

Using GTFS Transit Data in Transportation Modeling

presented by

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Presentation Outline

- GTFS Overview
- GTFS User Applications
- Data and Format
- Current Transit Modeling Practice
- Benefits of Using GTFS
- Challenges of Using GTFS
- GTFS – The Big Picture

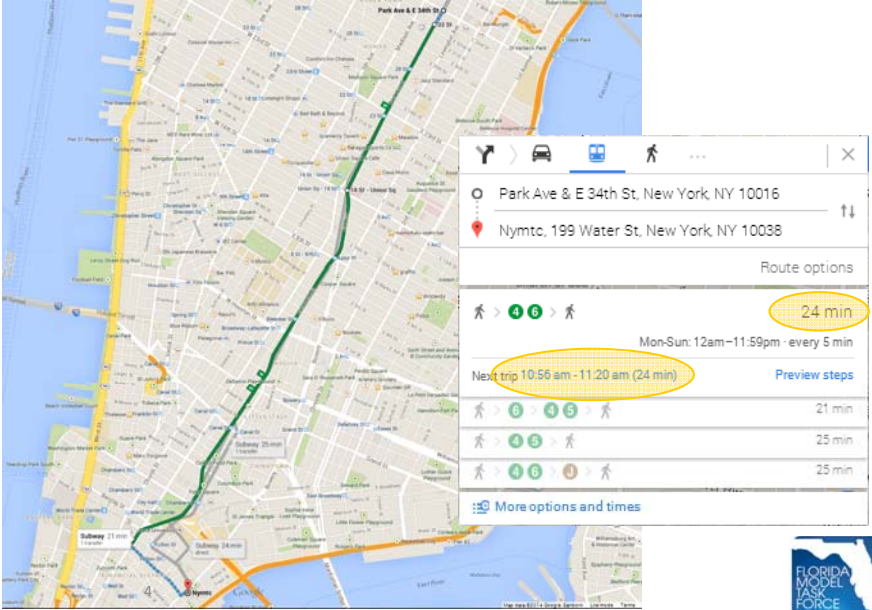


What is GTFS?

- GTFS = the **G**eneral **T**ransit **F**eed **S**pecification
- Is a common format for **public transportation schedules** and **associated geographic information**
- “Feeds” allow transit agencies to publish their transit data and developers to write applications
- It is a collection of text tables
- De-facto standard among public agencies
- Common amongst route planning applications



