

STOPS

presented to
MTF Transit and Rail Committee

presented by
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March 25, 2014



Parts of the Presentation



- Trips-on-project forecasting
- How STOPS works
- Making STOPS work for you
- Experience thus far with STOPS applications

2



Trips-on-Project Forecasting



- Topics
 - FTA motivations
 - Options for project sponsors
 - Implications for FTA reviews
 - Availability of STOPS and tech support
 - Plans for upgrades and extensions

3



FTA Motivations



- Streamlining
 - Project-evaluation measures
 - Mobility → trips on project (total, transit-dependent)
 - Environment → change in auto vehicle-miles traveled
 - Cost effectiveness → project cost per trip on project
 - Travel forecasting
 - FTA to provide a simplified method
 - Simplified method to be “good enough”
- Reductions in level of effort (sponsors and FTA)

4



FTA Motivations (continued)



- Resulting design standards for STOPS
 - Focus on the purpose: trips on major-capital projects
 - Urban fixed-guideways: BRT, streetcar, LR, CR, HR
 - Use readily-available inputs
 - Do not require any primary data collection
 - Rely on public, standardized data sources where possible
 - Keep it simplified for users
 - Provide a graphical user interface
 - Limit the number of switches, levers, and dials
 - Make it reasonably accurate
 - Calibrate with data on many existing systems/lines
 - Adjust to local conditions

5



Options for Project Sponsors



- Project sponsors may prepare forecasts with:
 - Regional travel models
 - Incremental models
 - STOPS

} Augmented with “special market” models, as needed
- Sponsors may provide to FTA forecasts from:
 - Regional travel models only
 - Incremental travel models only
 - STOPS only
 - Any combination of the above

} Augmented with “special market” models, as needed

6




Implications for FTA Reviews

Source of forecast	FTA review of submitted forecasts			
	Transit rider survey data	Properties of the travel model	Validation vs. current riders	Plausibility of forecasts
Regional model	●	●	●	●
Incremental model	●	●	●	●
STOPS			●	●

- Substantial scrutiny
- Modest scrutiny
- Limited scrutiny

Note that these reviews pertain to formally submitted forecasts. They do not reflect any informal technical assistance that may have been provided by FTA staff.


7



Availability of STOPS and Tech Support

- Download from the FTA website
 - <http://www.fta.dot.gov/grants/15682.html>
 - Software
 - User guide
 - Sample application
- Request help (after good-faith local effort)
 - Pete Mazurek (FTA; contact info on STOPS page)
 - Assistance from FTA contractor at FTA discretion

8



Plans for Upgrades and Extensions



- STOPS version 2.0
 - More recent worker flows (ACS? LEHD?)
 - Special markets
 - On-screen editing of transit lines
 - Additional calibration data
 - Automated disaggregation of overly large zones
- Software for incremental approach – “Steps”
 - Grounded in rider survey data
 - Incremental mode choice
 - Many other components taken from STOPS

9



How STOPS works



- Topics
 - Overview
 - Data sources
 - Calibration(s)




10



Overview

- Modified 4-step model structure; trip based
 - Zone-to-zone travel markets
 - Three trip purposes (HBW, HBO, NHB)
 - Peak and off-peak transit service levels
 - Walk, PnR, KnR access to transit
 - Stratified by household auto-ownership
- Modifications
 - CTPP data rather than trip generation & distribution
 - GTFS rather than coded transit network
 - Peak highway impedances from MPO model



Overview (continued)

Highway Supply

Hwy times, dists

Calculation

Delta auto VMT

Demand

Demographics

CTPP (→ACS)

Adaptations

Travel flows

Mode choice

Flows by mode

Flow summaries

Transit Supply

GTF network

GTF path

Trn times, xfers

Trn load

Trn summaries

Public file


External file

Internal file

STOPS model

Notes:

- Demographics, travel flows, and travel times are zone-to-zone
- Networks and loaded volumes are link-based
- "Adaptations" include translation to the year of the forecast plus:
 - Conversion of worker flows to Home-Based-Work trip flows
 - Scaling of HBW flows to represent Home-Based-Other flows
 - Development of Non-Home-Based flows from HB transit trip ends



Data Sources



- Public
 - Census: CTPP 2000 and Census 2010
 - General Transit Feed Specification (GTFS)
- MPO
 - Zone-specific population and employment
 - Zone-to-zone highway travel times and distances
- Sponsor
 - Coordinates of station locations on the project
 - Service plan for the project and its integration

13



Calibration(s)



- Nationally calibrated; local adjustments
 - National: against ridership on 24 FG systems
 - Local transit:
 - Against CTPP HBW attraction district-level transit shares
 - Against total transit ridership
 - Local fixed-guideway: against station counts

