



2014 FDOT Traffic Analysis Handbook

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Celebrating 100 Years of Innovation, Mobility and Economic Development

Why this Handbook?

Selection of appropriate traffic analysis tools is a challenge



Levels analysis and project contexts



Goals/objectives, budget and size of project



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Why this Handbook?

Selecting proper analysis tools

Streamlining the review

Making more informed decisions

Consistent
and unified
approach



Who can Use the Handbook?

Preparers of
traffic analyses



Reviewers of
the reports



Users of the
results



What Kinds of Analyses?

Corridor studies

Interchange requests

PD&E studies

Not a **training manual** rather a resource guidebook



What Levels of Analysis?

Generalized (sketch-level) planning

Conceptual planning and Preliminary engineering

Design

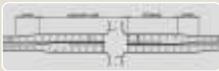
Operational



Example Applications in Design



Typical section



Acceleration/deceleration length



Geometric configuration



Refine design (operations)



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Traffic Analysis Guidance

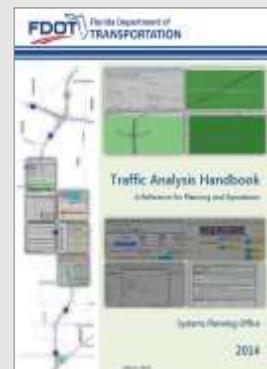


Nationally recognized documents

FDOT experience on traffic analyses

Florida specific but consistent with the FHWA's Traffic Analysis Tools

Not prescriptive nor a standard



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Limitations of the Handbook

Multi resolution modeling (MRM)

Traffic analysis on priced managed lanes

Multimodal transportation alternative studies



Chapters of the Handbook

① Introduction

② Methodology

③ Analysis Area

④ Tool Selection

⑤ Data Collection

⑥ Analytical Tools

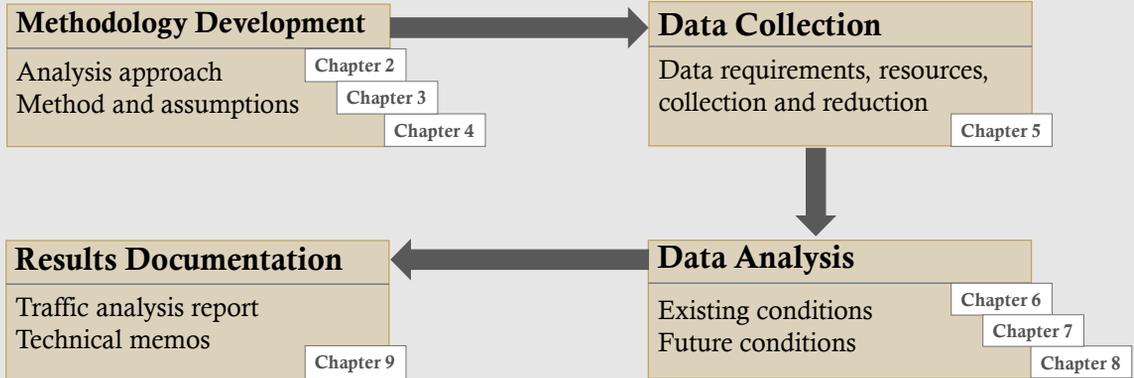
⑦ Microscopic Simulation

⑧ Alternatives Analysis

⑨ Documentation



Traffic Analysis Steps



Chapter 2 - Traffic Analysis Methodology

Analysis Approach

Purpose &
need, project
goals

Performance
measures

Context and
complexity of
the project



Table 2-1 Traffic Analysis Methodology Content Checklist

Financial Project ID: _____ Federal Aid Number: _____		Project Name: _____	
State Road Number: _____ Co./Sec./Sub: _____		Begin Project MP: _____ End Project MP: _____	
Item	Description	Check	Remarks
Traffic analysis objective	Discuss briefly and concisely objective, purpose and need. Include location map.	<input type="checkbox"/>	
Technical Guidance and Standards	Describe technical standards, procedures, and guideline to be followed to conduct analysis. Include quality assurance/control commitment.	<input type="checkbox"/>	
Analysis area boundary limit	Describe both spatial and temporal boundary limits. Include a legible and scaled area map showing all study intersections and interchanges.	<input type="checkbox"/>	
Analysis tool(s) selection and analysis approach	Describe the approach to be used to perform traffic analysis. List analysis tool(s) to be used along with their versions.	<input type="checkbox"/>	
Data requirements and data collection plan	Describe data collection plan, include methodology, sources, techniques, schedule, and quality assurance plan. Identify calibration and validation data requirements and include calibration data collection means.	<input type="checkbox"/>	
Project traffic forecasting	Summarize methodology for project traffic forecast. List design year/planning horizon, opening year, and term in years.	<input type="checkbox"/>	
Analysis output	Describe performance measures of effectiveness (MOEs) that will be evaluated. Explain how the selected approach and tools will report the MOEs. If calibration and validation are required, briefly explain approach and MOEs as well as locations to be calibrated and targets for acceptance.	<input type="checkbox"/>	
Project alternatives	Describe existing/No-Build conditions, and improvement (build) alternatives to the extent possible. Use graphics to illustrate build alternatives. Describe alternative screening criteria.	<input type="checkbox"/>	
Traffic analysis report and technical documentation	Describe required documentation requirements commensurate with the complexity of the analysis.	<input type="checkbox"/>	
Estimate of work effort	Include an estimate of the level of analysis effort.	<input type="checkbox"/>	
Preparer's Name: _____ Date: _____		Reviewer's Name: _____ Date: _____	

