

I-40 Regional Partnership 13th Annual Meeting

Friday, September 10, 2021

Coordinated by the Regional Transportation Alliance business coalition in cooperation with the NC Department of Transportation and area partners



Welcome and Introductions

Joe Milazzo II, RTA



I-40 Partnership Overview

Meredith McDiarmid, NCDOT I-40 Regional Partnership Executive



I-40 GOALS and FOCUS AREAS

- Improve the travel experience
- Identify projects and funding opportunities
- Strengthen relationships
- Implement Active Traffic Management techniques
- Transform into "multimodal freeway" to prioritize transit

letsgetmoving.org/I40plan



I-40 Partnership – past meetings

- Aug. 11, 2020
- Oct. 17, 2019
- Oct. 18, 2018

- Oct. 25, 2017
- Oct. 24, 2016
- June 18, 2015
- June 12, 2014
- June 4, 2013
- Dec. 20, 2012
- June 28, 2012
- Dec 6, 2011
- Sep. 13, 2011
- April 26, 2011
- Dec. 7, 2010
- Sep. 24, 2010
- June 15, 2010
- June 16, 2009

- Online
- SAS, Cary
 - Research Triangle Park Headquarters, RTP Research Triangle Park Headquarters, RTP Research Triangle Park Headquarters, RTP Joint Force Headquarters (JFHQ), Raleigh Joint Force Headquarters (JFHQ), Raleigh Joint Force Headquarters (JFHQ), Raleigh Research Triangle Park Headquarters, RTP Research Triangle Park Headquarters, RTP Fidelity Investments, Cary
- Cisco Systems, Research Triangle Park
- NetApp, Research Triangle Park
- Research Triangle Park Headquarters, RTP Fidelity Investments, Durham
- Fidelity Investments, Durham
- NetApp, Research Triangle Park
- Research Triangle Park Headquarters, RTP



AGENDA

- Active construction projects
- Upcoming and future projects and studies
- Updates on traffic and funding
- Final remarks



ACTIVE PROJECTS I-40 and parallel / reliever routes



NCDOT Division 5 – active projects

Brandon Jones, NCDOT



NORTH CAROLINA Department of Transportation



I-40 Regional Partnership

Active Projects Update September 10, 2021

Brandon Jones, Division Five Engineer

I-5506 Aviation Parkway Interchange Improvements

I-5700 Airport Boulevard Interchange Improvements

I-5111 I-40 from I-440 to south of NC 42 in Johnston County

U-0071 I-885 East End Connector

U-2719 I-440 Modernization

Beautify Fortify

Litter




















































U-2719 I-440 Next Steps

Shift to New Ramp D at Wade – Completed

Shift to Temporary Median between Melbourne and Athens – Completed

Shift to New Loop C at Wade – Completed

Shift Mainline to new structure 3 (I-440 over Wade) – September 2021

Closure at Athens Drive – October 2021

Closures and shifts at Western – September/October 2021 - DDI Completion – February 2023

Shift to New Bridge at Jones Franklin – January 2022



Litter Report 1-1-2021 to 8-23-2021

Row Labels	Sum of Total Pounds
Adopt-A-Highway	596,520.0
Contract Litter Removal	5,678,115.0
Ncdot Forces	1,983,960.0
Other Volunteers	181,875.0
Sponsor-A-Highway	543,960.0
Grand Total	8,984,430.0





SEPTEMBER 11-25, 2021 Volunteer Locally

> Sign up now at ncdot.gov/littersweep



Share your clean-up images at: #LitterSweepNC

Forms, posters and telephone listings are available online.



540 / Turnpike southeast ext.

Dennis Jernigan, NC Turnpike Authority

I-40 Regional Partnership

Complete 540 Update

Dennis Jernigan, P.E.

