

New Lessons Learned Using the Federal Transit Administration Simplified Trips-on-Project Software (STOPS) for Transit Demand Estimation

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presented

by Cambridge Systematics, Inc.

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Overview

- ① Background
- ② Overview of STOPS
- ③ Setting up for success
- ④ Developing forecasts

Our work with STOPS

- FTA commissioned Cambridge Systematics (CS) to produce additional independent ridership forecasts using STOPS
- CS collaborated with FTA and RSG on some preliminary training materials to help users work with STOPS
- CS is currently working with STOPS to produce forecasts for New Starts and Small Starts projects

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Introduction to Simplified-Trips-on-Project Software (STOPS)

- A simplified software package released by FTA, which
 - » Quantifies FTA's trips-on-project evaluation measure for FTA major capital funding
 - » Takes advantage of data that are generally available “off the shelf” to permit a user to develop transit project demand forecasts with relatively modest effort
 - » Produces reporting which permits straightforward review and interpretation of the likely beneficiaries of the proposed transit improvement

Introduction to Simplified-Trips-on-Project Software (STOPS) (continued)

- What makes STOPS much simpler to use...
 - » Estimates of total origin-destination travel are derived from Census data rather than trip generation or trip distribution procedures
 - » Representations of transit levels-of-service are derived from timetable information (General Transit Feed Specification)
 - » The model calibrates itself to represent current conditions

When to use STOPS

- ④ New Starts or Small Starts projects
 - » Regional model is not currently available or requires efforts beyond the current budget and time constraint to make usable
 - » Quality control – to provide a second ridership forecast for comparison to a forecast by other methods
- ④ STOPS applications require understanding and care
 - » Regional unlinked trips required
 - » Need for consistent zone-level socioeconomic forecasts
 - » Art of calibration to existing station volumes

STOPS internals

● 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

HBW = Home-Based Work
HBO = Home-Based Other
NHB = Non-Home Based

PnR = Park-and-Ride
KnR = Kiss-and-Ride

● Modifications

- » CTPP data rather than trip generation and distribution
- » GTFS rather than coded transit network
- » Peak highway impedances from MPO model

CTPP = Census
Transportation Planning
Package (2000)

GTFS = General Transit
Feed Specification

Calibration of STOPS

- Nationally calibrated; local adjustments
 - » National: against ridership on existing fixed guideway systems of various types
 - » Local transit:
 - Against CTPP HBW attraction district-level transit shares
 - Against total transit ridership
 - » Local fixed-guideway: against station counts

Read more about it...

The screenshot shows a web browser window displaying the U.S. Department of Transportation Federal Transit Administration website. The page title is "STOPS - FTA's Simplified Trips-on-Project Software". The navigation menu includes "News", "Grant Programs", "Funding & Finance", "Regional Offices", "Contact Us", "About FTA", and "Top Requests". The main content area contains the following text:

At their option, sponsors of New Starts and Small Starts projects may use a simplified method developed by FTA to quantify the measures used by FTA to evaluate and rate projects. STOPS is a limited implementation of the conventional "4-step" travel model. STOPS replaces the standard "trip generation" and "trip distribution" steps with the Census Transportation Planning Package (CTPP) – tabulations from the 2000 Census (and soon, the American Community Survey) to describe overall travel markets. It also replaces the traditional "coded" transit network with standard transit-services data in the General Transit Feed Specification (GTFS) format. More detail is available in an [overview](#) of STOPS and its component procedures.

Project sponsors who choose to apply STOPS will need to:

- Get [STOPS documentation and software](#);
- Get the appropriate [data from the Census](#);
- Obtain [supporting information](#) from the regional travel model; and
- Obtain current [GTFS data](#) for their individual metro areas.

Data for STOPS calibration and validation included detailed rider surveys from six metro areas and station-level count data from nine other metro areas. Together, these 15 metro areas have 24 fixed-guideway systems (six commuter rail, one heavy rail, 13 light rail, two bus rapid transit, and two streetcar).

STOPS produces all reporting needed by project sponsors to review its ridership forecasts in detail and to support grant applications to the FTA New Starts and Small Starts programs.

FTA anticipates that the local installation of STOPS and assembly of the required input information will require one to two weeks of effort by a capable travel-forecasting professional. FTA anticipates that preparation of project forecasts will require one additional week for straightforward projects and two to three additional weeks for complex projects.