Example 1. Real Time Route Planning

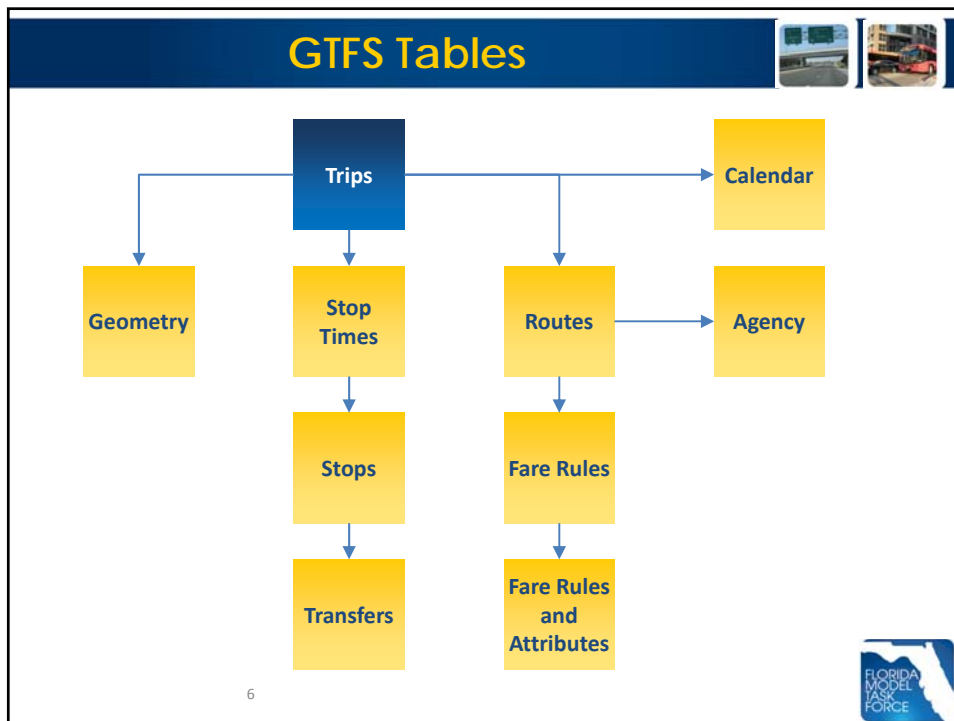


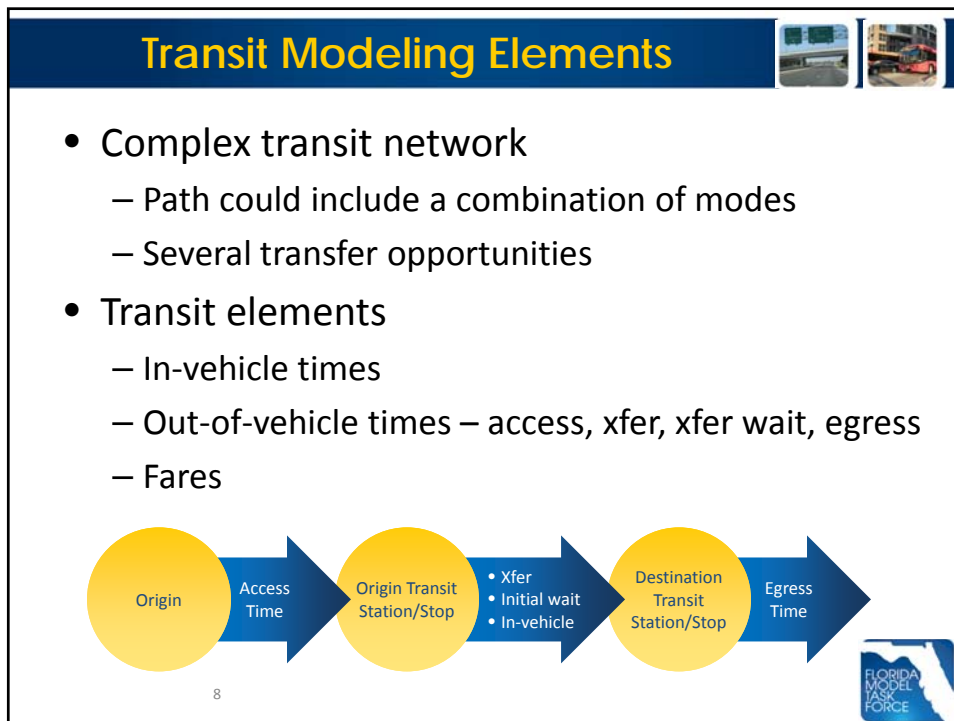
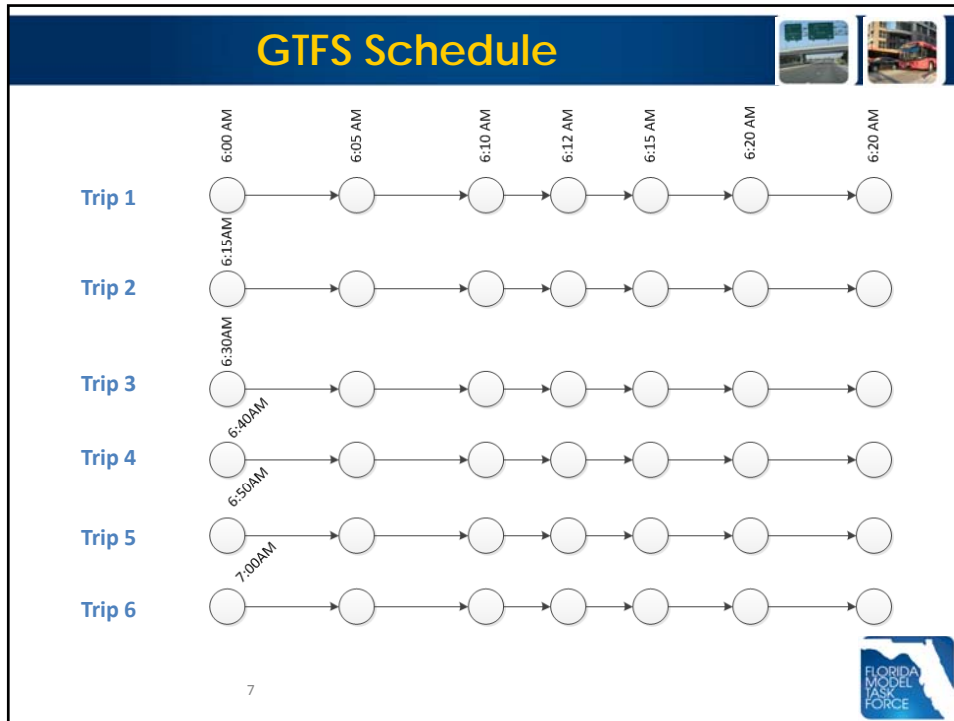
The screenshot shows a route planning interface for New York City. The starting point is 'Park Ave & E 34th St, New York NY 10016' and the destination is 'Nymtc, 199 Water St, New York NY 10038'. The route options panel displays several alternatives:

- A route with subway (4, 6) and walking icons, with a duration of 24 min. The schedule is 'Mon-Sun: 12am - 11:59pm - every 5 min'. The next trip is highlighted as 'Next trip 10:56 am - 11:20 am (24 min)'.
- A route with subway (6, 4, 5) and walking icons, with a duration of 21 min.
- A route with subway (6, 5) and walking icons, with a duration of 25 min.
- A route with subway (4, 6) and walking icons, with a duration of 25 min.

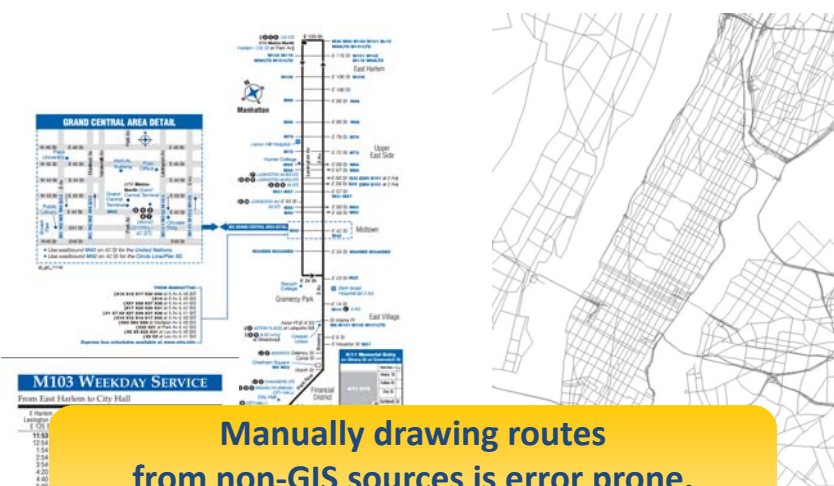
Example 2. Real Time Bus Location

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Current Transit Modeling Practice



Manually drawing routes from non-GIS sources is error prone, time-consuming, and hard to maintain

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Current Transit Modeling Practice

- Current Transit Modeling Practice
 - Network coding is time consuming and error prone
 - Periodic updates required – also time consuming
 - Unconflated transit network – introduces inaccuracies
 - Inaccurate access information – links need to be built manually in many cases
 - Many of the bus travel times are “model defaults”
 - Initial wait times – typically half the headway
 - Timed transfers – difficult to model
- Using GTFS could alleviate these limitations

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Benefits– *GTFS in Transportation Modeling*



- Used by several agencies – e.g., Brevard, Miami-Dade, Hillsborough and Space Coast
- Higher accuracy – geometry, stop detail, travel times, frequency based on schedule
 - Therefore improved calibration
- Easier to update – can be automated
 - Will need QA/QC
- Ability to integrate data from other agencies using GTFS
- Price is right – it's free!