I-40 Regional Partnership September 10, 2021









Bicycle and/or Pedestrian Accommodations

- East Williams Street
- Middle Creek
- Sunset Lake Road (Y3)
- WoodCreek Pedestrian and Bicycle Path (between two Sunset Lake Road crossings)
- Sunset Lake Road (Y4)
- Holly Springs Road
- Kildaire Farm Road
- Pierce Olive Road
- Future Camp Branch Greenway between Pierce Olive Road and West Lake Road

- West Lake Road
- Future Optimist Farm Greenway west of Bells Lake Road
- Bells Lake Road
- Lake Wheeler Road
- Old McCullers Road
- Old Stage Road
- Benson Road (NC 50)
- Jordan Road
- Fanny Brown Road
- Holland Church Road
- Sauls Road

























Complete 540 Outreach



Public Meetings

Over 1,400 participants over 43 public meetings



Informing Residents

15,668 postcards & 36 Nextdoor posts



Resident Inquiries

580 calls & 1,103 emails to the Complete 540 Hotline

Contact Us

ncdot.gov/complete540

complete540@ncdot.gov

1-800-554-7849

MCTurnpike

@NC_QuickPass



Thank you!



UPCOMING AND FUTURE PROJECTS AND STUDIES

I-40 Regional Partnership



I-40 widening in Orange Co.

Laura Sutton, NCDOT

I-40 Regional Partnership



NORTH CAROLINA Department of Transportation



I-40 Widening Update Laura Sutton, CPM, P.E. NCDOT Project Management Unit

September 10, 2021

Timeline of Project Activities

- March 2019: Environmental planning document (CE) completed
- October 2019: Firm contracted to begin work on I-3306AB/AC designs (US15-501 to NC 86/NC 86 Interchange)
- April 2020: I-3306AB/AC preliminary plans approved
- Spring 2020: Project placed on hold
- Fall 2020:Project restarted and combined with W-5707C for a
Design-Build letting
- August 2021:Project awarded to The Lane Construction Corporation/HDRDesign-Build team
- Fall 2021: Kick-off meeting with Lane/HDR Design-Build Team



Schedule



Intermediate Contract Time #1 (ICT1) is for the completion of the W-5707C safety project. This includes all signing and pavement marking modifications necessary to temporarily remove the existing I-40 westbound left lane drop near US 15-501 (Exit 270) and convert the I-40 westbound outside through lane (right lane) to an "Exit Only" lane onto US 15-501 exit ramp.



NCDOT Division 5 – ongoing/upcoming Brandon Jones, NCDOT

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Upcoming Projects September 10, 2021

Brandon Jones, Division Five Engineer

US 70 Freeway Conversion from I-540 to I-885

U-5307 US Freeway Conversion from I-540 to Wake Forest

US 64 West

U.S. 70 Improvements at Brier Creek Parkway & T.W. Alexander Drive






U.S. 70 Improvements in Durham







Capital Boulevard North Upgrade (Raleigh to Wake Forest)



Project Timeline

Milestone	Date*
Public Meeting	September 2021
Environmental document completed	Spring 2022
Right-of-way acquisition and construction begins on I-540 to north of Durant Road/Perry Creek Road	October 2024
Right-of-way acquisition begins on North of Durant Road/Perry Creek Road to north of Burlington Mills Road and North of Burlington Mills Road to south of N.C. 98 Business (Durham Road)	October 2024
Construction begins on North of Durant Road/Perry Creek Road to north of Burlington Mills Road and North of Burlington Mills Road to south of N.C. 98 Business (Durham Road)	October 2026
Right-of-way acquisition begins on South of N.C. 98 Business (Durham Road) to Purnell Road/Harris Road	October 2028
Construction begins South of N.C. 98 Business (Durham Road) to Purnell Road/Harris Road	Unfunded

U.S. 64 Improvements in Apex & Cary









I-40 managed freeway

Derrick Lewis, NCDOT



NORTH CAROLINA Department of Transportation

I-6006 Managed Motorways Feasibility Study Update

Derrick W. Lewis, P.E. Feasibility Studies Unit Head North Carolina Department of Transportation



CARM – Coordinated Adaptive Ramp Metering

- CARM is a signalized ramp metering operational strategy that aims to maximize freeway throughput, reduce delay, improve travel time reliability, and reduce crashes.
- Maintains optimal throughput on the mainline freeway by regulating traffic entering the freeway so traffic density on the mainline does not increase to the point where flow breakdown occurs.
- When the number of vehicles entering the freeway needs to be reduced, drivers will be held briefly on the ramps.
- Storage on the ramps must be provided to accommodate queued vehicles.
- Ramps coordinate with each other so that excessive queues do not form at any one ramp.

