FLORIDA ITS EVALUATION (FITSEVAL) TOOL

Phase 1 Pilot

Status Update Presentation

presented by
Jason Learned

FDOT District 5 Modeling Coordinator

December 10th, 2015

Introduction

Thank you for the opportunity to present

- Florida ITS Evaluation (FITSEVAL) Tool
- FDOT District 5 - Phase 1 Pilot Project
- Joint collaboration - FDOT D5 & CO
- Jason Learned - FDOT District 5 PM
- Leftwich Consulting Engineers - Consultant

Overview

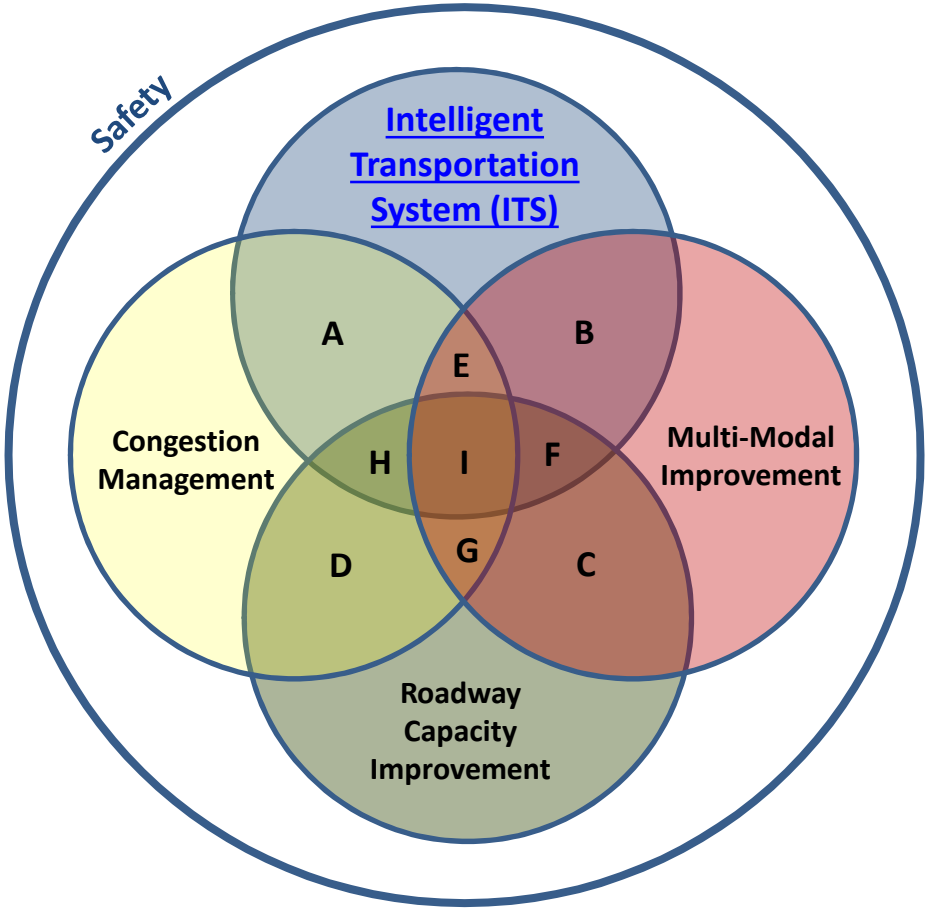
- **Florida ITS Evaluation (FITSEVAL) Tool**
  - Sketch-planning/decision making tool
  - Forecasted volumes from FSUTMS models
  - Evaluates the Benefits/Costs of ITS strategies
- **Applications**
  - Budgeting/Decision making
  - ITS Master Plans
  - Alternatives selection

*History & Acknowledgements

- **In 2008, FITSEVAL was developed by FIU**
  - Under guidance of Dr. Mohammed Hadi
- **Joint effort between FIU and FDOT**
- Based on an extensive research of ITS deployments and benefit/cost information
- FITSEVAL was developed using Cube
- **In 2012, Citilabs updated FITSEVAL** to be adaptable to all FSUTMS models
- Improvements were incorporated by Citilabs for some of the ITS deployments

Current Situation

- **Limited Capacity => Integrated Strategies**
- **ITS increasingly important**



- A - Adaptive Controllers
- B - Transit Info Systems
- C - Bus Bays
- D - Lane Addition
- E - Transit Preemption
- F - Bus Rapid Transit
- G - Dedicated Bus Lanes
- H - Managed Lanes
- I - HOV Lanes

Current ITS Planning

- **ITS Master Plans**
  - MPO planning mechanism
  - Limitation: Future traffic volumes not typically quantitatively evaluated
- **ITS technologies are becoming more**
  - Frequent
  - Effective
  - Accessible
  - **Regionally Integrated**

