

North Carolina  
DEPARTMENT OF TRANSPORTATION

Understanding the Moore County  
Travel Demand Model  
September 10, 2014

North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

## What is a CTP?

- A Comprehensive Transportation Plan Is:
- A long-range transportation plan that addresses all forms of transportation.
- A plan that supports community priorities, local land use plans, and protects local assets.
- A concept plan that provides a locally preferred solution to a transportation problem.
- A shared vision for the people of Moore County.
- A tool to position Moore County to more successfully compete for funding at the statewide level.
- An outline for smart growth and development as it relates to transportation.
- *Based on 2040 Needs*



North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

## What a CTP is NOT:

A Comprehensive Transportation Plan Is NOT:

- A plan for specific roadway alignments.
- A promise to build projects
- An outline for the scheduling of new projects.
- A permanent document without opportunity for revision.
- About one project, one form of transportation, one roadway, or one community.



North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

## Why Develop a Comprehensive Transportation Plan?

- Federal Legislation like TEA-21 and SAFETY-LU
- North Carolina G.S. 136-66.2. Development of a coordinated transportation system and provisions for streets and highways in and around municipalities



4

North Carolina DEPARTMENT OF TRANSPORTATION ncdot.gov

## Why Does Moore County Need a CTP?

- Used to develop a county traffic model to project future conditions with Moore County’s community goals and visions.
- Helps identify deficient facilities and links.
- Helps governmental agencies know how to protect corridors designated for proposed roads
- Used in conjunction with the municipal land use plan to make development decisions .
- Helps in the funding process.  
(Developer, local funding, or in cooperation with the RPO and the State Transportation Improvement Program)



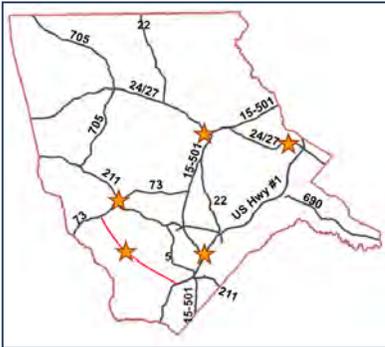


North Carolina DEPARTMENT OF TRANSPORTATION ncdot.gov

## Background On The Moore County CTP Development Process

**CTP Team began CTP Development by starting with 5 Focus Areas:**

1. NC 24-27 through Carthage
2. NC 24-27 through Cameron
3. US 1
4. A “Western Connector” from West End/Foxfire communities south and east connecting with US 1 near Aberdeen.
5. West End where 3 significant transportation projects intersect.





