Introduction

- Tampa Bay Regional Planning Model (TBRPM v7.x)
  - 4-Step Model used for 2035 Long Range Transportation Plans (LRTP)
  - One feedback loop for HBW Distribution
  - Sophisticated Mode Choice
  - “CTOLL” based tolling model
  - Daily Highway Assignment
  - Two-Period Transit Assignments
    - (HBW, HBO & NHB)
Introduction

• Need for New Starts Model for Alternatives Analysis
  – Time-of-Day components added
  – Mode Choice structure expanded
  – Six-loop feedback for Peak Distribution
  – Four-Period Highway Assignments
    • (AM, Mid-Day, PM, Evening)
  – Two-Period Transit Assignments
    • (Peak, Off-Peak)

Introduction

• Need for Managed / Express Lanes Model
  – Consistency with “Managed Lane Model Application for FSUTMS Phase 1” Report FDOT Central Office
  – Adopted changes to final Highway Assignment only
    • CTOLL converted to Diversion Curve Methodology
  – Designated as TBRPM-ML
Toll Modeling in TBRPM

• Build Shortest Impedance Path between OD Pair
  – Toll cost converted to equivalent time using “CTOLL” (inverse of value-of-time)
  – Total path impedance computed by summing travel time and time equivalent of toll
• OD Volume Assigned to the Shortest Impedance Path

Toll Modeling in TBRPM

• General Purpose Path
  B
  Travel Time = 20 min
  Impedance = 20 min
  A

• Tolled Path
  B
  Travel Time = 20 min
  Toll: $0.5
  Toll Equivalent Time = 2 min
  Impedance = 20 + 2 = 22 min
  A
Express Lane Modeling in TBRPM-ML

- Central Office Express Lane Framework
  - General Purpose (GP) path
  - Paid path
- Introduce one more Path in TBRPM-ML
  - General Purpose (GP) path
  - Paid path
    - Toll (TL) path
    - Express Lane (EL) path

Express Lane Modeling in TBRPM-ML

- Three Shortest Time Paths Developed between Each OD Pair
  - GP path includes GP link(s) only
  - TL path must include TL link(s) and can also include GP link(s)
  - EL path must include EL link(s) and can also include TL link(s) and GP link(s)
  - TL and EL paths are considered only if faster than GP path; ignored otherwise
Express Lane Modeling in TBRPM-ML

• Case I: Only One Path Exists
  – All the demand is assigned to the one path, either GP, TL, or EL path

• Case II: Two Paths Exist
  – Travel shares computed for the two competing paths using diversion curve and assigned to the two paths

• Case III: Three Paths Exist
  – Travel shares computed for the three competing paths using diversion curve and assigned to the three paths

Express Lane Modeling in TBRPM-ML

• Case IIa: GP and EL Paths Exist
  – Skim GP and EL paths
  – Compute toll on EL (Distance * Toll Rate)
  – Compute travel time saving
  – Compute toll to travel time saving ratio
  – Compute GP and EL travel shares

• Case IIb: GP and TL Paths Exist
  – Same as Case IIa with the exception that toll values are read from an input file
Express Lane Modeling in TBRPM-ML

• General Purpose Path
  - Travel Time = 20 min

• Express Lane Path
  - Travel Time = 16 min
  - Distance on EL = 5 mile
  - Toll Rate = $0.20/mile
  - Toll = 5 * 0.20 = $1.00

Travel Time Saving = 20 – 16 = 4 min
Toll / Travel Time Saving = $1 / 4 min = $15 / hour
Lookup $15 / hour on Diversion Curve
40% share for EL, 60% share for GP
Express Lane Modeling in TBRPM-ML

• Case III: GP, EL and TL Paths Exist
  – Apply diversion curve in two steps
    • Travel share of GP and “Paid” paths
    • Split the share of “Paid” paths into TL and EL

Diversion Curve Development

• Developed from Household Income 3-Year ACS Data for FDOT D7 Counties

![Diagram of diversion curve and household income relationship]
Network Coding

Cube Network
Lane Line Diagram

Express Lanes Coded as Separate Facility Type

---

Model Validation - TOD Factors

Traffic Counts vs. Household Survey

2007 Household Survey
2006 Traffic Counts
Model Validation - TOD Factors

Traffic Counts vs. Household Survey by Purpose

Model Validation - Counts by Facility

Year 2006 Traffic Counts by Facility Type
Model Validation - Counts by County

Year 2006 Traffic Counts by County

Model Validation - Existing Tollways

Veterans V/C Ratio:
CTOLL: 1.08
Diversion Curve: 1.11

Crosstown V/C Ratio:
CTOLL: 1.02
Diversion Curve: 0.90
CTOLL vs. Diversion Curve Comparison

Express Lane % by Peak and Off Peak Direction

Average Daily vs. Design Hour Volumes

Future Year Testing: Average Daily vs. Design Hour

11
Average Daily vs. Design Hour Volumes

Future Year Testing: Average Daily vs. Design Hour

Subarea OD Trip Table Extraction
Questions?

Subarea Trips and Volumes