FTA provides technical assistance to project sponsors using STOPS to prepare project forecasts. After you have read the User Guide, installed the software, and made progress towards producing forecasts for your project, you can contact Pete Mazurek (peter.mazurek@dot.gov or 202-366-1627) with questions or with a request for help from an FTA-provided contractor.

FTA has sponsored tests of the STOPS software and travel models in six applications across the country over the last three months. These tests have led to updates of the software and the user guide for clarity and ease of application. This initial release of STOPS reflects the insights gained through that testing program. Nevertheless, STOPS remains both a new software release and a new approach to travel forecasting for major transit projects.

Learn more about the calibration, capabilities, and limitations of STOPS in FTA's "An Overview of STOPS" available via the website

New Version 1.50 of STOPS

- ④ Similar in operation to prior releases, but new version is designed to generate more accurate results due to the following major changes
 - » Revised NHB trip procedures
 - » Enhanced the schedule-based path-building
 - » Simplified the process of coding BRT facilities
 - » Improved representation of station-level impedance
 - » Redefined the Fixed Guideway Visibility Factor

New Version 1.50 of STOPS (continued)

- Similar in operation to prior releases, but new version is designed to generate more accurate results due to the following major changes
 - » Expanded handling of multiple GTFS directories
 - » Updated the model calibration
 - » Added capacity to process split Census geography
 - » Revised identification of project trips to include trips that neither board nor alight at a project station
 - » Increased maximum problem size

Overview

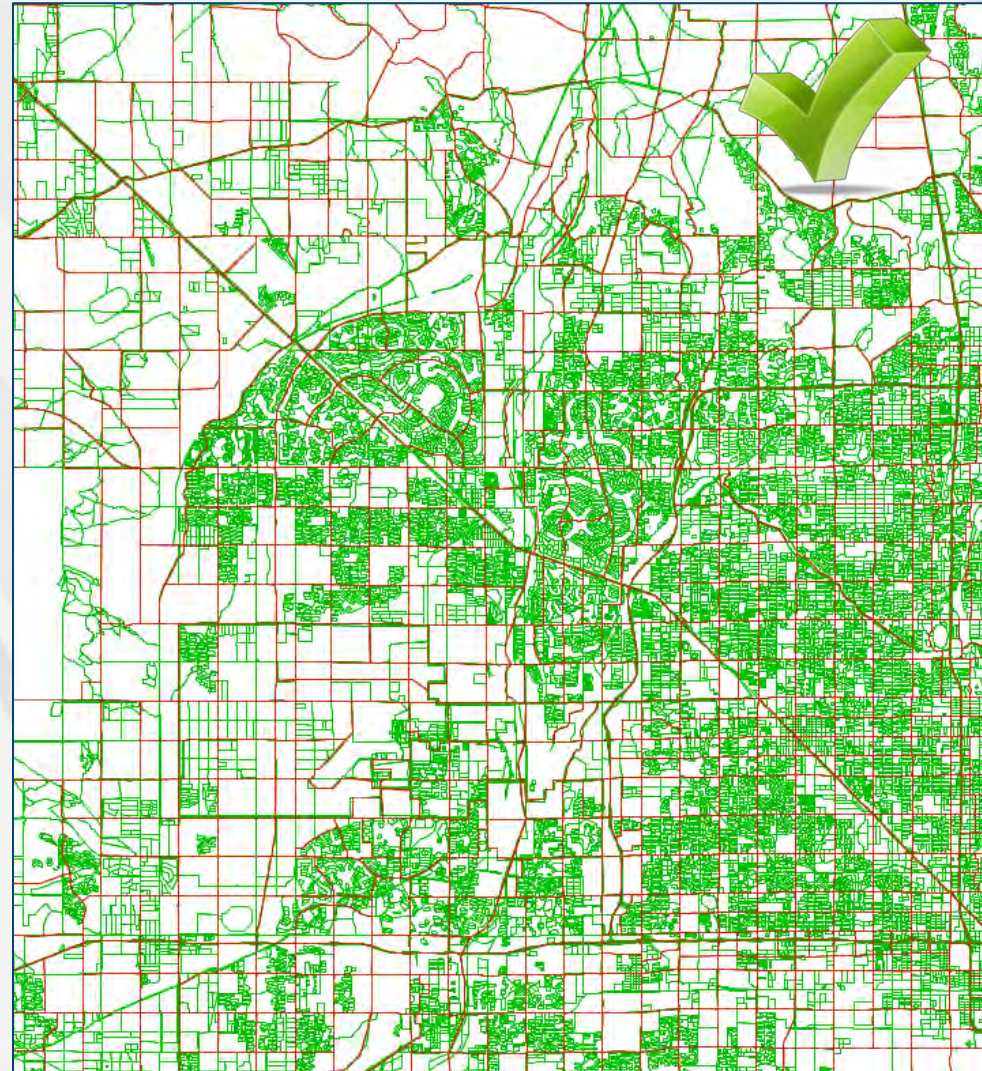
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Many details in setting up