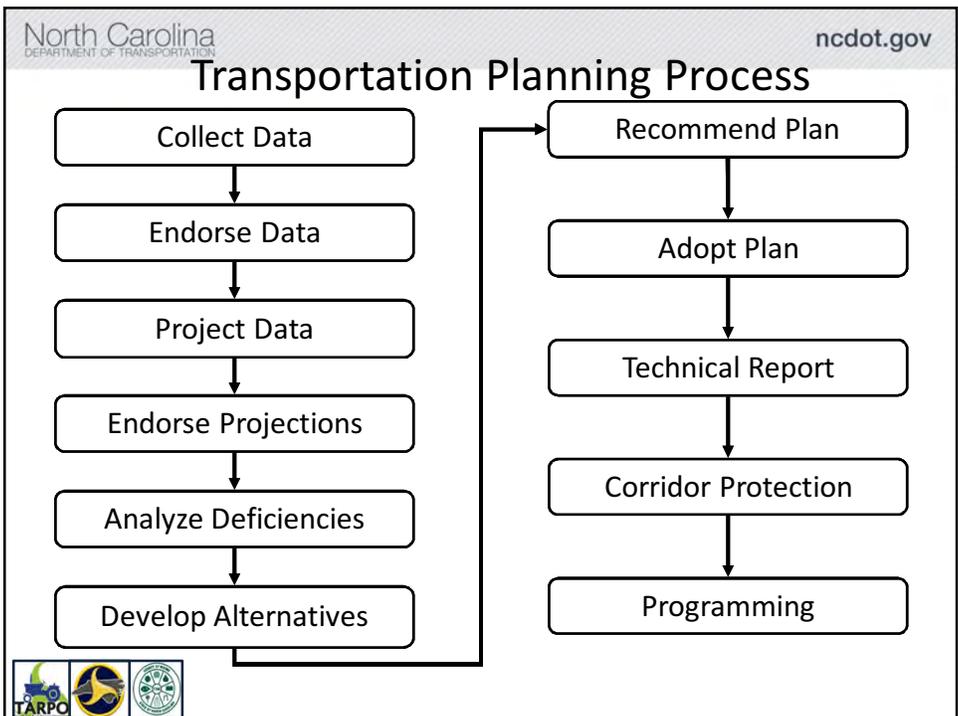


6

North Carolina DEPARTMENT OF TRANSPORTATION ncdot.gov

## Our Last Meeting

- Received approval from MCTC to move forward with use of all socioeconomic data submitted
  - Did not receive further updates
  - Data forwarded to and used by Parsons Brinckerhoff



North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

## Objectives:

Review & Explain

- What a Model Is
- What a Model Is Not
- Why the Moore County Model is Useful
- How The Approved SE Data Has Been Used
- How the Model will be Used in the Future
- Present the base year results and data

North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

## Consultant Review

 Rhett Fussell, PE

 Craig Gresham, PE

10

# Moore County Travel Demand Base Year Model Development



By Rhett Fussell & Craig Gresham  
September 10, 2014



## Refresher on Who Are We?

### Rhett Fussell, PE - Parsons Brinckerhoff

- 16 years experience in modeling
- Developed and taught small area modeling here in NC
- Project Manager for the NC Statewide Model
- Worked recently on Orlando, Nashville, Honolulu



### Craig Gresham, PE - Clearbox Forecast Group

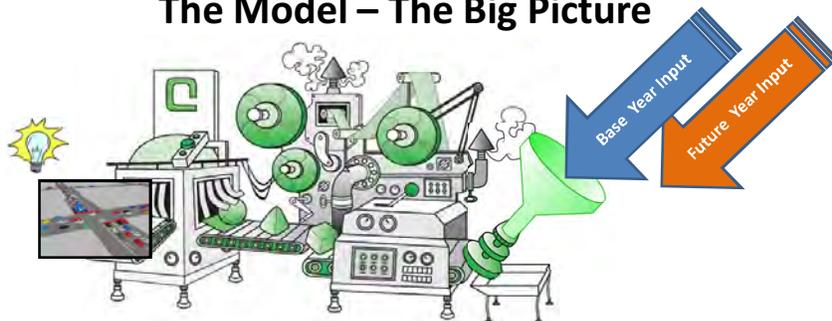
- 16 years experience in modeling
- Has either helped developed or has performed project level work with all larger models in the State
- Has worked recently on Charleston SC, Charlotte, NC Statewide Models



### We both.....

- Develop Models and Use for Project Application
  - (and can explain in non tech terms ☺)
- Understand the acceptable rates/parameters in NC
- Have Developed/Analyzed Survey Data for Many Places
- Provide Practical/Usable Model Results

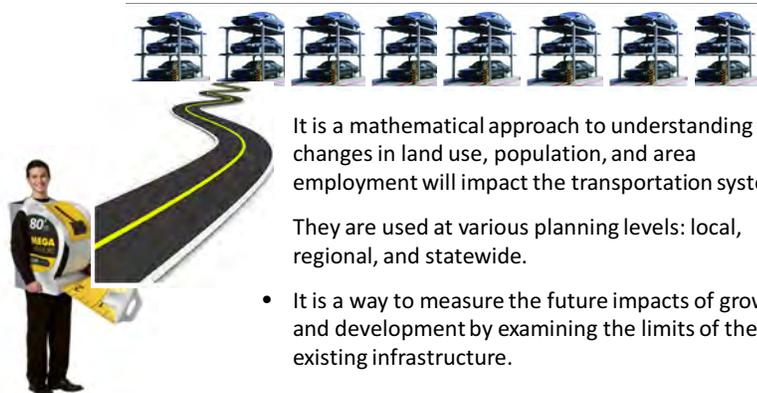
## The Model – The Big Picture



- Step I Think About Boundaries: **Study Area**
- Step II Build a Replica of the Roadway System: **Mapping**
- Step III Highlight the Roads You Want to Study: **Network**  
(**Significant Roadways: # lanes, speeds, type**)
- Step IV Divide Study Area into Smaller, Manageable Sections For Study: **TAZs**
- Step V Load Model with Population, Housing, Employment Data: **Census, Local Data**
- Step VII Load Traffic– **Compare to counts**
- Step VIII Calibrate – **Are the outcomes consistent with known data?**

13

## What is a Travel Demand Model?



It is a mathematical approach to understanding how changes in land use, population, and area employment will impact the transportation system.

