

The logo of North Carolina State University, featuring a large, stylized 'NC' in a red and white color scheme, set within a red octagonal border.

Institute of Transportation Engineers
North Carolina State University Student Chapter

ITS Solutions: HOT Lanes on I-40

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Project Background

Assignment for CE 705 (Intelligent Transportation Systems):
Identify a need for HOT Lanes in the Triangle Area on I-40
and recommend an implementation plan



HOT Lane Definitions

- HOT = High Occupancy Toll
- Reduced Cost or Free for High Occupancy Vehicles
- Increase Effective Person-Capacity of the Lane Since Carpooling is Encouraged
- Manage Demand via Pricing Scheme



Examples

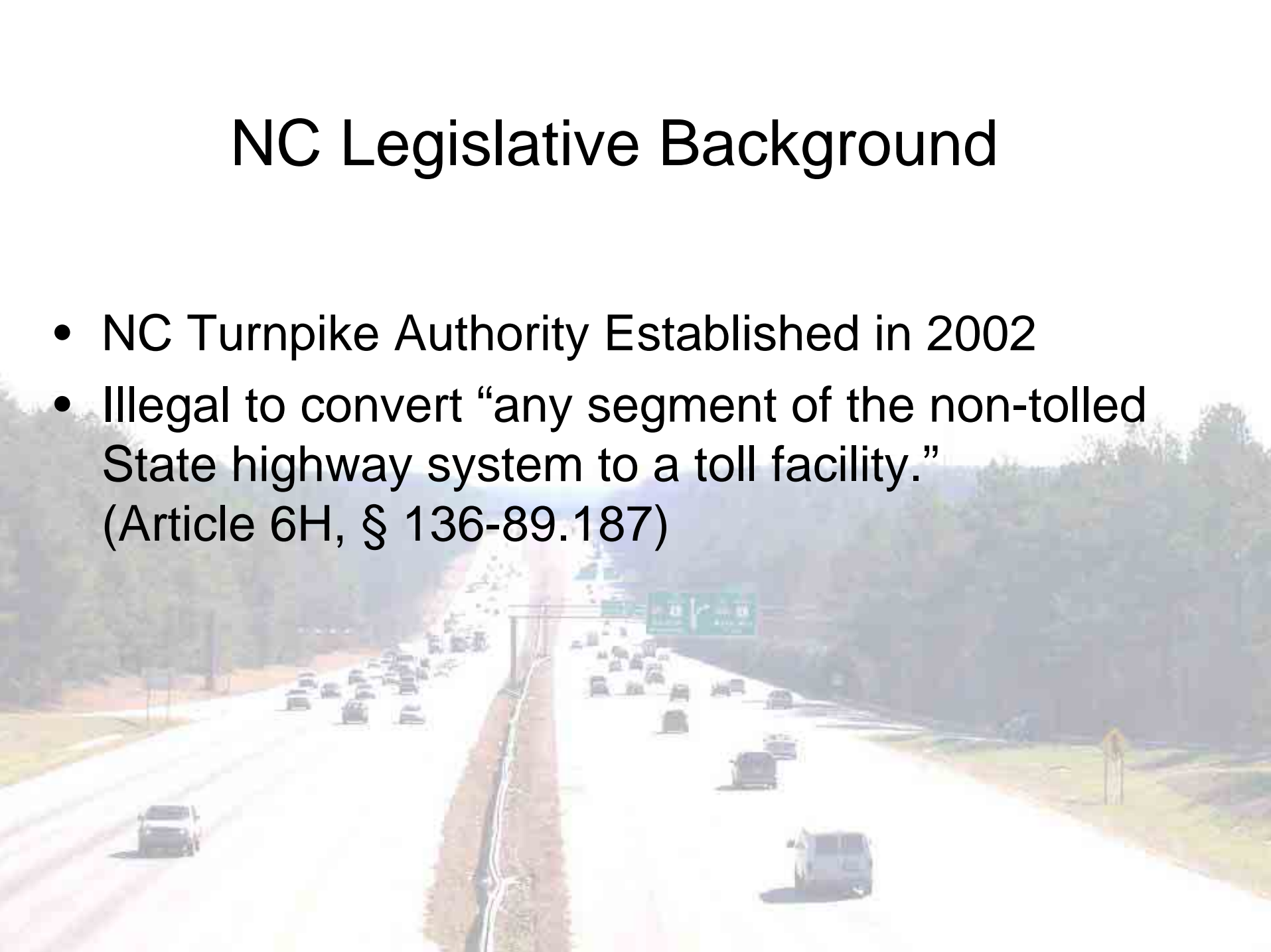
North I-25 in Denver, Colorado

I-15 in San Diego, California



NC Legislative Background

- NC Turnpike Authority Established in 2002
- Illegal to convert “any segment of the non-tolled State highway system to a toll facility.”
(Article 6H, § 136-89.187)