14



National Calibration



Fixed-guideway systems with rider-survey datasets

Metro area	Comm. rail	Heavy rail	Light rail	Streetcar	BRT	Total
Atlanta		1				1
Charlotte			1			1
Denver			1			1
Phoenix			1			1
San Diego	1		2			3
Salt Lake City	1		1		1	3
Subtotal	2	1	6	0	1	10

15



National Calibration (continued)

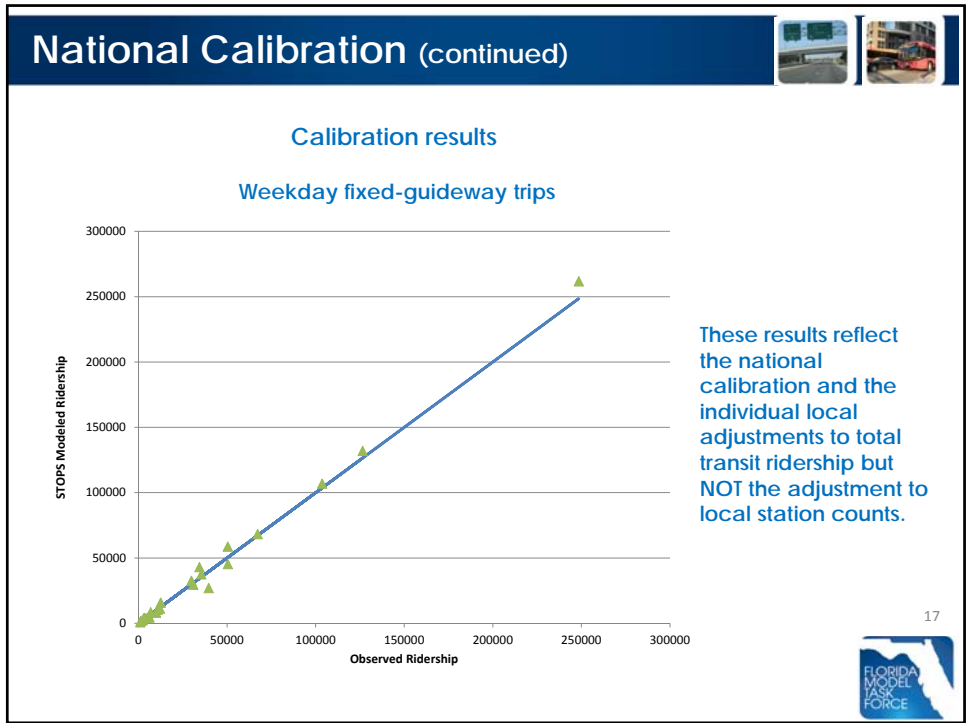


Fixed-guideway systems with rider counts


Metro area	Comm. rail	Heavy rail	Light rail	Streetcar	BRT	Total
Kansas City					1	1
Houston			1			1
Minneapolis	1		1			2
Nashville	1					1
Norfolk			1			1
Portland	1		1	1		3
San Jose			1			1
Seattle	1		1	1		3
St. Louis			1			1
Subtotal	4	0	7	2	1	14
Total	6	1	13	2	2	24


16






Making STOPS Work for You





- Topics
 - Resource requirements
 - Inputs – things you should know
 - Reports and other outputs

18



Resource Requirements



- Inputs
 - CTPP worker flows
 - GTF transit file(s) – and edits
 - MPO population/employment
 - MPO highway times / distances
- Staff
 - Journeyman travel forecaster
- Computer
 - Mid-range laptop
 - 4-8GB RAM
 - 500-1000GB storage
 - + floating-point performance
- Other models
 - Special-market models if needed
- Time
 - Setup: ≈2 weeks (actual effort, not calendar)
 - Forecasts: 1-3 days/scenario

19



Inputs – Things You Should Know



- CTPP 2000
 - Need to know the geography type
 - Need all states relevant to your project
 - Available for download on the FTA STOPS webpages
- Census 2010 block-boundary file
 - Yes, 2010; it describes density of current street grid
 - Available for download on the FTA STOPS webpages

20



Inputs – Things You Should Know (continued)



- GTFS data
 - Current system
 - From every transit agency relevant to your project
 - Check for publicly available data from your agency at <http://code.google.com/p/googletransitdatafeed/wiki/PublicFeeds>
 - If not listed, check with your transit agency
 - Changes (project, project-integration, future year)
 - No on-screen editor available
 - Text-editing of the various GTFS data files
 - Prioritization of changes to be coded
 - Planned upgrade in Version 2.0

21



Inputs – Things You Should Know (continued)



- MPO files
 - Population and employment by zone
 - Consistent series: 2000, current year, horizon years
 - Formatted in a GIS file: zone boundaries & their attributes
 - Care needed to ensure consistency if merging MPO files
 - Zone-to-zone highway impedances
 - Consistent series: current year, horizon years
 - MPO files in format generated by travel-model software
 - Need conversion to CSV format (large files!)
 - Consistency in geographic definitions
 - MPO files must use consistent zone definitions
 - MPO files and CTPP data may use different zones