They are used at various planning levels: local, regional, and statewide.

- It is a way to measure the future impacts of growth and development by examining the limits of the existing infrastructure.
- It is just **ONE** of the tools used in the analysis of transportation systems . Key word being **System**.



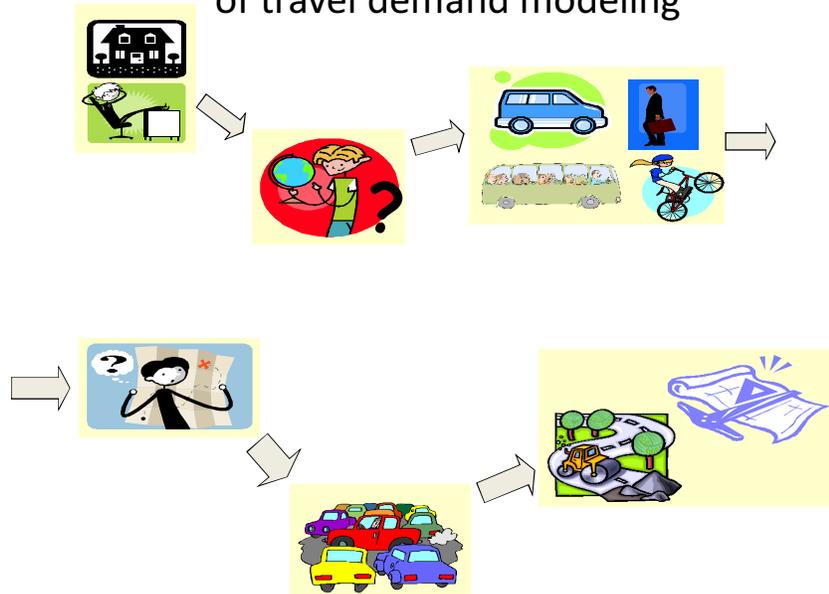
14

## The completely over-simplified basics of travel demand modeling

- It turns people and jobs into trips
- These trips are used to provide traffic volumes (or bus/light rail passengers)
- Forecast people and jobs 20-30 years out
- See what happens to traffic – where congestion is, where roads need to be improved and added, etc.
- Similar to a weather forecasting model

15

## The completely over-simplified flow chart of travel demand modeling



16

# Hurricane Models & Moore County

- **Feed It Conditions**
  - Now and Future
- **Get an Expected Future Path of Travel**
- **What if the wind pattern changes?**
  - Where does Hurricane go?
  - How does its path change?
- **Allows for people to Plan!!**
  - With real data
  - Make their own decisions



17



## Purpose of a Travel Demand Model is

....

to **assist** decision makers in making informed transportation planning decisions.

- **decisions are NOT BASED ON THIS TOOL ALONE!**

the ability to ask critical "what if" questions about proposed plans and policies.

- **it understands travel behavior instead of speculating**

**...To Help Decision Makers See What the Future May Hold**

**Is it absolute? Nope!**

★ **NOT a provider of the "answers"**

★ **IT IS A TOOL that requires professional judgment!!**

**BUT IT IS A GOOD WAY TO ESTIMATE PROBABLE OUTCOMES.**

18

## Travel Models: A Means of Predicting the Unpredictable

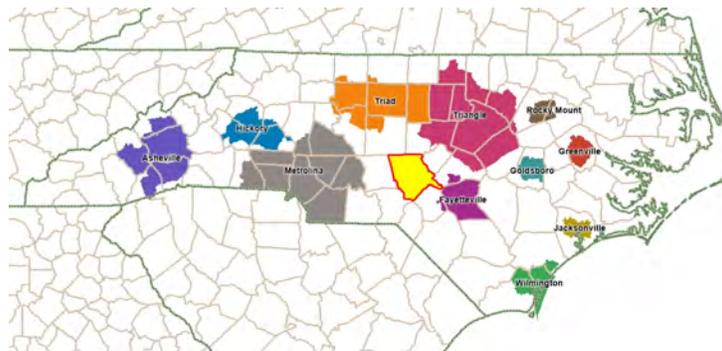
No model can take into account all of the factors that affect travel behavior and thus no model can perfectly replicate or predict reality!