JAAZ: Johnston Accelerated Access Zone

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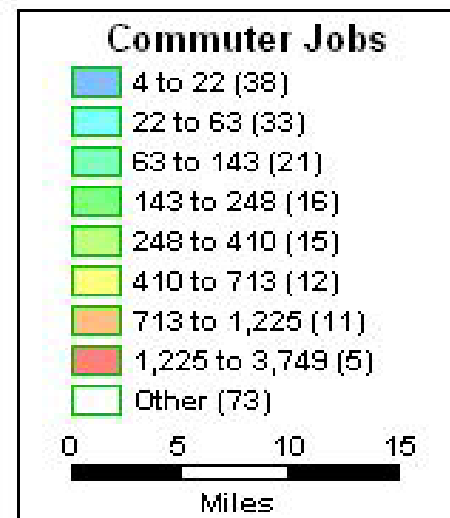
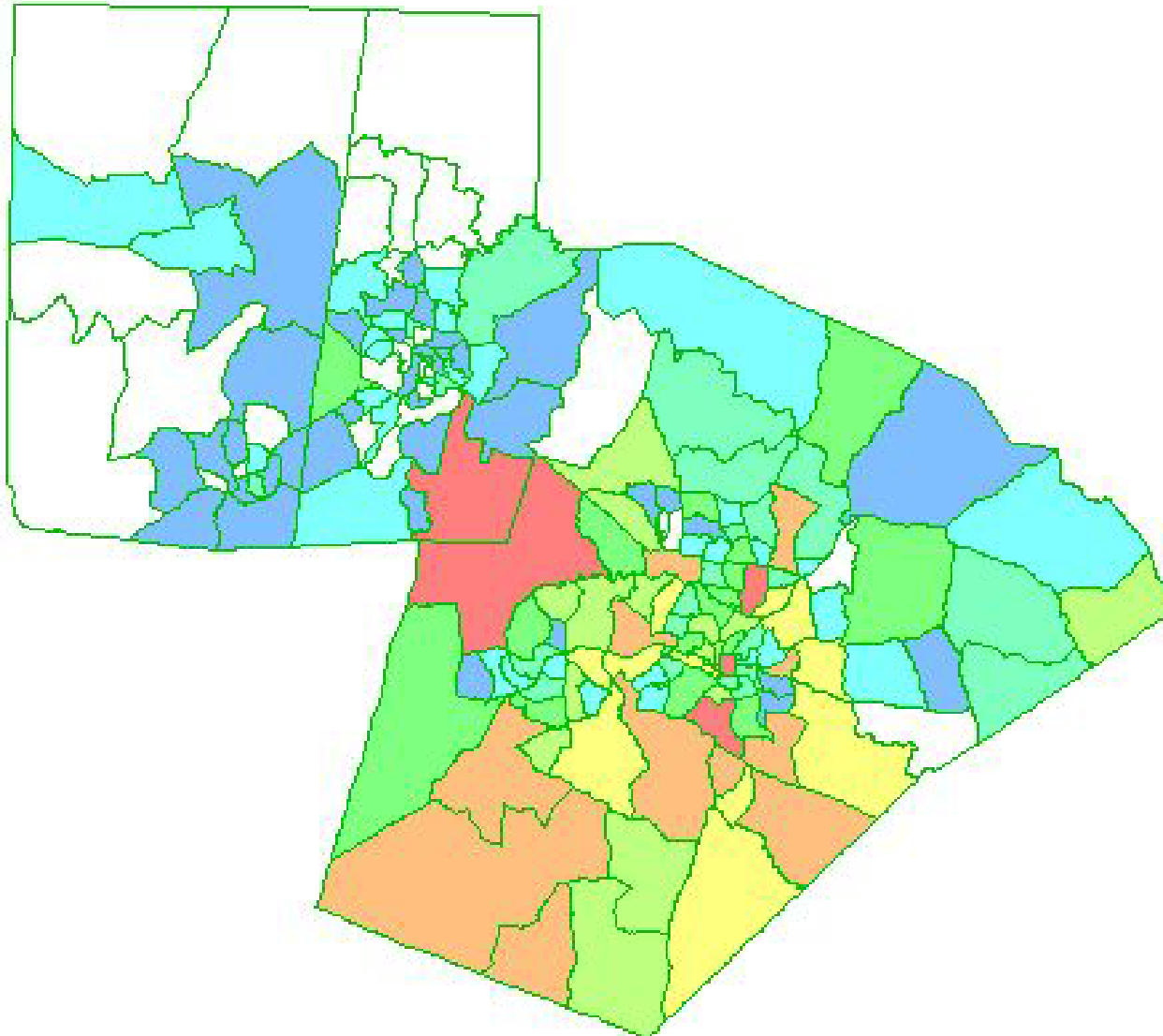


Purpose and Need

- Johnston County projected to be the 2nd fastest growing county in NC from 2010-2030
 - Congestion at Wade Avenue split and I-40/US-70 split
 - No improvements planned for commuters traveling into Raleigh from the east
 - 17% - commuters in eastern Wake County and Johnston County who already use carpools or transit.
- (Source: 2000 Census data)

