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Durham-Orange LRT Ridership Forecasting

presented to NCMUG presented by Cambridge Systematics, Inc.

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Presentation Outline

- Overview of Durham-Orange LRT
- FTA New Starts Program
- Transit Modeling and Ridership Forecasting under FTA New Starts Program
- Durham-Orange LRT Ridership Forecasting



Overview of Durham-Orange LRT



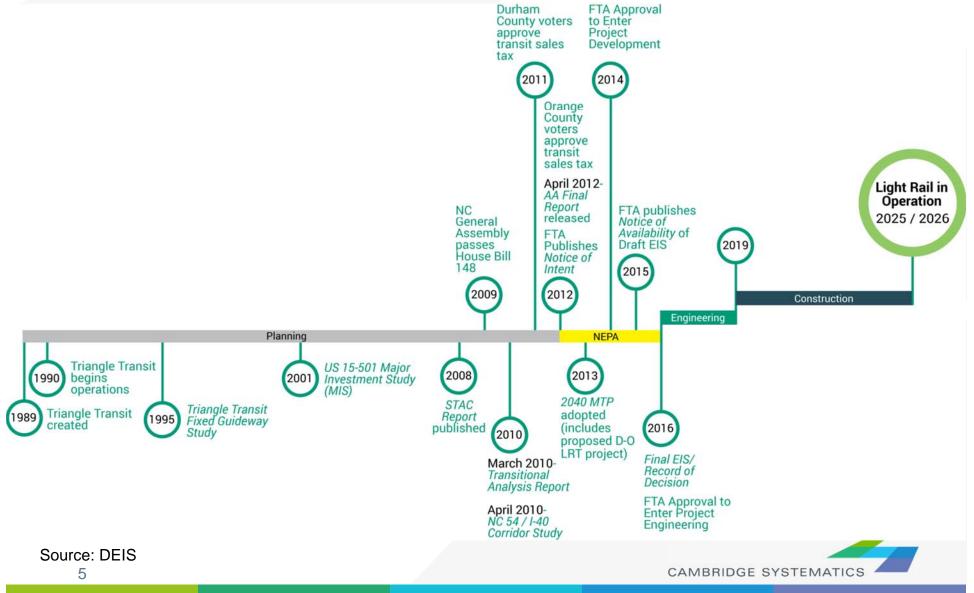
Durham-Orange Corridor LRT

- The Federal Transit Administration (FTA) approved the Durham and Orange Counties' light rail project to advance into the Engineering phase of the federal Capital Investment Grant Program, on July 28, 2017.
- On December 14, 2016, the FTA issued an Amended ROD, Final Section 106 Effects Determination, and Final Section 4(f) Determination for the D-O LRT Project NCCU Station Refinement (the requirements of the NEPA).
- In February 2016, the FTA issued FEIS/ROD on the D-O LRT Project
- Project website with publications, interactive maps and videos
 - » http://ourtransitfuture.com/projects/lrt/
 - » https://youtu.be/XK3B2UjPrs4
 - » https://youtu.be/haLr578l5oo