ATMS-Advanced Traffic Management System

- In addition to the analysis of a CARM system along this corridor, additional advanced traffic management system (ATMS) mechanisms were also considered to increase efficiency and a high-level analysis was conducted to consider the cost of these mechanisms.
- Potential ATMS strategies that can be considered are:
 - dynamic lane assignment
 - dynamic speed limits
 - dynamic shoulder lanes
 - dynamic junction control
 - queue warning.
 - This analysis includes the design and cost of implementing gantries along the corridor to support variable speed limits and dynamic lane assignments.

TABLE 06-1: DAILY CHANGE IN REGIONWIDE CRITERIA

	Daily			
2045	With CARM	Without CARM	Difference	% Difference
Total Demand	290,469,591	288,656,767	1,812,825	0.63%
Total Delay (hours)	446,648	578,911	(132,263)	-22.85%
Total VMT (miles)	90,675,812	89,871,037	804,775	0.90%
Total VHT (hours)	2,535,616	2,682,544	(146,928)	-5.48%
Average Speed (mph)	35.76	33.50	2.26	6.74%
Delay per mile traveled (mins)	0.30	0.39	(0.09)	-23.53%

I-6006 Cost Estimate (Jan 2020)

	Total Costs			
	Low	Average	High	
Ramp Meter	\$41,375,000	\$46,625,000	\$51,875,000	
ATMS (Gantry)	\$30,740,000	\$31,740,000	\$32,740,000	
Total	\$72,115,000	\$78,365,000	\$84,615,000	

Please note we are reopening the study to consider the Operations Costs that where not addressed in the original study, so these costs are subject to change during this update.

Thank you!



I-40 Transit Priority Shoulder

Kory Wilmot, AECOM Andrew Bell, HNTB



I-40 Transit Priority Shoulder

I-40 Partnership Meeting Regional Transportation Alliance

Kory Wilmot, AECOM

Andrew Bell, HNTB

Project Goals

- Provide connections to (5)
 future BRT routes and
 proposed commuter rail line
- Develop a lower-cost, nearterm option for a transit priority lane or shoulder
- Maintain a transit speed of 45 mph, regardless of travel conditions in adjacent mainline lanes on I-40



Alternatives Screening Process

Our team identified seven transit priority facility types or concepts to evaluate:

- Separated busways
- Freeway bus lanes
- Freeway HOV lanes
- Freeway HOT lanes
- Reversible Express lanes
- Dynamic Shoulder lanes
- Bus on Shoulder System (BOSS)

SCREENING PROCESS

1. Ability of buses to operate at a speed of 45 mph

2. Requires minimal changes to the existing infrastructure

3. Nothing met all criteria -- so we considered a new alternative

Transit Priority Shoulder

- Assessed a transit priority facility using the inside (left) shoulder near I-40 median
- Modify or expand left shoulder to 14 feet wide
- Goal of a 45 mph max operating speed next to slower-moving traffic
- Strike a balance of
 - Safety
 - Travel speed
 - Cost
 - Speed of implementation
 - "Viability" and opportunity



Credit: Pace Suburban Bus

Pre-Feasibility Results

Overall

- No additional right of way needed anywhere along facility
- Existing pavement width may be sufficient along majority of facility – <u>if general purpose lanes reduced to 11 ft</u>
- Operational challenges, ability to access a shoulder facility
- Comfort level of bus operators
- Impacts to drainage and existing transportation infrastructure could be significant

Segment notes

- West of US 15-501 (Segment A) and NC 540 to Wade Ave (Segment E) - additional pavement required; rigid median barrier may be required
- East of US 1/US 64 (Segment F) includes a horizontal curve that barely meets sight distance for the inside shoulder at 45 mph





RTP (Segments C and D) – High-level Design and Analysis

- I-40 from NC 55 to I-540/NC 540
 - Most traffic (vehicles per day) in North Carolina
 - Two System Interchanges
 - NC 147 (Future I-885)
 - I-540/NC 540
 - Three Service Interchanges
 - Davis Drive
 - Miami Boulevard
 - Page Road
 - High-priority Rail Crossing
 - Substandard Left Lane and Inside Shoulder Pavement Depth

- Alternatives
 - 12' (minimum) and 14' (preferred) inside shoulder
 - 11' and 12' general purpose lanes
 - Minimum or existing outside shoulder
- High-level initial estimate: \$50M to \$60M







