FLORIDA ITS EVALUATION (FITSEVAL) TOOL

Phase 1 Pilot

Status Update Presentation

presented by
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FDOT District 5 Modeling Coordinator

December 10th, 2015
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

![Venn Diagram](image)

- **Safety**
- **Intelligent Transportation System (ITS)**
- **Congestion Management**
- **Roadway Capacity Improvement**
- **Multi-Modal Improvement**

**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

<table>
<thead>
<tr>
<th>Deployment</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced Traveler Information (ATI)</td>
<td>Informational</td>
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<tr>
<td>Road Weather Information (RWI)</td>
<td></td>
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<tr>
<td>Advanced Public Transit (APT)</td>
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<tr>
<td>Signal Timing Improving (STI)</td>
<td>Signal Improvements</td>
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<tr>
<td>Bus Priority (BP)</td>
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<tr>
<td>Emergency Vehicle Preemption (EVP)</td>
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<tr>
<td>Ramp Metering (RM)</td>
<td>Management</td>
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<tr>
<td>Managed Lanes (ML)</td>
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<tr>
<td>Incident Management (IM)</td>
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<tr>
<td>Smart Work Zone (SWZ)</td>
<td></td>
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</tbody>
</table>
What does FITSEVAL Provide?

• Measures of Effectiveness (MOEs)

- 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

| Benefit Summary | Cost | Driver | $493,832.36
|-----------------|------|--------|-------------------|
| Time Savings    | $15,560.58
| Changes in Fuel Consumption | $2.15
| Changes in Emissions of CO | $0.17
| Changes in Emissions of HC | $-0.28
| Total Annual Benefit | $509,390.68

| Cost Summary | $29,189.50
| Total Annual Cost | $29,189.50

| B/C Ratio | 17.45
| Annual Benefit-to-Cost Ratio | 17.45

*To be refined as part of Phase 2

Main Cost Savings = Time & Fuel Consumption
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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

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

- 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

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THANK YOU!