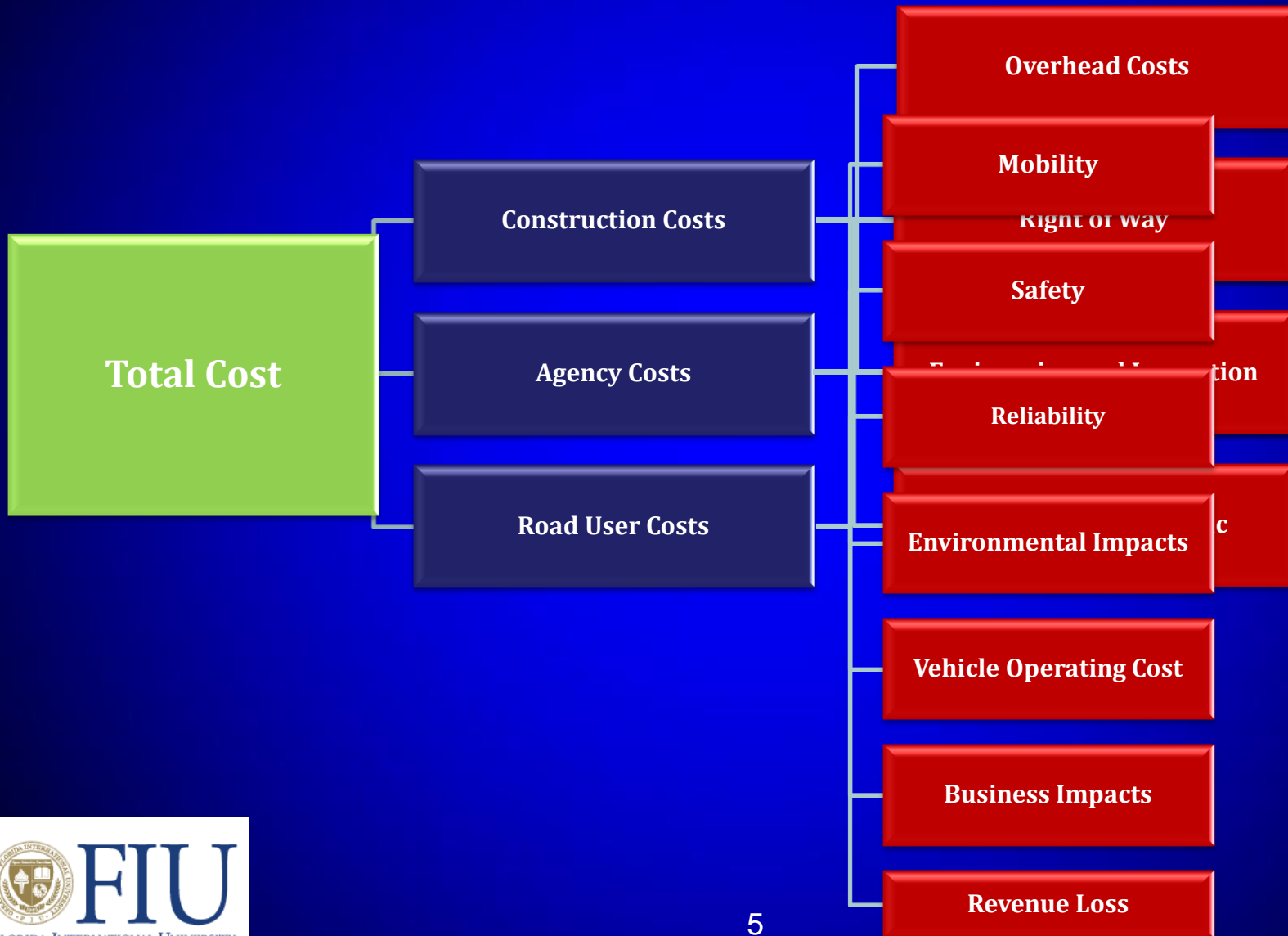


Road User Costs



Source: FHWA,
2011

Total Cost Components



Project Construction Cost and Agency Costs

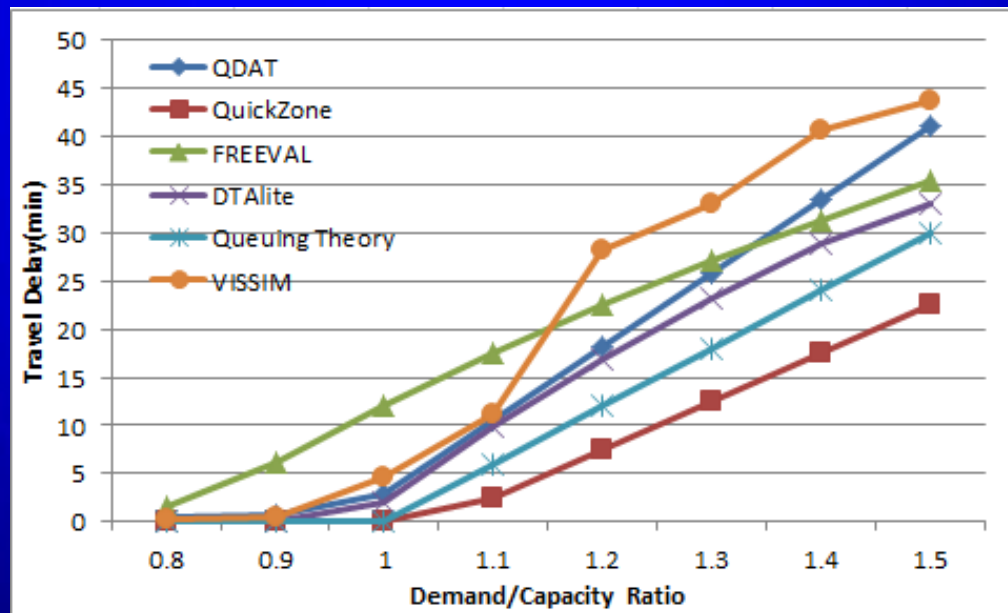
- Data from a total of 65 projects were collected from 29 states.
- Multinomial logistic regression model was developed
- Project engineering, right-of-way, Construction Engineering, Construction Inspection

User Cost Evaluation Methods (Two Levels)