I-40 / RTP modernization

Andrew Bell, HNTB

I-40 RTP Modernization Express Design



Presented By: Andrew Bell, PE, PTOE (HNTB)

Client: NCDOT Feasibility Studies Unit NCDOT Corridor Development Unit

Corridor Characteristics and Challenges

- I-40 between NC 147 (Future I-885) and I-540/NC 540
- Highest AADT in North Carolina at 196,000 vpd (2019)
- 2 System Interchanges
- 3 Closely-spaced Service Interchanges
- Critical Railroad Bridge



Current Design Concept



- Based on O-D Traffic Estimate Provided by Patriot & Three Oaks
- One-way Frontage Roads in Each Direction
 - Example: Toll NC 147
- Tight Diamond Configuration at Davis Dr, Miami Blvd, Page Rd
- Removal of Weaving Segments
- Removal of Loops

Stakeholder Involvement

- Stakeholders
 - NCDOT Division 5
 - NCDOT Congestion Management
 - CAMPO
 - DCHCMPO
 - City of Raleigh
 - City of Durham
 - Durham County
 - RTA
 - GoTriangle
 - RTP/RTF

Feedback

- Include business community
- Account for Triangle Bikeway Study
- Ramp configuration favors Wake County travelers
- Provide preferred access for transit
- Provide additional access along frontage roads
- Minimize additional capacity on I-40 mainline
- Compatibility with other projects (Managed Motorways, Managed Lanes, etc.)

Additional Design Options

- Right-in/Right-out Access Along Frontage Roads
- "Texas U-Turns" at Interchanges
- Ramp Reconfigurations
- Bypass Lanes for Frontage Road Thru Traffic
- Transit-only Access Points



- Next Steps
 - Additional Capacity Analysis
 - Design Revisions
 - Stakeholder Involvement

- Contact Info
 - Andrew Bell, PE, PTOE (HNTB)
 - aabell@hntb.com



Triangle Bikeway study

Iona Thomas, McAdams

Triangle Bikeway study

<u>https://vimeo.com/553048796</u>



Bus on Shoulder (BOSS) I-540 expansion Rick Major, GoTriangle



I-40 Partnership Meeting

Update: I-540 Bus on Shoulder System

Richard Major, MPM PMP Director, Capital Development

The Problem

I-540, like other area interstate and primary roads, has become increasingly congested. Bus schedules are affected, which may contribute to a reduction in public transportation ridership.



The Solution: Bus on Shoulder System

Partnership with the NCDOT will allow GoTriangle buses, driven by trained bus operators, to travel on designated I-540 shoulder sections.



Bus on Shoulder System Objective

The objective is to keep buses on schedule and maintain service reliability, which encourages more people to use public transportation.


I-540 Bus on Shoulder System (BOSS) Plan



NCDOT & GoTriangle partnership determines that BOSS along I-540 will require installation of signs similar to those on I-40.

NCDOT & GoTriangle executed an agreement in June 2021. LAPP funding from CAMPO and Wake Transit Plan funding will be used to fabricate and install highway signs. NCDOT contracted to furnish the highway signs. GoTriangle will contract with safety experienced contractor to install the signs. NCDOT will furnish the signs in October. GoTriangle forecasts installation will be completed within one month of receiving the signs.

Questions?



BOSS regional study

Patrick McDonough, HDR

I-40 Regional Partnership



What is a Bus On Shoulder System, or **BOSS?**

A Bus On Shoulder System, or BOSS, is a cost-effective and comparatively easy-to-implement solution to improve bus service performance on limited access facilities. With BOSS, buses are allowed to drive on the shoulder when certain conditions are met.

Key Benefits

Where is BOSS currently

operating in the Triangle?

Current BOSS Operations on I-40 in the Triangle

BOSS has been successfully

operated in the Triangle along

I-40 from US 15-501 to east of

Blue Ridge Rd along Wade

Avenue since 2012.

.0

North West Raleigh

of BOSS:



- Allows buses to bypass congestion
- Helps reduce delays to transit riders during heavy traffic periods, and improve on-time performance
- Can be implemented incrementally, and at a relatively low cost per mile
- 🚟 Has an excellent safety record
- Acts as an advertisement for the transit service as it keeps moving when traffic stops

The Triangle and NC are BOSS Leaders

- BOSS is currently deployed or under development in 11 states, with the largest deployment in Minnesota, at 290 miles of BOSS facilities.
- Carolina are home to one of the five largest BOSS deployments by mileage.
- With completion of this study, North Carolina has one of the most well-defined sets of BOSS design and operating standards in the USA.