- Need for holistic long range plans more critical
- Quantitative tools needed to analyze ITS deployments

FITSEVAL Project

- **Phase 1 - Pilot Project**
  - Establish FITSEVAL for use in District 5 and the CFRPM v6 Model
  - Stakeholder coordination
- **Phase 2 - Refinement**
  - Refine FITSEVAL based on Agency input obtained during Phase 1 and National research
- **Project Goals**
  - Consistent, Predictable and Reliable results
  - User friendly sketch planning tool
  - Widespread application
  - Longevity of use
- **We value your input!!**

FISTEVAL POST PROCESSOR OVERVIEW

What does FITSEVAL do?

- **Currently the following ITS deployments are evaluated**

Advanced Traveler Information (ATI) Road Weather Information (RWI) Advanced Public Transit (APT)	**Informational**
Signal Timing Improving (STI) Bus Priority (BP) Emergency Vehicle Preemption (EVP)	**Signal Improvements**
Ramp Metering (RM) Managed Lanes (ML) Incident Management (IM) Smart Work Zone (SWZ)	**Management**

What does FITSEVAL Provide?

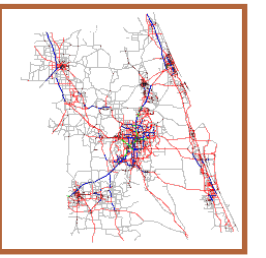
- **Measures of Effectiveness (MOEs)**

FITSEVAL

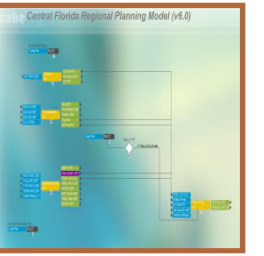
- **Delay**
- **Travel Time**
- **Safety**
  - *Fatality*
  - *Injury*
  - *Property Damage Only*
- **Fuel Consumption**
- **Emission**
  - *Hydrocarbon*
  - *Carbon Monoxide*
  - *Oxides of Nitrogen*

What is the FITSEVAL Process?

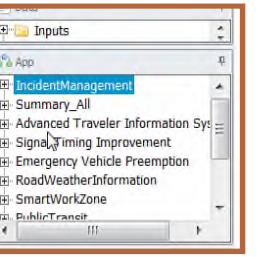
Code ITS Deployments in CFRPM v6 Model



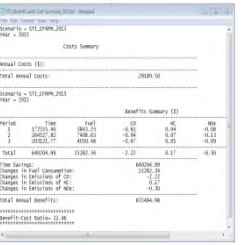
Run Model *CFRPM v6 Model*



Post-Process Model with FITSEVAL



Review Benefit/Cost Output



FITSEVAL Example Results

- **A quick 10 minute Run gives a Benefit and Cost Summary**

Cost Summaries

BENEFIT SUMMARY	
Time Savings	*$493,832.36*
Changes in Fuel Consumption	*$15,560.58*
Changes in Emissions of CO	*-$2.15*
Changes in Emissions of HC	*$0.17*
Changes in Emissions of NOx	*-$0.28*
Total Annual Benefit	$509,390.68

COST SUMMARY	
Total Annual Cost	$29,189.50

B/C RATIO	
Annual Benefit-to-Cost Ratio	*17.45*

Main Cost Savings = Time & Fuel Consumption

***To be refined as part of Phase 2**

FISTEVAL DEPLOYMENTS REVIEW

Advance Traveler Information




- **Advance Traveler Information Systems (ATIS)**
  - Collection, aggregation & dissemination of information to assist travelers moving from origin to a destination
  - e.g. Dynamic Message Signs
- **Calculates delay using queuing theory equations**
  - Cohen, H. and F. Southworth, — On the Measurement and Valuation of Travel Time Variability Due to Incidents on Freeways, *Journal of Transportation and Statistics*, **December 1999**, pp. 123-131:

$$\mu_d = 0.00715\left(\frac{V}{C}\right)^{32.2} + 0.00653\left(\frac{V}{C}\right)^{7.05}$$

- **Phase 2 will further consider more recent research**

Ramp Metering

- **Ramp Metering (RM)**
  - Uses signals at ramps to regulate ramp flow rate
  - **Calculates travel time with and without ramp metering**
  - Travel time improvements consider the increase in throughput due to the reduction in the probability of flow breakdown
- **Model assumes that 5% vehicles divert to alternative routes to avoid ramp**
  - Adopted BPR Curves used to determine increase in alternative route travel time
- **Phase 2 will further review the 5% diversion assumption**