- ④ While all of the inputs are straightforward, there are many details in getting started with a STOPS forecast
- ④ Inspecting the inputs carefully can save many hours later
- ④ Some areas where things can go wrong...
 - » Coordinate systems
 - » Census-Zone splitting
 - » District systems
 - » GTFS coding

Coordinate systems

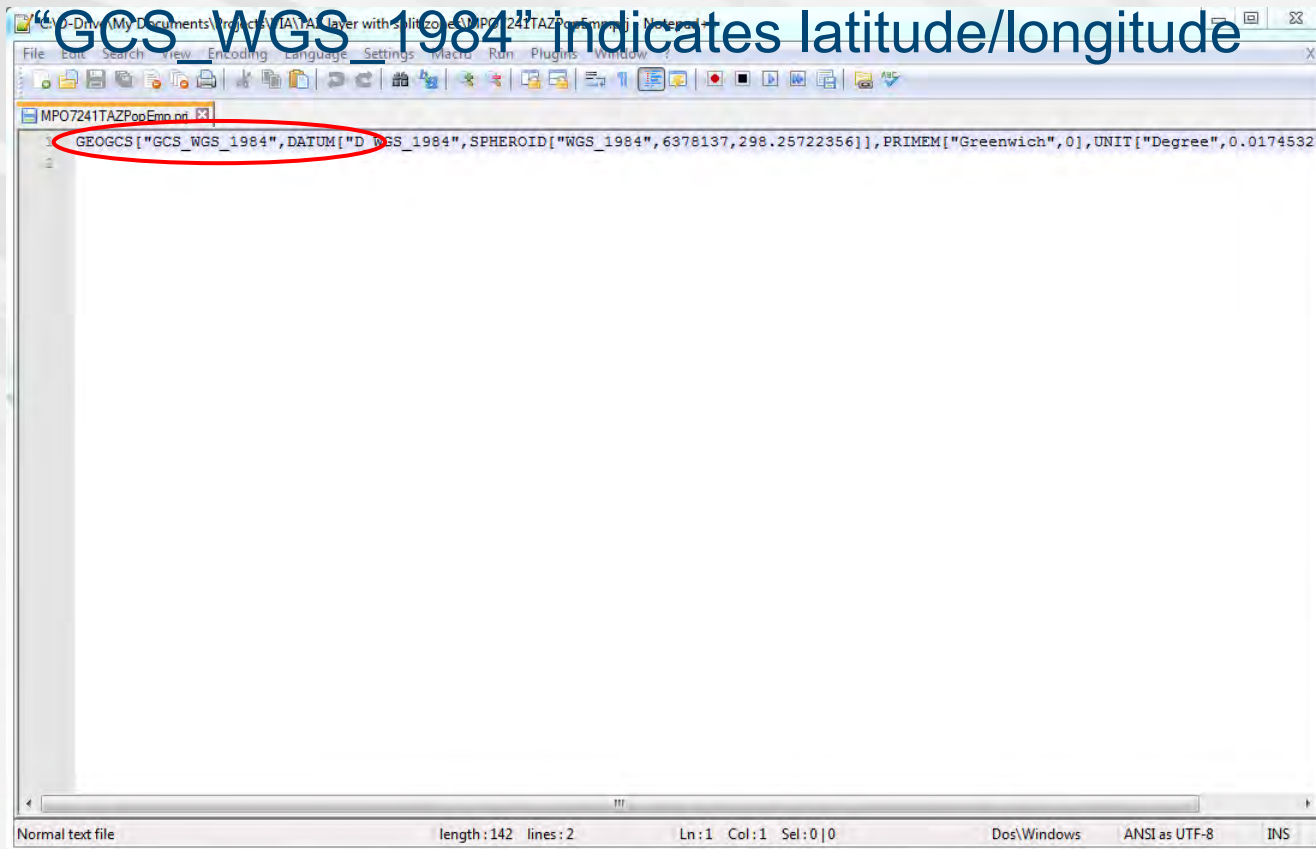
- STOPS uses coordinates to relate data from different sources
 - » Census transportation analysis zone (TAZ), tract, or block group shapefiles
 - » Station shapefiles
 - » Metropolitan Planning Organization (MPO) TAZ shapefiles
 - » General Transit Feed Specification (GTFS) stop objects
- STOPS expects coordinates that are latitude and longitude



Check coordinate system before using

- Multiple acceptable methods for checking the coordinate system
 - » If a projection file (*.prj) is provided, open it in a text editor.