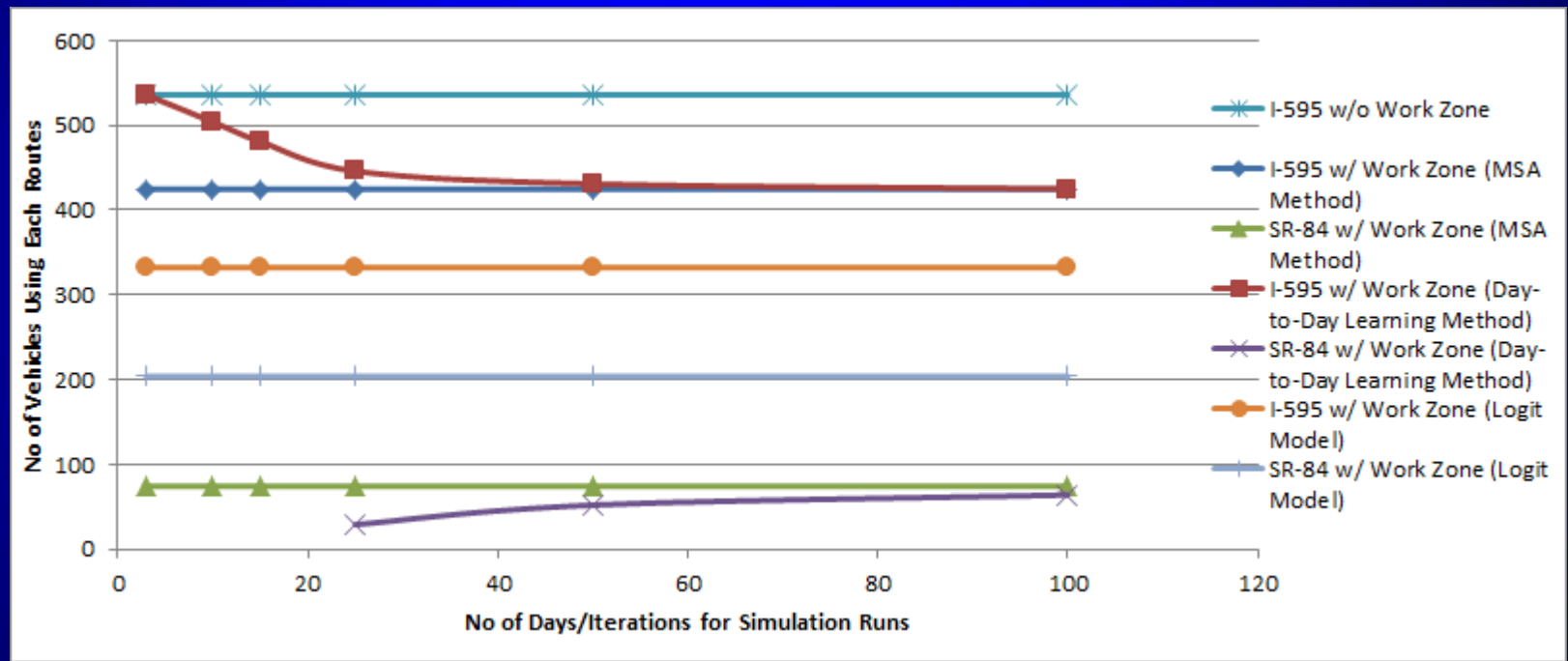
- Mobility: Range from simple spreadsheets (L1), to HCM facility procedures, DTA, and simulation-based (L2)
- Safety: Based on the national statistics of vehicle and worker crash rates in work zones
- Reliability: Based on SHRP 2 reliability using regression equations
- Environmental: Based on the EPA MOVES program
- Revenue loss/diversion: Logit model (L1) and DTA (L2)
- Impact on business