Again decisions are NOT BASED ON THIS TOOL ALONE!

19

## Models Across the State: Common Practice



- 11 Urban Area Models (New Bern soon)
  - Cover all MPOs
- Statewide Model
- Many small area models-like Moore County

20

## What Does Model Do Well?

### Non-Technical Speak....the “Cans”

- Provides you LOCAL travel data
- It can show the impacts of road widenings and new road additions
- It can analyze the impacts of transportation plans
- It can show the impacts of new interchanges
- It can forecast changes in corridor volumes
- It can be used as a basis for microsimulation
- It can test alternative land use plans
- Provides visual (live/accurate) information and pretty maps to decision makers

21

## What Does Model Not Do Well?

### Non-Technical Speak....the “Cant’s”

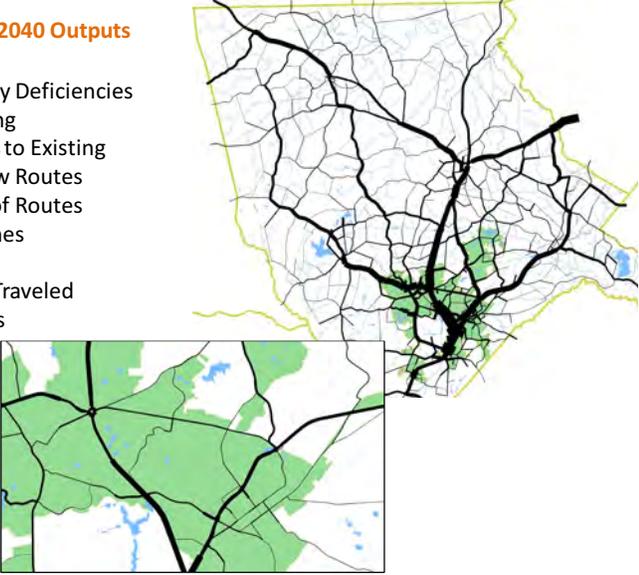
- It can’t be used to time traffic signals
- It can’t design interchanges – lanes, configurations, etc.  
(although it can provide insight)
- It can’t show impacts of new turn lanes at intersection  
(or most other intersection level improvements)
- It can’t identify induced growth or shifts in land use because of new road  
(the whole “chicken and the egg” thing)
- Does not represent true speed/Congestion on each link
  - Does not understand intersection queues
  - Does not limit capacity so over assignment can occur
- Does not give accurate turning movements at all intersections
- Will not give you true peak hour volumes
- Does not get local streets correct (neighborhood flows)

22

### What the Model Does Well

**FUTURE YEAR: 2040 Outputs**

- Future Capacity Deficiencies
- Scenario Testing
- Improvements to Existing
- Impacts of New Routes
- Classification of Routes
- Number of Lanes
- Air Quality
- Vehicle Miles Traveled
- Route Volumes



Example Output Not Actual Final Results

23

### *Moore County Model “Fast Facts”*



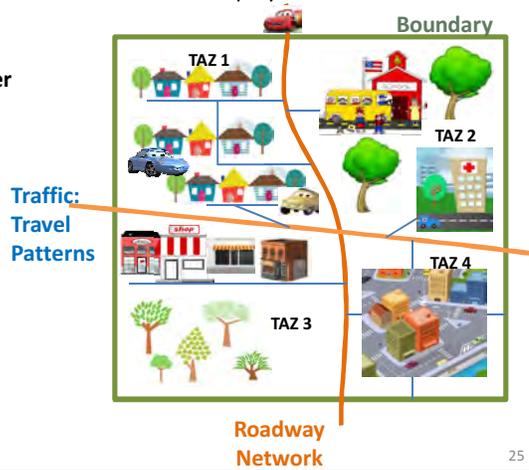
- 2012 Base Year
- 2030 & 2040 Future Year Data Also
- 174 TAZs
- Employment Classified into 8 Categories(cleaned by MCTC and staff)
  - Industry
  - Retail
  - HwyRetail
  - Office
  - Recreational
  - Hotel
  - Hospital
  - Shopping(Big Box/shopping centers)
- Peak Periods (AM & PM)
  - Also midday and night
- Includes trucks & commercial vehicles
- Uses mobile phone data to verify the flows
  - Average trip lengths match
- Validates to acceptable national criteria
  - Volumes to counts