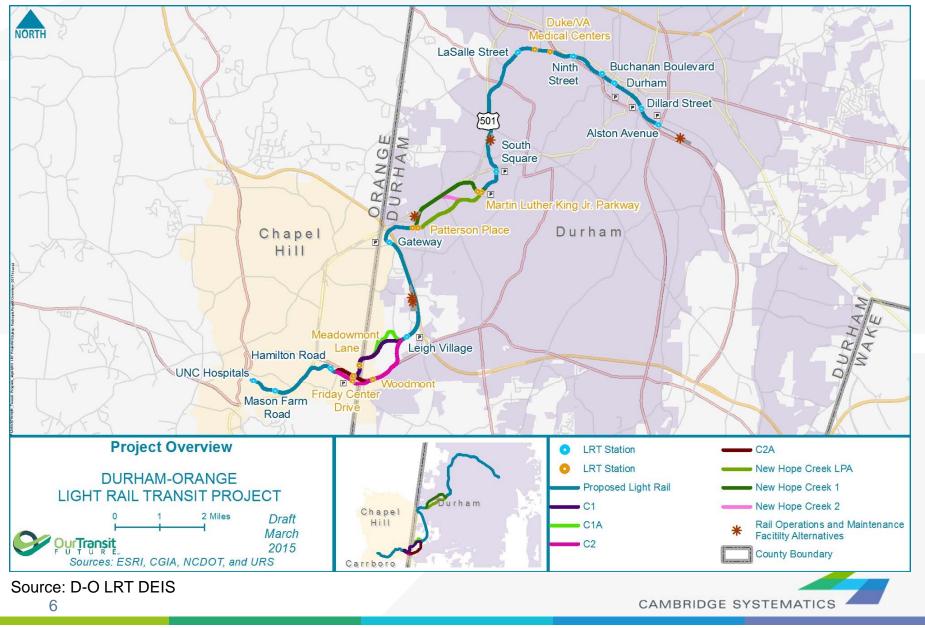


Source: GoTriangle

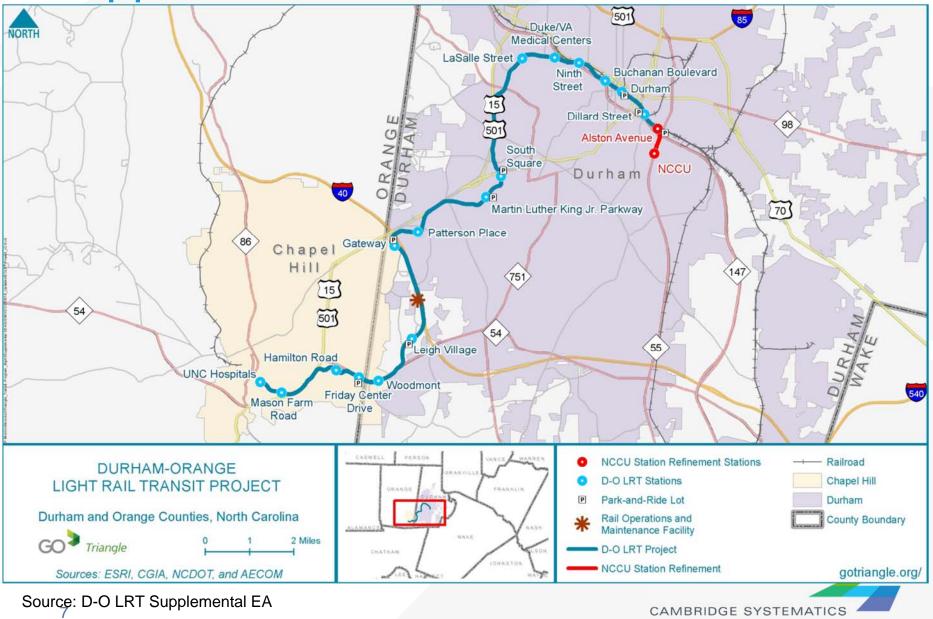
Durham-Orange Corridor History and Timeline



DEIS Alternatives



Supplemental EA – NCCU Station



FTA New Starts Program and Ridership Forecasting



Capital Investment Grant Program

- Discretionary & Competitive Federal Grant Program
 - » Demand for funds exceeds supply; 63 projects currently in the program
 - » FAST authorized level = \$2.64 billion through FY2019
- Legislatively directed multi-year, multi-step process to receive funds, with FTA project evaluation & rating required at specific points during the process

9 Source: FHWA Overview of Capital Investment Grant Program



Capital Investment Grant Program

New Starts

» Fixed guideway > \$300 million or seeking >\$100 million in CIG funds

Small Starts

» Fixed guideway or corridor-based BRT < \$300 million and seeking <\$100 million in CIG funds</p>