Mobility Estimation

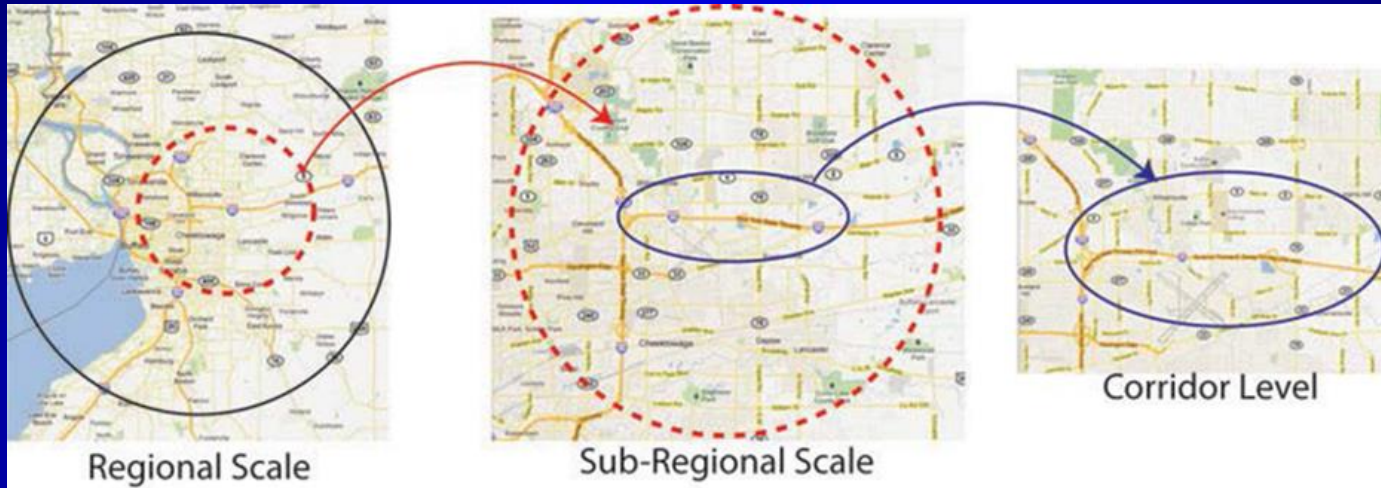
- **Sketch-Planning Tools: Q-DAT, QuickZone**
- **Analytical Tools (HCM Methods):FREEVAL**
- **Travel Demand Tools: DTA lite**
- **Simulation Tools: VISSIM**