24

## Moore County Model Socio-economic Data

- Developed by MCTC and Local Planning Staff
  - Not PB or NCDOT
  - Process started in 2013 but model kept being developed
  - Developed 2012, 2030 & 2040 households and employment

**\*\*Divide study area into smaller areas for closer study called Traffic Analysis Zones or TAZs.**

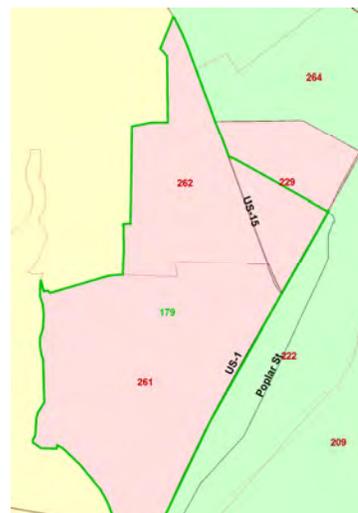


25

## Moore County Model Socio-economic Data

- Results showed that level of detail was not enough in key areas
  - Additional 14 zones Added (from 160 to 174)
- Data from MCTC needed to be "re-allocated" to new zones
  - Total HHs and Employment by Category remained the same
  - Split between zones based on staff input
  - Notes and tracking for EACH change

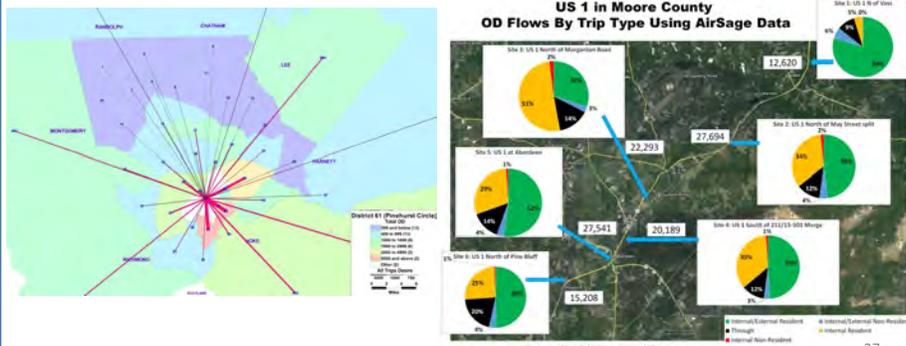
261 & 262  
 hwy and retail split even,  
 40% off/Ser in 229, 30% split in 261 & 262



26

## Moore County Model Results... How Well Does it Perform?

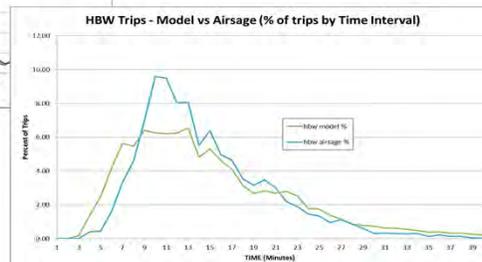
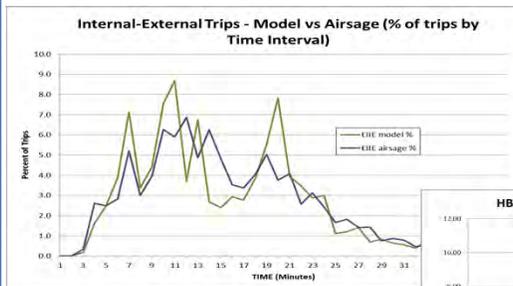
- Mobile Phone Data
  - Recall it allows us to look at travel patterns in Moore County
  - Develop External Flows (through trips)
  - Try to match that data the best possible
    - Trip distance, locations, # of trips
  - Unbiased Data and good sample size