Advance Public Transit

- **Advanced Public Transit (APT) Systems**
  - Automated Scheduling Systems (ATSS)
  - Automated Vehicle Location (AVL) systems
  - Electronic Payment System (EPS)
  - Transit Traveler Information
  - Security Systems (e.g. Cameras)
- E.g. Information on transit/bus stop arrival times
- **National level research used to estimate benefit parameters (e.g. wait time, % ridership increase)**
- **Currently FITSEVAL uses 2005 or earlier research**
- **Phase 2 will review the 5% diversion assumption**

Managed Lanes



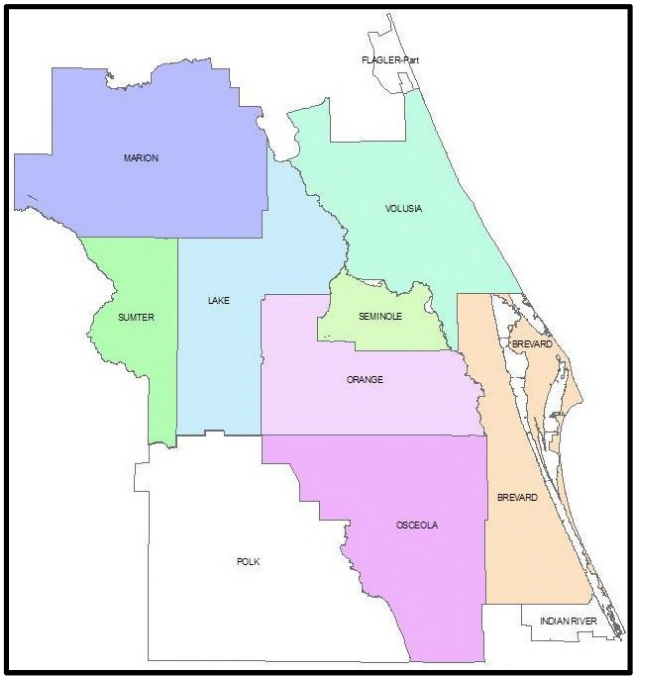

- **Managed Lanes (ML)**
- High Occupancy Vehicle (HOV) or High Occupancy Toll (HOT) lanes
- **FITSEVAL is a sketch planning tool and not a revenue level study**
- Therefore benefit amounts are likely to vary as compared to say the ELTOD model
- **Phase 2 will further sensitivity testing already done as part of Phase 1**

PHASE 1

RECAP

Phase 1 MPO Coordination

- **Met with all the MPOs/TPOs in District**
  - Kick-Off meetings held in June and July
  - Second meetings provided in November/December
  - Comments obtained on FITSEVAL and potential future refinements
  - Guidance provided on using FITSEVAL



- **Language for LRTPs, CMPs, and ITS Master Plans have been shared with MPO/TPOs**

Phase 1 Additional Coordination

- FDOT Central Office throughout Phase I
- FITSEVAL Meetings/Presentations
  - FDOT D5 ITS Operations Staff
  - FDOT D5 Planning Staff
  - FDOT D5 PD&E Staff
  - FDOT D5 TSM&O Group
  - MetroPlan Orlando TSM&O
- **Stakeholder input used to develop Phase 2 goals**

Phase 1 Model Progress

- **FITSEVAL model**
  - Established FITSEVAL to run with CFRPM 6.0
  - Reviewed & ran all 10 FITSEVAL deployments
  - Checked scripts and assumptions utilized
  - Conducted sensitivity test of model parameters
- **Some SERPM variables did not exist in CFRPM**
  - Ensured that there was consistency
  - Will include these variables when 2040 CFRPM is finalized circa January 2016
- **Benefit and Cost calculations**
  - Have identified cost and benefit input parameters
  - Established a plan to update these values

Phase 2 Next Steps

- **Phase 2 focuses on refining FITSEVAL**
- **This will be achieved through**
  - Scripting and Algorithm adjustments
  - Research into updated data and procedures
  - Making refinements within FITSEVAL model structure
  - Continually thinking “outside-the-box” such as adding other congestion management options
  - Continued coordination with stakeholders
- **Conduct FITSEVAL training work sessions**
- **A successful project is a consensus project**
- **We value your feedback and input!**

Questions/Contacts




FDOT DISTRICT 5 PROJECT MANAGER

Jason Learned

Jason.learned@dot.state.fl.us

CONSULTANT

Leftwich Consulting Engineers, Inc.

Scot Leftwich, PE, PhD

Scot.Leftwich@Lce-fl.com

Vasu T. Persaud, PE, AICP, PTOE

vtp@Lce-fl.com

Charlotte N. Davidson, PE

cnd@Lce-fl.com

THANK YOU!