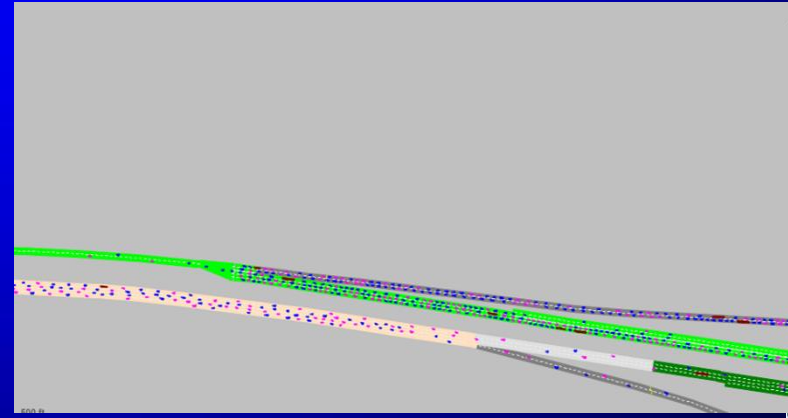
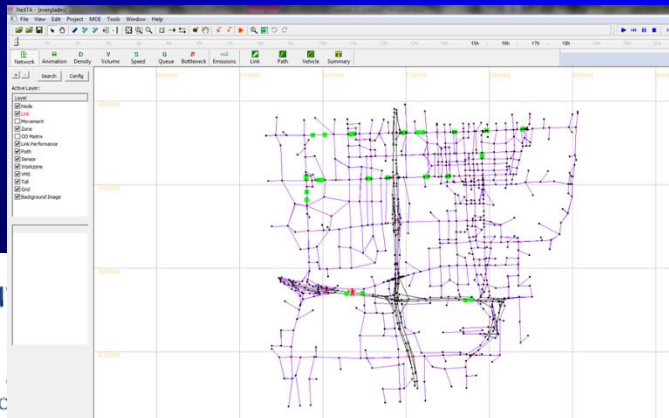
Diversion Estimation



Multi-Resolution Modeling



Travel Demand (vph)	Without Diversion	With Diversion
I-595 WB	2478	1480
I-95 SB Ramp	1210	320
I-95 NB Ramp	2728	1508



Reliability Estimation

- TTI: Travel Time Index

$$TTI_{n\%} = e^{(j_n LHL + k_n dc_{crit} + l_n R_{0.05})}$$

Where,	$TTI_{n\%}$	=	<i>nth percentile TTI value</i>
	LHL	=	<i>lane – hour lost</i>
	dc_{crit}	=	<i>critical demand – capacity ratio</i>
	$R_{0.05}$	=	<i>hours of rainfall exceeing 0.05 inches</i>
	j_n, k_n, l_n	=	<i>coefficients for nth percentile</i>

Safety Estimation

- Macroscopic: Use Highway Safety Manual (HSM) cash prediction with work crash modification factors
 - Function of work zone duration and length
 - Will consider parameters derived in studies
- Microscopic: Possible use of Surrogate Safety Assessment Model (SSAM)

Emission Estimation

The screenshot shows the MOVES software interface. The title bar reads "MOVES - C:\NEPA\MOVESTestSuite\Runspecs\MOVES2010b.mrs - ID 189389588378876076". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help".

The left sidebar contains a list of settings, each with a green checkmark: "Description", "Scale", "Time Spans", "Geographic Bounds", "Vehicles/Equipment", "Road Type", "Pollutants And Processes", "Manage Input Data Sets", "Strategies", "Output", and "Advanced Performance Features".

The main panel is titled "Domain/Scale" and contains three radio button options:

- National** Use the default national database with default state and local allocation factors.
Caution: Do not use this scale setting for SIP or conformity analyses. The allocation factors and other defaults applied at the state or county level have not been verified against specific state or county data and do not meet regulatory requirements for SIPs and conformity determinations.
- County** Select or define a single county that is the entire domain.
Note: Use this scale setting for SIP and regional conformity analysis. Use of this scale setting requires user-supplied local data for most activity and fleet inputs.
- Project** Use project domain inputs.
Note: Use this scale setting for project-level analysis for conformity, NEPA, or any other regulatory purpose. Use of this scale setting requires user-supplied data at the link level for activity and fleet inputs that describe a particular transportation project.