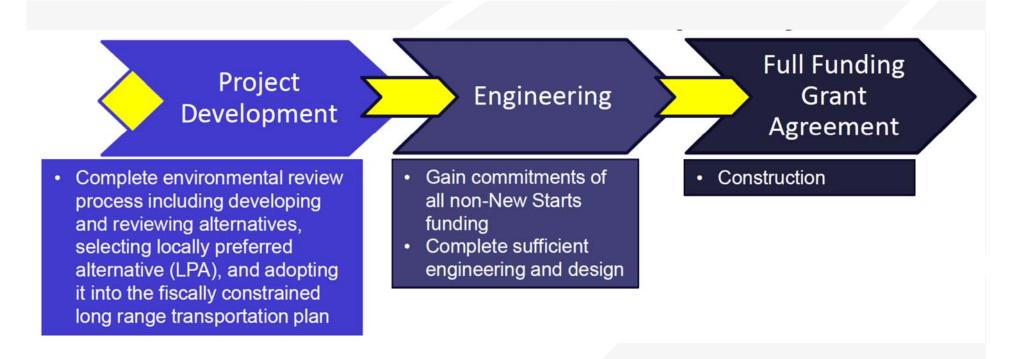
Core Capacity

» Expands capacity by > 10% in an existing fixed guideway corridor that is at capacity today or will be in five years

10 Source: FHWA Overview of Capital Investment Grant Program

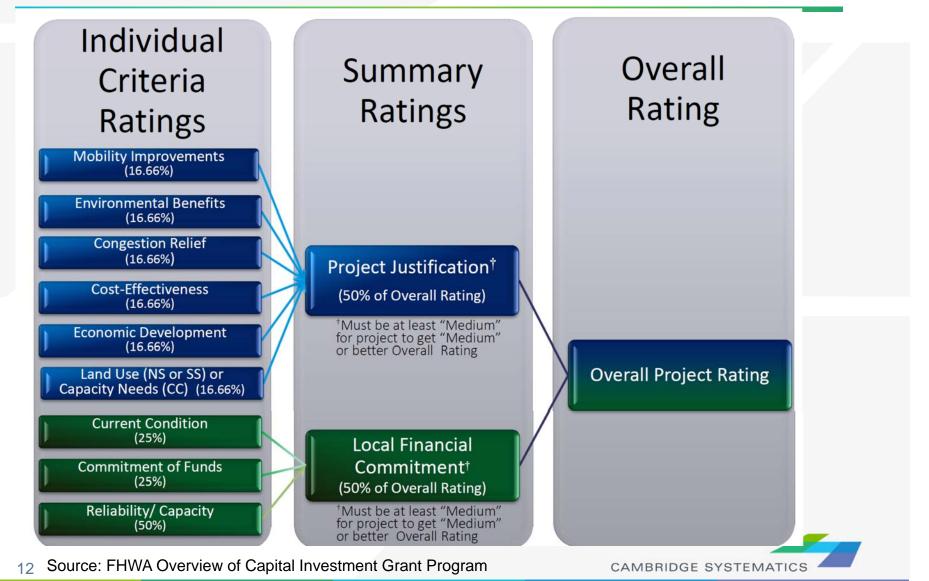


New Starts and Core Capacity Process



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Project Evaluation and Rating



FTA Guidance on Ridership Forecasting

- Five aspects of the forecasts
 - » Properties of the forecasting methods
 - » Adequacy of current ridership data to support useful tests of the methods
 - » Successful testing of the methods to demonstrate their grasp of current ridership
 - » Reasonableness of inputs (demographics, service changes) used in the forecasts
 - » Plausibility of the forecasts for the proposed project

FTA Guidance on Ridership Forecasting (continued)

- Three approaches to prepare ridership forecasts
 - » Regionwide travel models
 - » Incremental data-driven methods
 - » Simplified Trips-on-Project Software (STOPS)

Source" FHWA. https://www.transit.dot.gov/funding/grant-programs/capital-investments/travel-