Chapter 3 - Analysis Area Boundary Limits

Existing and future conditions



Queues and unserved demand



24-hour demand profile



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Spatial Boundary

Common locations for localized bottlenecks

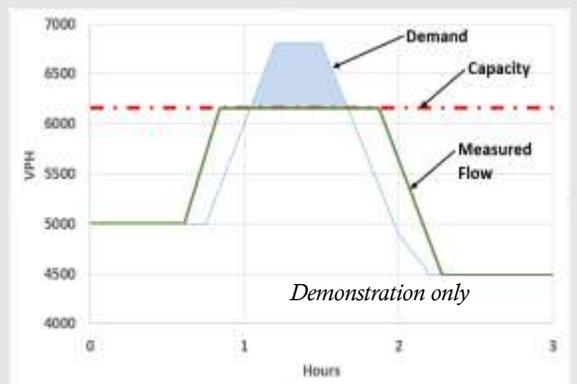
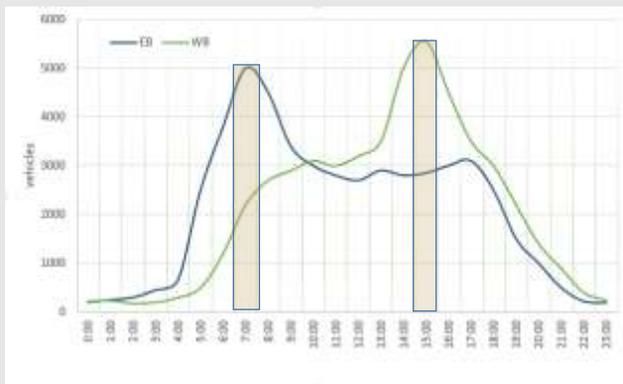
Lane Drops		Freeway Exit Ramps		Tunnels/Underpasses	
Weaving Areas		Freeway-to-Freeway Interchanges		Narrow Lanes/Lack of Shoulders	
Freeway On-Ramps		Changes in Highway Alignment		Traffic Control Devices	

Source: FHWA, 2012



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Temporal Limits



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Chapter 4 - Traffic Analysis Tools

Analysis tools mostly used in Florida

Generalized Service Volume Tables (GSVT)	LOSPLAN	Cube Voyager	HCM/HCS	Synchro and SimTraffic	SIDRA	CORSIM	VISSIM
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Traffic Analysis Tools Selection



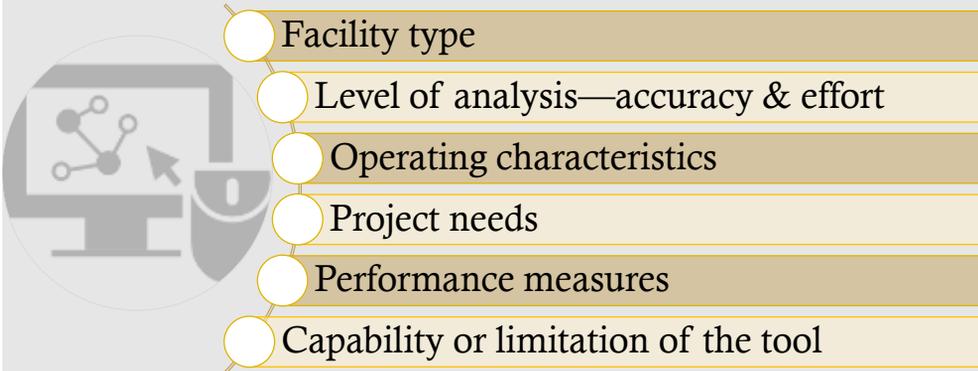
Which tool is ~~accurate~~ ^{Reasonable} for my traffic analysis?

The answer is.....

It depends on project complexity, goals, time, budget & performance measures



Things to Consider...