“GCS_WGS_1984” indicates latitude/longitude

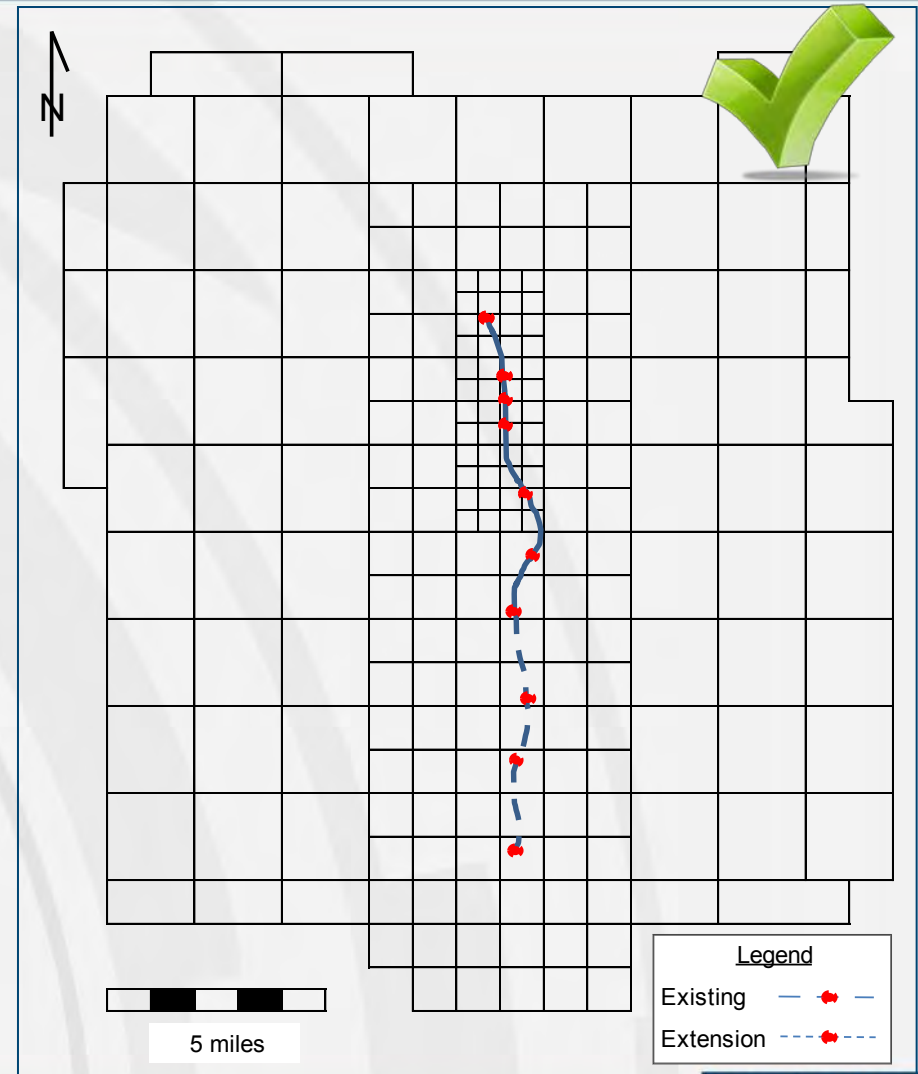


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Census-Zone splitting

- STOPS uses census zones as the geographic reference for CTPP Journey-to-Work (JTW) flows
- Good Practice:
 - » Large census zones split along project corridor
 - » Large census zones split into smaller zones
 - » Zones contain single station