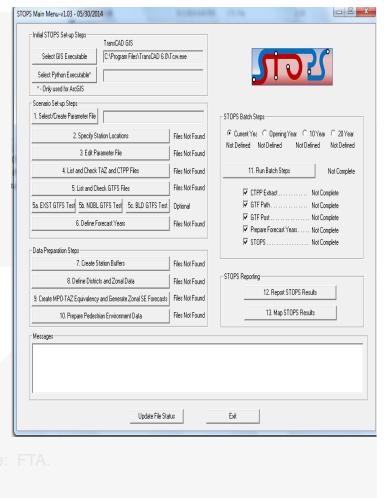


Properties of Methods

- Mode choice model formulation coefficients
 - » Need compelling evidence if out of ranges
 - » Coefficient of in-vehicle time (Civtt): 0.03 < Civtt < 0.02 for work trips, but lower for nonwork trips?
 - » Coefficient of out-of-vehicle time (Covtt); does it satisfy? $2.0 < \frac{Covtt}{Civtt} < 3.0$
 - » Cost coefficients and implicit value of time; does it satisfy? $\frac{AverageWage}{4} < \frac{Civtt}{Ccost} < \frac{AverageWage}{3}$

Simplified-Trips-on-Project Software (STOPS)

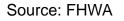
- A simplified software package released by FTA
 - » Quantifies FTA's trips-on-project evaluation measure for FTA major capital funding
 - » Useful for areas where a regional model or an incremental approach is not currently available or not suitable
 - » Useful for quality control to provide a second ridership forecast for comparison to a
 - 16 forecast by other methods



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Timelines for Submittal of Travel Forecasting Information

Information for FTA Review	Region-wide Model	Incremental Model	STOPS	
Dataila	Months in ac	lvance of anticip	ated ratings	
Details		request		
Documentation of the model methodology	4	3	n/a	
Documentation of model testing	4	3	n/a	
lesting				
Documentation of project- specific inputs	3	3	2	
Draft-final forecasts for the project	2	2	1	





Durham-Orange LRT Ridership Forecasting



Forecasting Activities

Alternative Analyses (AA) for three priority corridors

» "TRM Version 4 Enhanced" or "TRM4E.1"

DEIS

» Triangle Regional Model (TRM), Version 5

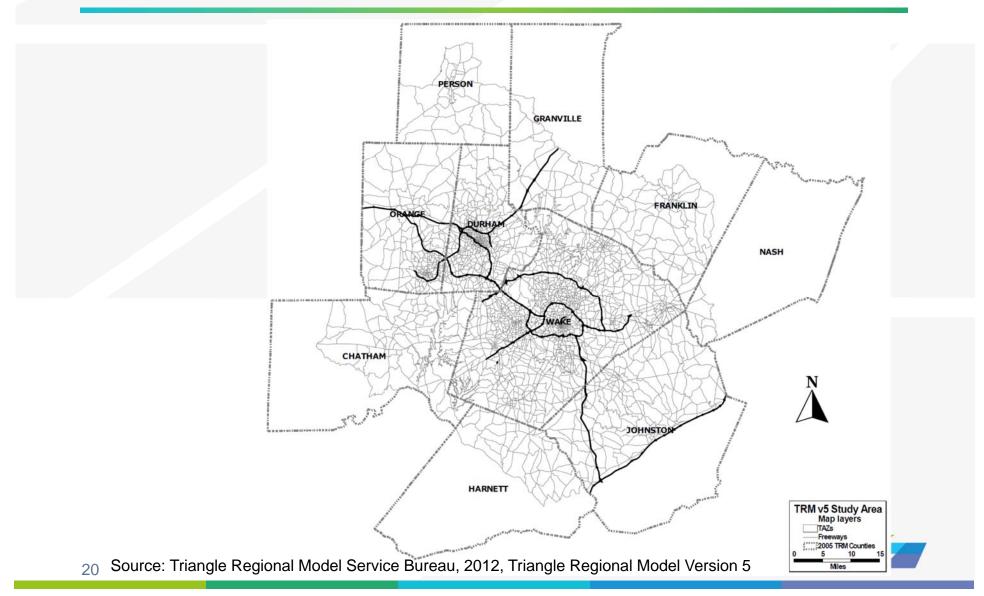
EA

» TRM Version 5 (Revalidated)