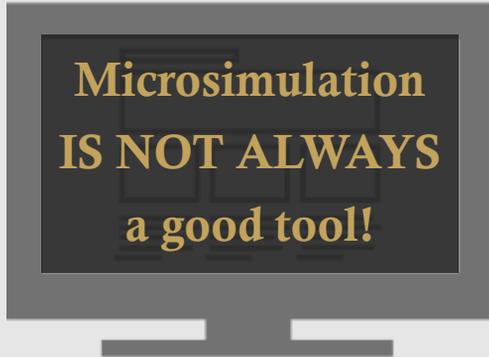


Traffic Analysis Tools Selection

Analysis Type	Level of Analysis	Analysis Tool
Sketch Planning	Generalized Planning	GSVT, LOSPLAN, HCM, SafetyAnalyst Network Screening Tool
Travel Demand Modeling	Conceptual Planning	Cube Voyager
Deterministic	Conceptual Planning & Preliminary Engineering; Design; Operation	LOSPLAN, HCM/HCS, Synchro, SIDRA,
Microscopic Simulation	Preliminary Engineering; Design; Operation	CORSIM, VISSIM, SimTraffic



Which Tool is Appropriate?



Tradeoff between resources vs. decisions

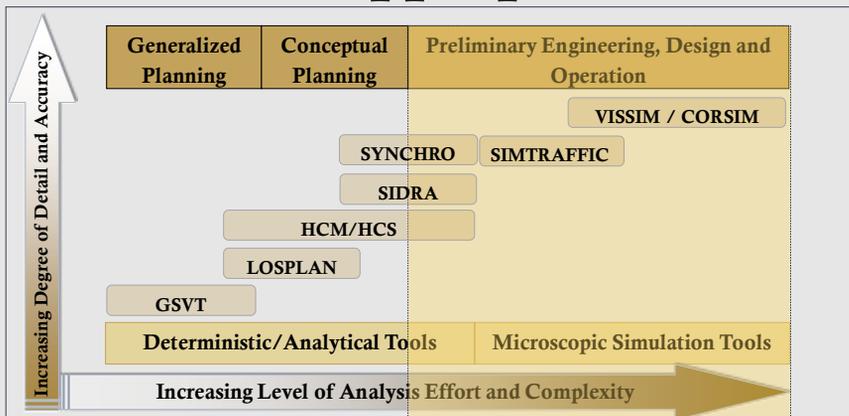
Default to HCM based tools

Review capabilities of the tool.



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Which Tool is Appropriate?



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Safety Analysis Tools

Safety is always a consideration

Adherence to design standards minimize crashes, yet crashes continue to increase on our facilities.



Are we missing something?



Safety Analysis Tools

Safety is always a consideration



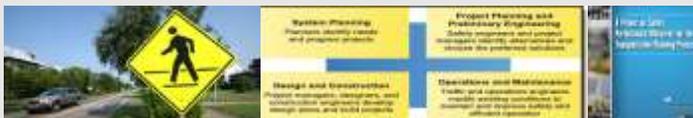
Existing crashes



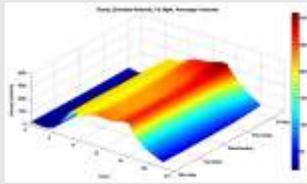
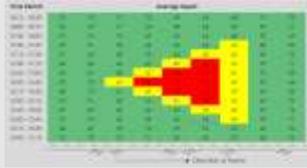
Surrogate measures

HSM methodologies

More guidance from Safety Office is forthcoming



Chapter 5 - Traffic Analysis Data



- Analysis approach
- Existing data
- Default values v/s field measurements
- Field observations
- Calibration data
- Data quality control



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Analysis Approach

Analytical tools >> Chapter 6

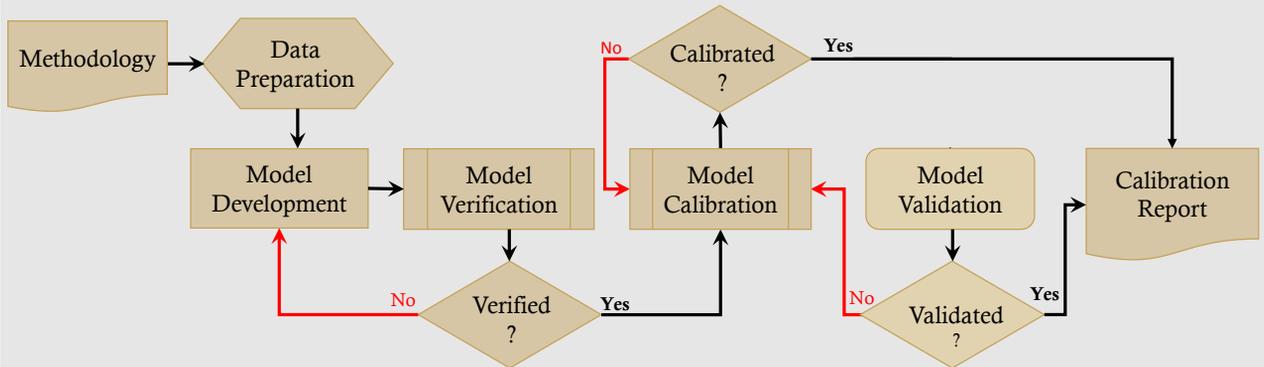
Microsimulation >> Chapter 7

Guidance is provided consistent with the industry practice



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Chapter 7 - Microsimulation Analysis