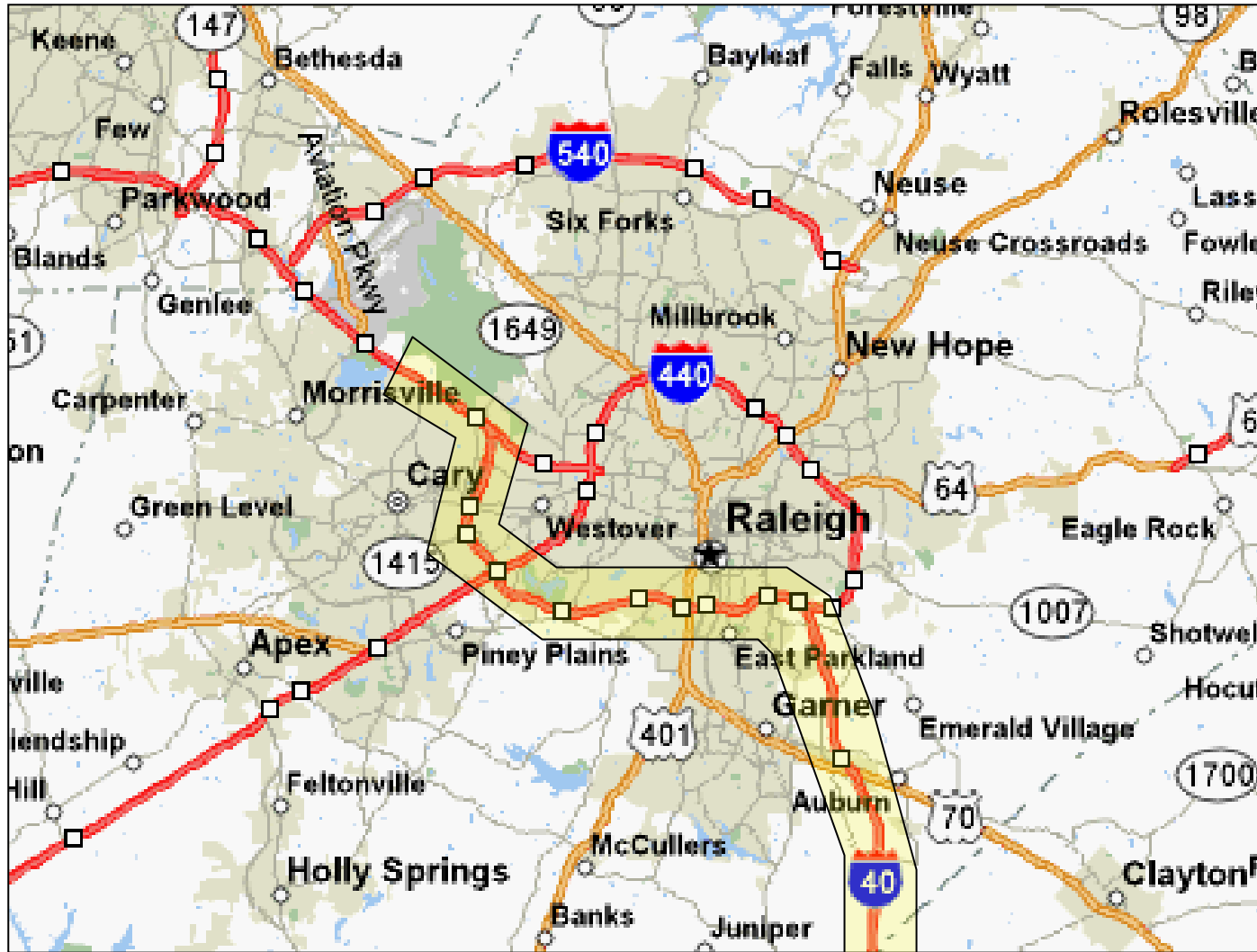


Destinations for Commuters East of Raleigh





Study Area





Design Recommendations

- One Lane in Each Direction
- Separated from Regular Traffic with Pylons
- Five Access Points
- Access Points are Extended Breaks Between Pylons
- Almost all of the HOT Lanes Built on Existing Shoulder and Median
- Open System - Charges Incurred at Fixed Points Regardless of Origin/Destination
- Real-Time Toll Pricing



Demand Management

- Purpose is to Guarantee Reasonable Free-flow Speeds
- Peak and Off-Peak Pricing Plan
- Dynamic Tolls Based on Current Speeds Across the Facility

Sample Pricing Plan

Speed (mph)	Toll
65-63	\$1.00
63-61	\$1.50
61-59	\$1.75
Etc.	



I-40/I-440 Split
Wake County



HOT Technology

- Logistics
 - RFID transponders (SOVs only)
 - Roadside Transponder Readers
 - Dynamic Message Signs
 - Toll Calculation and Recording System
- Transponder Transferability Between Vehicles
 - Windshield Sleeves
 - Shielding Pouch



Transponder Example

TransCore EGo Windshield Sticker Tag





Obstacles

- Roadway Design Issues
 - Bridge Crossings
 - Access Points
 - Lane Changing/Barriers
- Administrative Issues
 - Operational Phasing
 - Business Structure
 - Enforcement
 - Incident Management
- Institutional Issues
 - NCTA parameters
- Public Involvement
 - Not a typical project
 - Education
 - Information





Questions?

Thank You!!