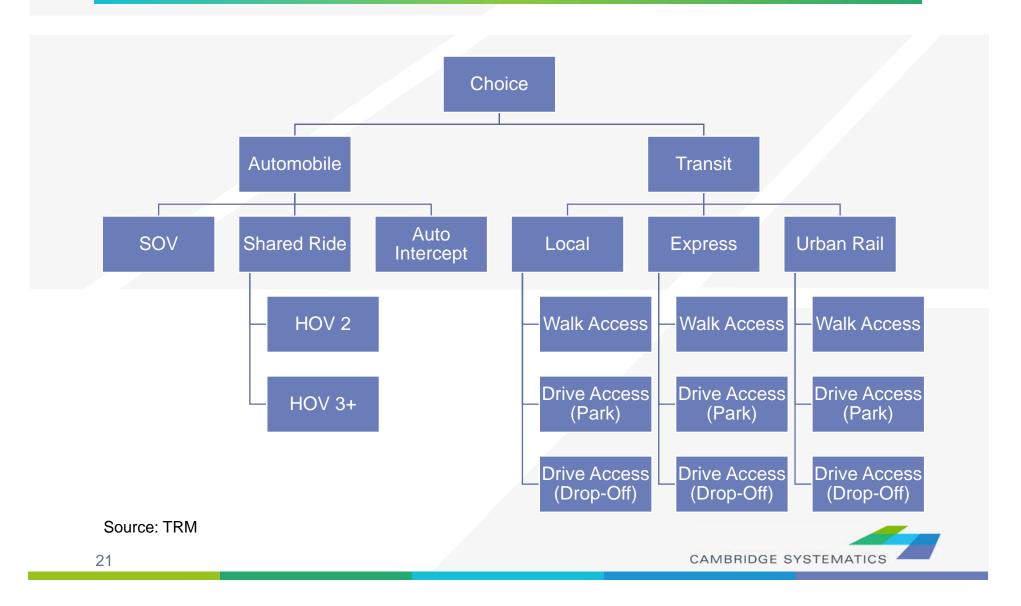
» STOPS



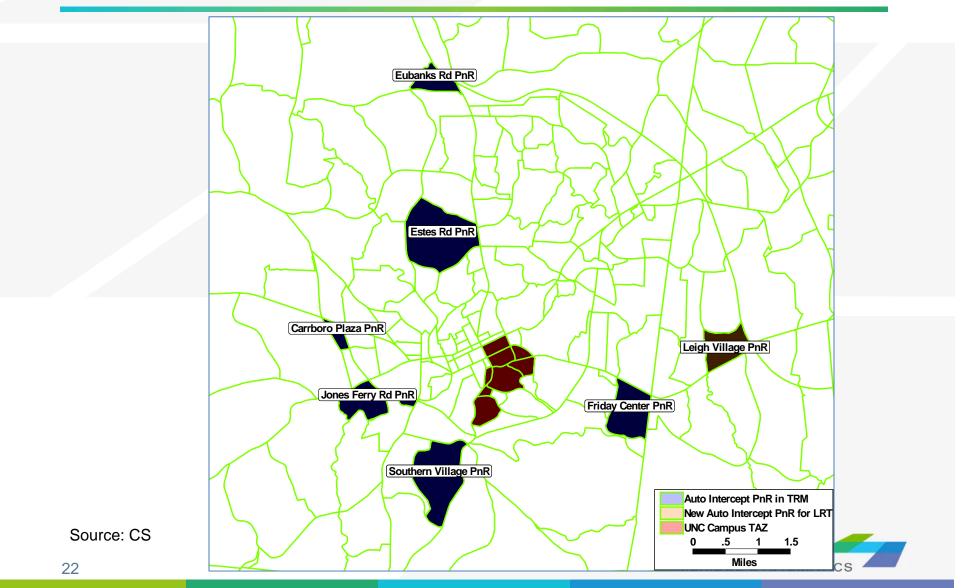
Model Domain (TRM Version 5)



Mode Choice Model (TRM V5)