Model Verification

Input parameters shown are initial

Peer reviewer to error-check the model

Error checking checklists



Model Verification

Latest version or “patch”

Software error or computation limitation

Color codes by attributes

Field verify unusual model behavior



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Model Verification

Project Name: _____

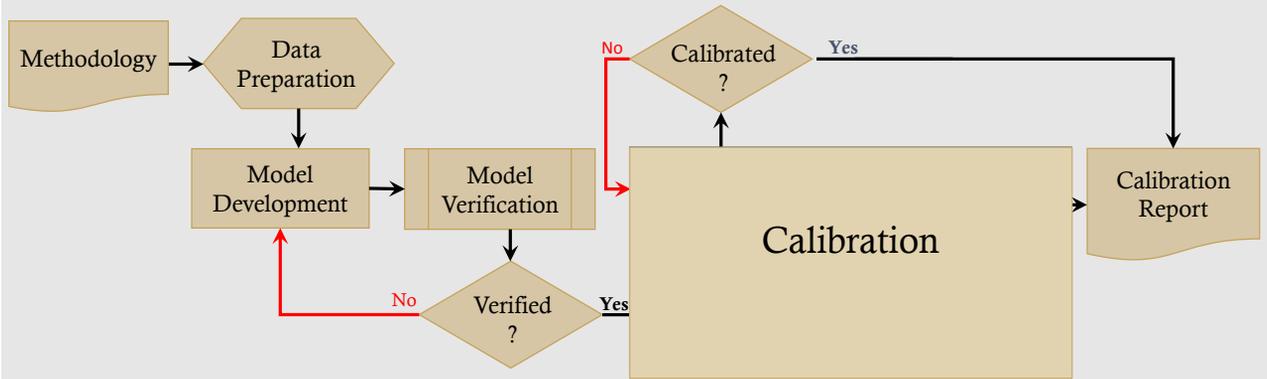
State Road Number: _____ Co./Sec./Sub. _____

Error Type	Description	Check
Software	■ Verify no runtime or syntax error occurs in the Protocol Window	<input type="checkbox"/>
	■ Review the error file (.err) for any errors or runtime warnings that affect simulation results	<input type="checkbox"/>
	■ Review RBC errors or warnings	<input type="checkbox"/>
Model run parameters	■ Review temporal boundary limit to confirm it matches the approved methodology	<input type="checkbox"/>
	■ Verify initialization period is at least equal to twice the time to travel the entire network	<input type="checkbox"/>
	■ Verify spatial boundary limit against approved methodology	<input type="checkbox"/>
	■ Check basic network connectivity.	<input type="checkbox"/>
	■ Verify the background image has been properly scaled	<input type="checkbox"/>
	■ Verify the background image has been properly scaled	<input type="checkbox"/>



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Microsimulation Calibration



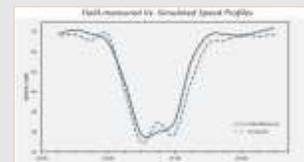
Model Calibration

Calibration process

Calibration targets based on error analysis

Recommending model validation step

Reviewer's checklists are provided



Model Calibration Documentation

Documentation is required for changes of initial input parameters



Help reviewer understand the intent of the analyst



Should We Improve Documentation?



Improved documentations enhance review of the documents



Portability of microsimulation models



How to Improve Documentation?



Tell the story



Keep it Brief



Control Quality



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Calibration Evolution (Not in Handbook)

National level efforts

HCM 2015 update

TRB Planning & Prel. Engineering Guide

New TRB Simulation Manual (TSSM)?

Traffic Analysis Toolbox Vol. III



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Revised Traffic Analysis Toolbox Vol. III

Data driven approach

Statistical based

Cluster analysis

Experiential designs

Multi-objective optimization

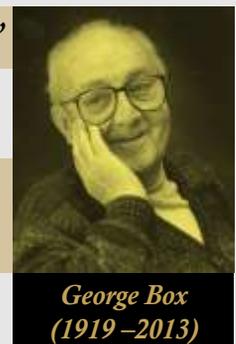


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Perfecting the Models...

"Essentially, all models are wrong but some are useful"

"Since all models are wrong the scientist cannot obtain a correct one by excessive elaboration"



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