Below the "Domain/Scale" section is the "Calculation Type" section with two radio button options:

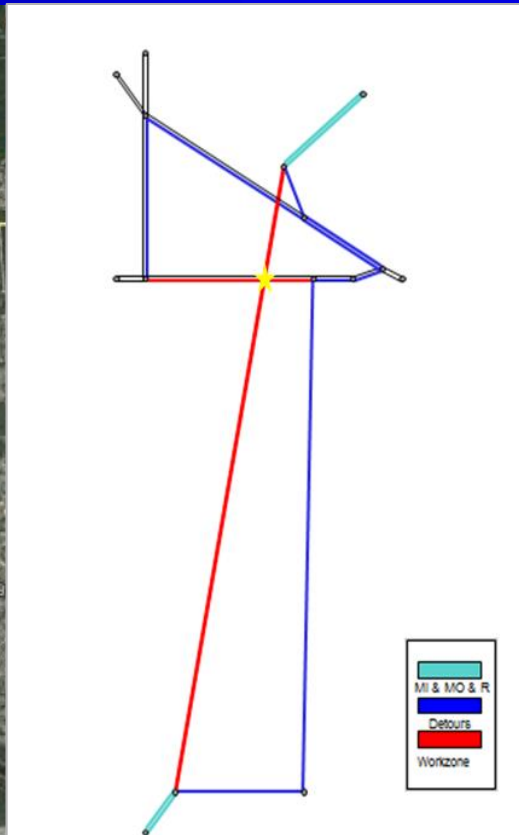
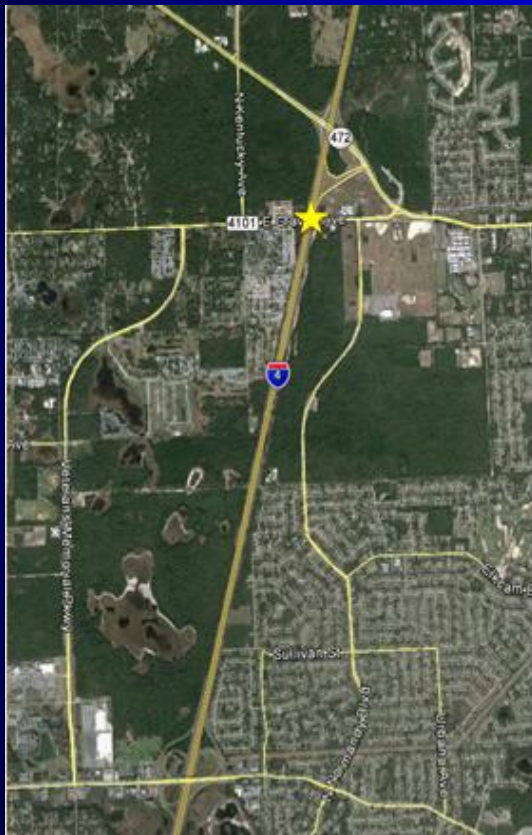
- Inventory** Mass and/or Energy within a region and time span.
- Emission Rates** Mass and/or Energy per unit of activity.

A text field labeled "MOVESScenarioID:" is located below the "Emission Rates" option.

A **Caution** icon and text at the bottom of the panel state: "Caution: Changing these selections changes the contents of other input panels. These changes may include losing previous data contents."

The status bar at the bottom of the window reads "Stop execution of active RunSpec".