22



Reports and Other Outputs



- Main STOPS report
 - Calibration summary
 - District-to-district and station-to-station flows
 - Total linked transit trips
 - Incremental linked transit trips: Build minus No-build
 - Linked transit trips that use the project
 - Station volumes
 - By mode of access at the production end of the trip
 - Parallel tabulations of existing, No-build, and Build volumes
 - District-to-district changes in person-miles of travel in automobiles

23



Reports and Other Outputs (continued)





- Graphical outputs
 - Trip ends (productions or attractions) selected by:
 - Existing, No-build, Build, project, trip gains, or trip losses
 - Attraction district or production district
 - Transit path-type
 - Access mode
 - Trip purpose
 - Household auto-ownership

24




Experience Thus Far with STOPS






- Topics
 - Initial applications
 - Plausibility of forecasts
 - For existing fixed-guideways in current year’s No-build
 - For proposed projects
 - Ongoing refinements to STOPS
 - Some lessons learned

25




Initial Applications (known to FTA)

Metro area	CR	HR	LR	SC	BRT	Metro Area	CR	HR	LR	SC	BRT
Salt Lake City				1	1*	Raleigh / Durham	1		1		
Phoenix				1*		Charlotte				1	
Denver			1*			Albuquerque					1
Lexington					1	Indianapolis					1
Washington				1	1	Buffalo			1		1
Chicago					1	Cleveland		1			1
Seattle				1		Northern Indiana	1				
Kansas City				1	1	Sacramento					TBD
SF Bay Area	1					Houston					TBD
Phoenix-Tucson	1					Dallas / Ft. Worth					TBD
South Florida	1				1	Twin Cities					TBD
Totals							5	1	3	6	10

* Applications prepared by FTA contractors

26



Plausibility of Trips-on-Project Forecasts



- Existing fixed-guideways
 - Constrained to actual volumes (for station groups)
 - Close matches where useful count data are available
 - Accurate predictions for (4 of 4) recently opened projects whose station-count data were not available to STOPS
- Proposed projects (not in Florida)
 - Compared to forecasts from local methods
 - Two cases of STOPS > local by 40 percent
 - Three cases of STOPS ≈ local within 10 percent
 - Two cases of STOPS < local by 50 percent
 - One case of STOPS < local by 80 percent
 - Note that all STOPS and local forecasts < 18k

27



Ongoing Refinements to STOPS



- Version 1.01 (September 2013)
- Version 1.02 (February 2014)
 - User control of application subarea within metro area
 - Ability to process GTFS calendar_dates file
 - Tabulation of trips-on-project measure for bus projects
 - New report on total boardings for every route
 - New index to reports
 - Formatting of intermediate files as binary rather than text to reduce file sizes and processing times

28



Ongoing Refinements to STOPS (continued)



- Version 1.03 (under development)
 - Higher maximum #stations: 10,000 total, 360 in sta-sta report
 - Capability to split CTPP zones
 - Early warning of #zones or #stations exceeding limits
 - Faster pathbuilding (now 1/3 of v1.02 time for large systems)
 - Fewer KnR connections to bus stops
 - Smarter tree pruning
 - New report on impedances for selected paths
 - Revised mode-of-access reporting for stations
 - Downsized station-to-station reporting
 - Others to be determined?

29



Some Lessons Learned



- STOPS applications need understanding and care
 - District definitions
 - Clone selections
 - Station grouping
 - Classification of BRT projects: bus vs. fixed guideway
 - Regional unlinked trips required
 - Data, not “data”
 - Need for consistent zone-level SE forecasts
 - Art of calibration to existing station volumes

30

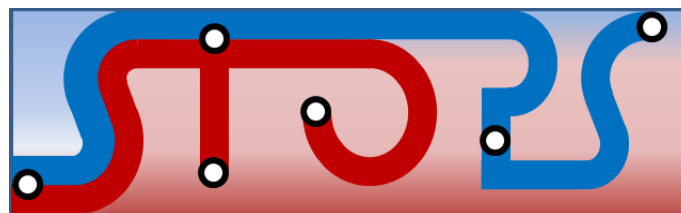


Some Lessons Learned (continued)



- Largest lesson learned, so far:
 - We're all still learning about trips-on-project forecasting with STOPS.
 - Written guidance is limited – largely because guidelines are still emerging.
 - STOPS users must be experienced enough to recognize anomalies as potential problems.
 - FTA will continue to support aggressively the ramp-up of STOPS applications.
 - Resources to provide hands-on assistance
 - Continual updates to the software and user guide

31



32