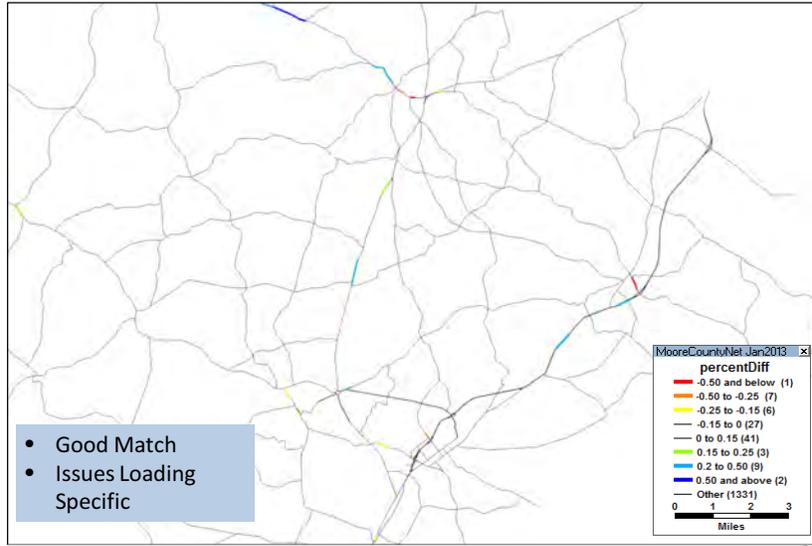
## How Well Does it Perform?

- Model Trip Lengths and Number of Trips Match Well
  - Little short in length of trip by distance
  - Internal & External Good

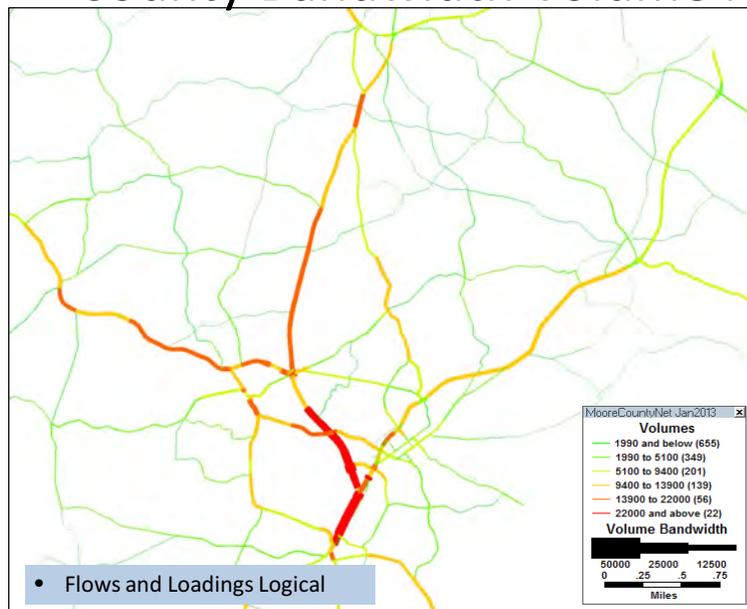
Purpose	Target Travel Time (Min)	Model Travel Time (Min)
HBW	14.12	13.8
HBO	9.35	9.1
NHB	9.73	9.6



### Percent Difference Map (Vol vs Count)



### County Bandwidth Volume Plot



## Zoom Bandwidth Volume Plot



32

## So How Can the Model be Used?

- Recall no model can reproduce reality perfectly
- Professional judgment is needed to interpret results



~~So Eagle Road Volume in Future is 15,002 Right??~~

NO!! You must understand the conditions for the result!!  
**NEVER PULL A NUMBER STRAIGHT OUT OF THE MODEL** without understanding it!

33

North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

## Now That We Have This Information, How Will It Be Used?

North Carolina  
DEPARTMENT OF TRANSPORTATION

ncdot.gov

- It will help estimate how long current conditions can accommodate \*growing traffic
- It will help estimate how long future conditions can accommodate \*growing traffic
- It will assist with long range transportation network alternatives for the \*future growth.

*\* Growing traffic and future growth based on local data and land-use plans.*

North Carolina DEPARTMENT OF TRANSPORTATION ncdot.gov

## Next MCTC Meeting Will Cover

- 2030 Deficiencies
- 2040 Deficiencies
- Show Traffic Simulations

*Public Involvement Meetings may be late 2014 or early 2015*

36

North Carolina DEPARTMENT OF TRANSPORTATION ncdot.gov



### NCDOT

Cheryl Collins  
cjcollins@ncdot.gov  
919-707-0923

Division 8 Contacts

Robert W. Stone, II, PE Division Engineer robstone@ncdot.gov	Darius Sturdivant Division Planning Engineer ddsturdivant@ncdot.gov
--	---

910-944-2344



### TARPO

Matt Day  
mday@tjcog.org  
919.558.9397

**NCDOT Moore Choices website**  
<http://www.ncdot.gov/projects/moorechoices/>