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Challenges Using GTFS Data



- Challenges
 - Map the network agnostic routes to our network
 - Integration with highway network
 - Updating *select* data when importing
 - Data formatting issues while importing/exporting

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Challenge – Map Matching the GTFS Routes

The diagram illustrates the challenge of map matching GTFS routes to a physical roadway network. It features a grid of solid green lines representing the Physical Roadway Network and a grid of dashed black lines representing the Transportation Planning Network. A red dot labeled 'stop' is located on a vertical roadway line, but it does not align with any of the horizontal lines of the Transportation Planning Network.

Physical Roadway Network

GTFS Route

stop

Transportation Planning Network

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Challenge – Map Matching the GTFS Routes

This diagram shows the solution to the map matching problem. The red dot representing the stop is now positioned at the intersection of a vertical roadway line and a horizontal line from the Transportation Planning Network. A dashed green line indicates the path of the GTFS route, which follows the roadway line and then turns to follow the horizontal planning network line at the stop location.

Physical Roadway Network

GTFS Route

Stop: closest Node in the planning network

Transportation Planning Network

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GTFS Data and Map-Matching

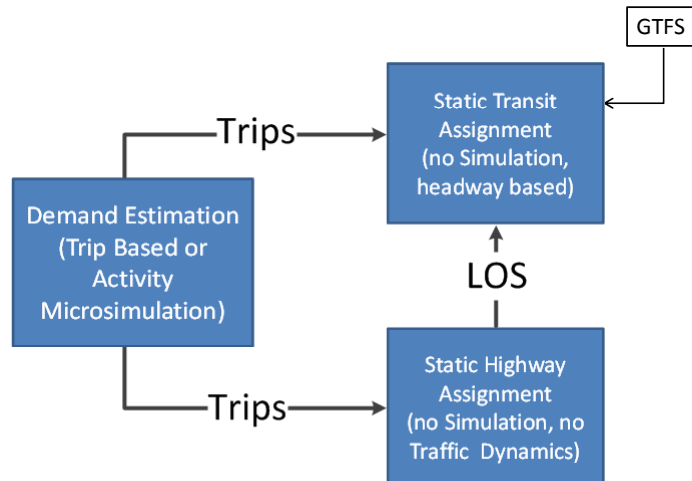


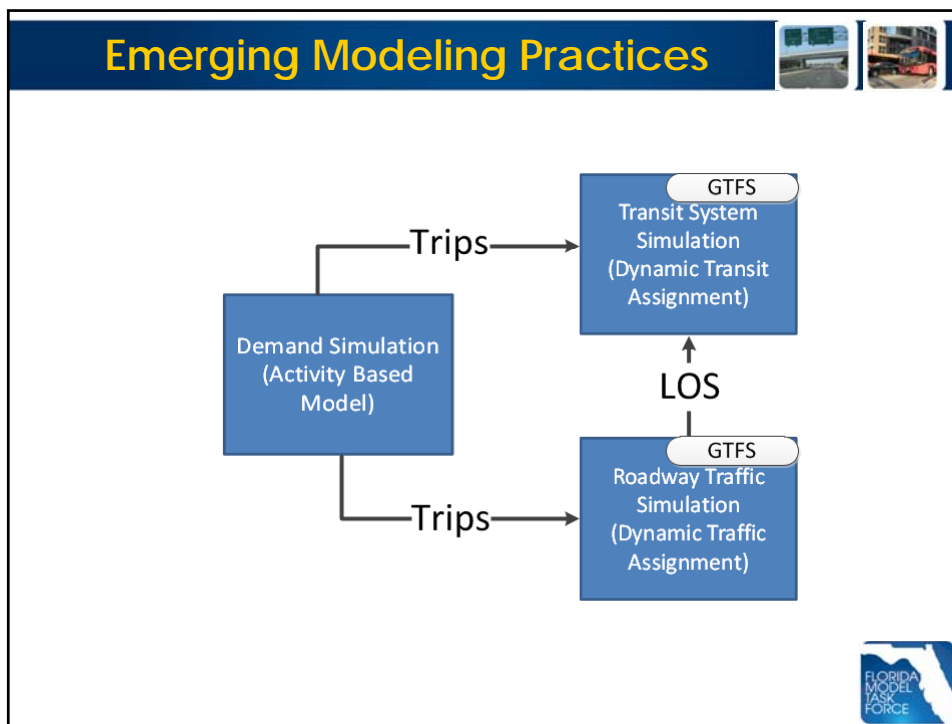
- The higher detail in the roadway network the easier it is to match an accurately coded route to the planning network
- Map matching is available now and has high success
- Knowledge of the GTFS data in the study area and collaboration with public agencies is necessary