Locations of TAZs that are related to Auto Intercept Trips



Unmeasured Attributes of Guideway Transit

- Three categories of attributes are recognized for credits
 - » Guideway-like characteristics
 - » Span of good service
 - » Passenger amenities
- Two types of adjustments
 - » equivalent minutes of travel time savings to increase the attractiveness
 - » a discount on the weight applied to in-vehicle travel time on the guideway



Source: FHWA

Further Model Testing and Validation

- GoTriangle conducted a transit on-board (TOB) survey in the fall of 2014
 - » 58 existing bus routes in or near the proposed D-O LRT corridor with a total ridership of 53,000
 - » 18 routes have been designated as in-corridor routes
 - » collected 5,831 samples

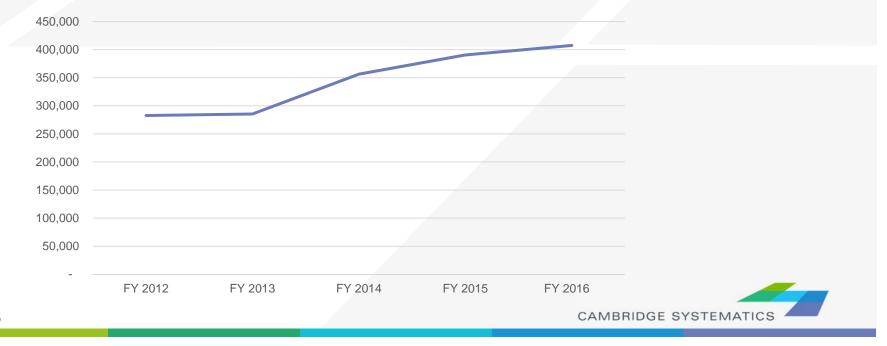
Transit fare

- Transit assignment of observed trips
- Corridor validation of 2014 model

Transit Fare and Discount Fare Programs

GoPass programs has expanded significantly over the recent years

Weighted average fares by providers/services



Transit Assignments

- Ridership by Transit Operator for all Surveyed Routes
- Ridership by Transit Operator for Routes in the Orange-Durham Corridor

Transit Operator	Observed Ridership ² for Surveyed Routes	Modeled Ridership for Surveyed Routes	Difference	Percentage Deviation
GoTriangle	5,193	4,601	-592	-11.4%
СНТ	25,373	26,623	1,250	4.9%
GoDurham	22,350	22,080	-270	-1.2%
Total	52,916	53,304	388	0.7%



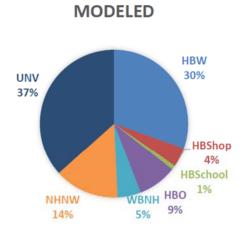
2014 Model Validation

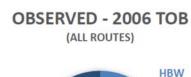
- Ridership by Transit Operator for all Surveyed Routes
- Ridership by Transit Operator for Routes in the Orange-Durham Corridor



2014 Model Validation

 Shares of Trip
Purposes
in the
Corridor





UNV

38%

NHNW

16%

28%

HBShop 3%

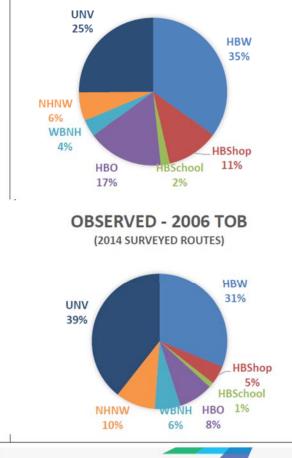
HBSchool

1%

HBO

WBNH 8%

6%



OBSERVED - 2014 TOB

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STOPS

Used to conduct a reference forecast as part of the uncertainty analysis and quality control and quality assurance

"Incremental" Approach

» 2014 Durham-Orange Corridor Transit On-Board survey

Sensitivity tests

- » Fare assumptions for LRT
- » Fare assumptions for background transit
- » Regional transit trips



Resources

D-O LRT Project Website

- » <u>http://ourtransitfuture.com/projects/Irt/</u>
- » EA/FEIS/DEIS documentation
- » Project interactive maps and videos



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