Case Study



- Show the impact of incorporating user cost in decision making
- Interchange of I-4 and Graves Avenue
- Located in Orlando, FL

Case Study-Scenarios

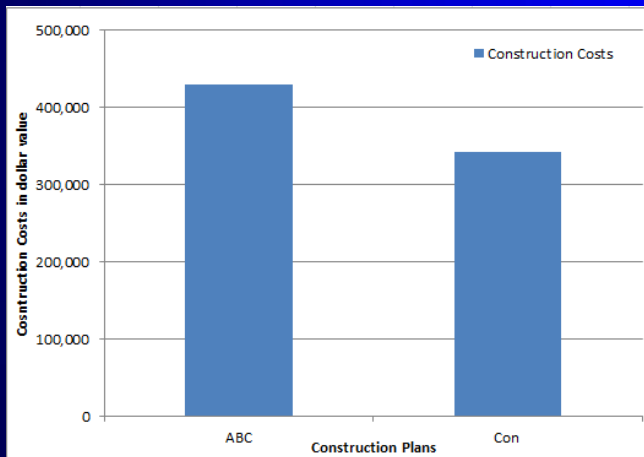
- ABC Method
- Requires I-4 to close one outside lane from 21:00 to 24:00 for only 4 nights, and Graves Avenue closes 8-month.
- Conventional Method
- Requires I-4 to close two outside lanes from 21:00 to 24:00 for 32 nights, and Graves avenue closes 12-month.
- Sensitivity Analysis
- Sensitivity analysis using different capacity value (veh/hr/lane) was conducted to see the impact on the conclusion

Case Study—Tier 1 Results

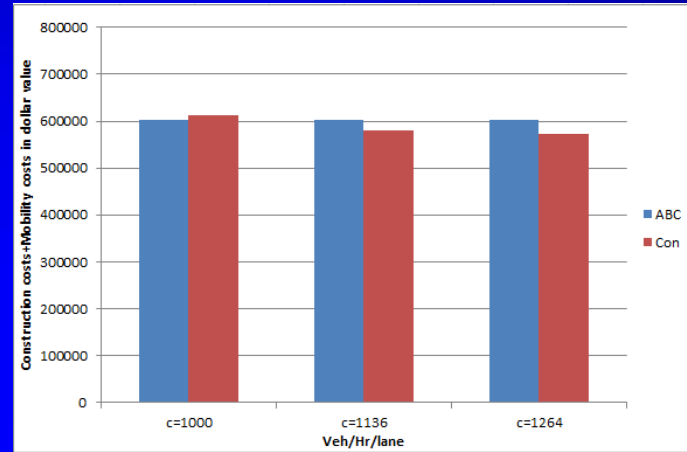
Costs in dollar value (\$)		Mobility Impact	Reliability Impact	Safety Impact	Emission Impact	Construction	Construction Agency Costs	Total Cost
C=1000 veh/hr/lan e (Capacity with Const.)	ABC	120,347	32,807	40,864	1,615	430,000	53,320	678,983
	Convent.	224,591	258,414	77,313	2,274	342,125	46,529	951,246
C=1136 veh/hr/lan e	ABC	120,347	32,489	40,864	1,615	430,000	53,320	678,635
	Convent.	191,339	202,851	77,207	2,425	342,125	46,529	862,476
C=1264 veh/hr/lan e	ABC	120,347	32,311	40,864	1,615	430,000	53,320	678,457
	Convent.	183,026	73,715	77,207	2,499	342,125	46,529	725,101

- User may want to put different weights on the construction, agency, and user costs

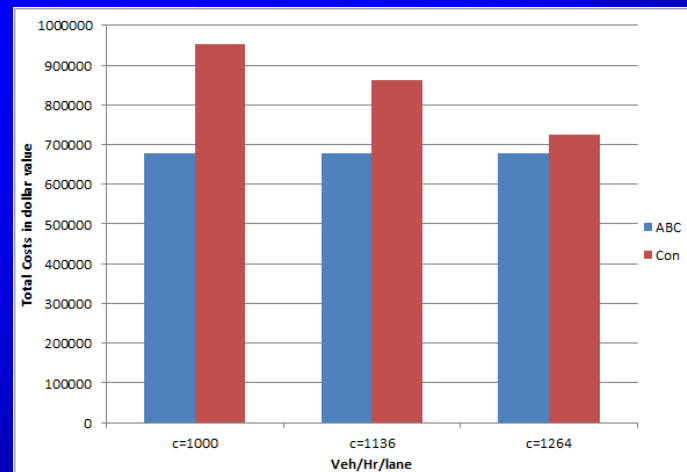
Case Study—Tier 1 Results



Construction



**Construction
+
Mobility**



Total Costs

THANKS!

Questions?