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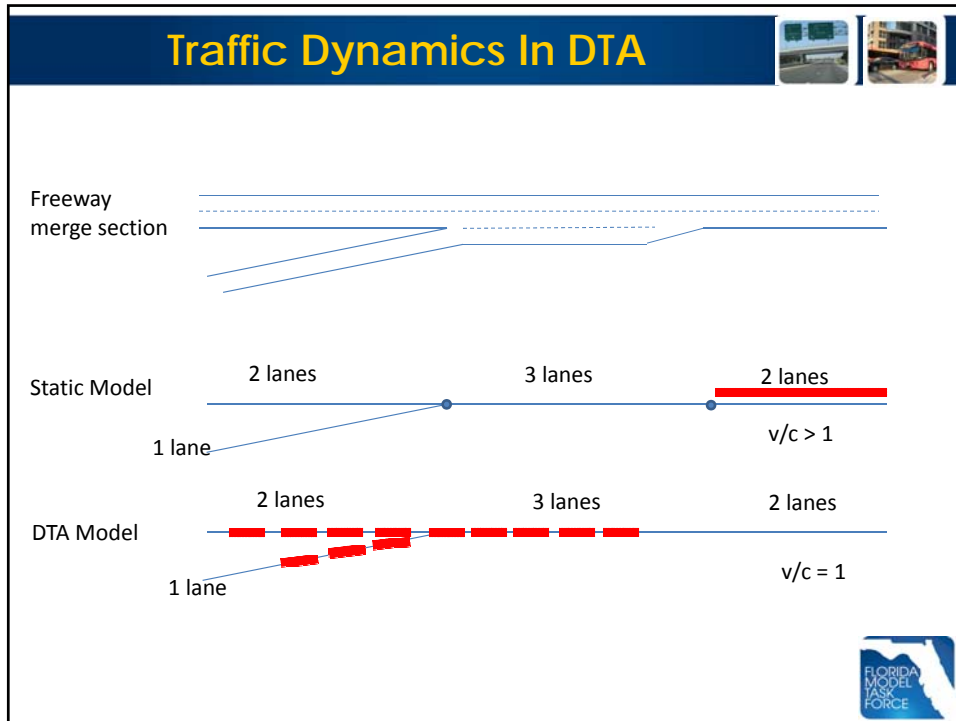
Current State-of-the-Practice





Dynamic Traffic & Transit Assignment

- Dynamic Transit Assignment uses schedule-based transit information instead of frequencies
 - Service and demand are time dependent while individual travelers can be microsimulated
 - Capacity, crowding, information provision, and service irregularities are modeled explicitly
- Dynamic Traffic Assignment can be the most appropriate tool for modeling traffic congestion
 - Realistic traffic dynamics that do capture congestion
 - Enhanced multiparametric route choice
 - Can use mesoscopic, microscopic, or a combination of both traffic simulation methodologies



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