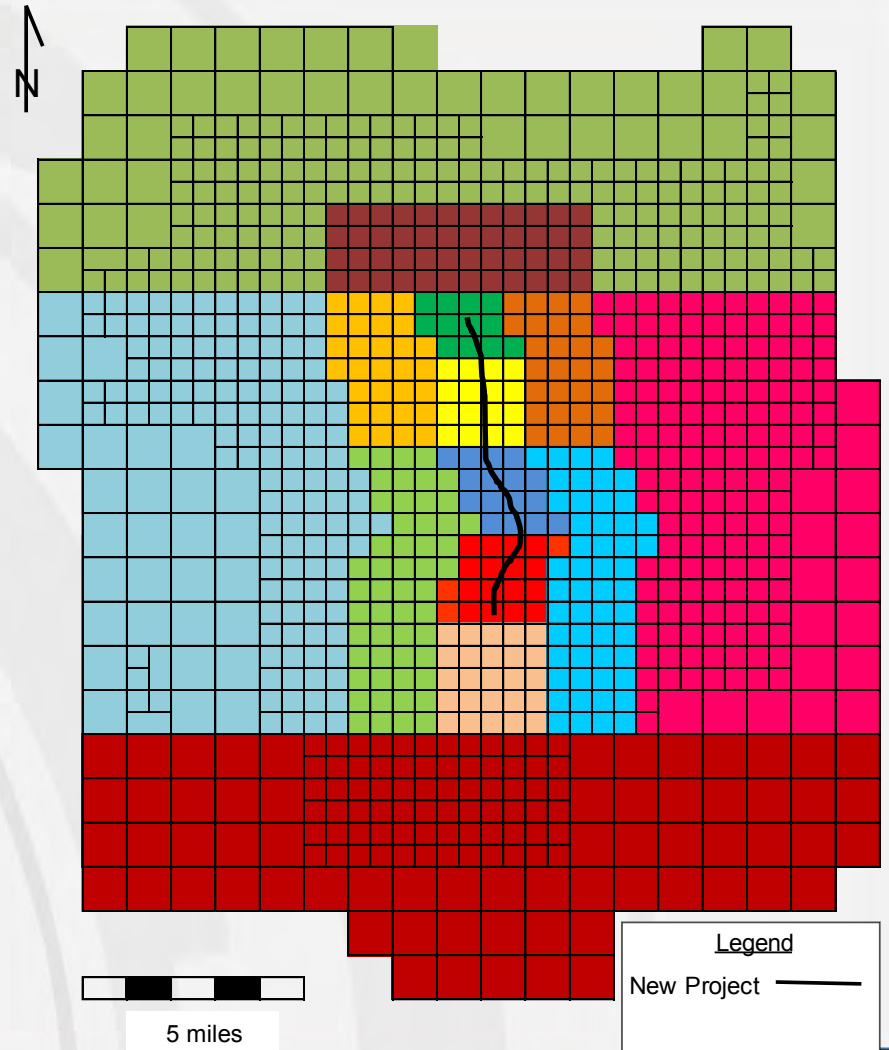


Districts in STOPS are used in several ways

- ④ Represent attraction areas for internal calibration
 - » Match CTPP transit shares for each attraction district
- ④ Supports the growth factoring step
 - » Compute trips per worker and trips per employee in 2000 CTPP (by district) that are applied to each constituent zone future population and employment
- ④ Used for reporting

District definition

- Good Practice:
 - » Districts for CBD and suburban activity center
 - » 4 districts representing different walk areas to project
 - » 6 districts representing extended corridor
 - » 4 districts covering remaining region



GTFS coding strategy

- ④ GTFS coding can be laborious!
- ④ Strategy to manage GTFS coding includes
 - » Prioritizing coding changes according to the likely impacts on estimates of project ridership
 - » Monitoring the impacts of changes on ridership to provide information on when to stop

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Application strategy

- Plan from the very beginning to work from current conditions through all of the changes from today to the future with the project

Step	Demographics	Existing Scenario	No-Build Scenario	Build Scenario	Objective
1	Current	Existing GTFS	Existing GTFS	Existing GTFS	Calibration
2	Current	Existing GTFS	Existing GTFS	Build GTFS	Initial project ridership
3	Current	Existing GTFS	No-Build GTFS	No-Build GTFS	Impact of no-build network
4	Horizon Year	Existing GTFS	No-Build GTFS	No-Build GTFS	Impact of future year demographics
5	Horizon Year	Existing GTFS	No-Build GTFS	Build GTFS	Plausibility of horizon year project ridership

- This application strategy of running STOPS multiple times with small incremental improvements builds experience and increases confidence in the results

Producing a forecast

- ④ You aren't done until you have written up the results in plain language to describe
 1. Existing ridership patterns and service characteristics
 2. Service and ridership changes associated with the project itself assuming implementation in the current year
 3. Service and ridership changes associated with implementation in the horizon year
 - a. Other projects and service improvements included in the no-build definition
 - b. Ridership changes associated with future demographics

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