Which future Triangle projects are the best BOSS implementation opportunities?

This study took a qualitative approach to screen for near-term projects in regional plans that had attributes that were supportive of BOSS implementation, including:

- Existing pavement conditions
- Regional traffic system operations

2020-2029 STIP Commitments and SPOT projects



A promising opportunity for the Triangle is to consider an expanded BOSS network through the collection of Traffic System Management and Operations (TSMO) investments that NCDOT has planned in the region to enhance travel time reliability.

Phase 1 of these TSMO improvements includes 71 miles implemented over the next decade through STIP projects along I-40, I-440, I-87, and US 1. Phase 2 is implemented beyond the next decade encompassing 120 more miles resulting in an expanded, broader regional network along the fully complete I-540 and parts of US 1, US 64, and US 70.

Which Triangle projects scored highly for BOSS benefits AND have TSMO improvements planned?

The study reviewed the STIP for existing projects that are both planned for TSMO investment and also scored in the Top scoring or Second-Best Scoring group of segments for BOSS benefits, and found that the projects in the map to the right with a purple centerline and red or orange outline offer particular promise.

These facilities include:

- US 1 from NC-540 in Apex to I-40 in Raleigh, continuing along I-440 to Wade Avenue
- I-40 from exit 289 to the Johnston County Line
- I-440 from US 1 North to I-87 in East Raleigh



Design and Operating Criteria to Standardize Implementation

The study worked to develop detailed design standards for BOSS expansion in the Triangle, with two types of criteria:



Θ

Minimum Criteria

Minimum criteria to meet for each design criterion to operate Bus On Shoulder, very useful in evaluating existing facilities for BOSS use

Recommended Criteria

Criteria that allows for robust BOSS operations, very useful in planning to design future facilities to be BOSS-ready from day one



NCDOT is currently working on studies that may update how they design roadway shoulders in general, independent of BOSS operations. When that work is complete, NCDOT can use the BOSS Design Criteria and their revised standards to update the BOSS Implementation and Operations Plan.

(+) 75.5% ▼

Ð

Teamwork Makes BOSS Work for the Community

Stakeholder Roles and Responsibilities

Stakeholder	Roles and Responsibilities
DR MARTIN CHOCH	Owner and operator of the road; Design, permitting, and approvals; Project implementation; Motorist-oriented information about BOSS; Facility maintenance including sweeping shoulders
GO ^D Triangle	Operates the transit buses; Bus operator training; Public Awareness, Transit Passenger- Other transit oriented information about BOSS; Performance monitoring; Emergency response
NC State Highway Patrol	Responsible for enforcing laws and responding to crashes/incidents
	Prioritize future BOSS project investment in Metropolitan Transportation Plans
Local Motorists	Support safe BOSS operations by allowing buses to transition safely from travel lanes to shoulders, and across interchange ramps
Study Conducted by:	For more information please contact: Shelby Powell , AICP, Deputy Director Capital Area MPO 421 Fayetteville St, Suite 203 Raleigh, NC 27601 919-996-4393 5



Freeway And Street-based Transit; state policy updates Joe Furstenberg, NCDOT

I-40 Regional Partnership



Freeway And Street-based Transit (FAST) approach

- Quick, low-cost, scalable improvements for roadways
- Prioritize transit efficiency and reliability while serving all users

Objectives of the FAST Network study

- Identify example investments to create "transit advantages" quickly
- Connect all 5 BRT corridors, link to future passenger rail in the Triangle
- Institutionalize a "FAST" mindset and approach that can serve as a model for metro areas across the state



10+ Years Potential FAST Network



FAST study implementation

- NCDOT Roadway Design Manual update to incorporate transit advantage improvements
- Complete Streets Policy update expands transit facility coverage

https://www.ncdot.gov/divisions/public-transit/Pages/fast-study.aspx



UPDATES ON TRAFFIC AND FUNDING

I-40 Regional Partnership



Coronavirus and recovery – traffic impacts

Dom Ciaramitaro, NCDOT

I-40 Regional Partnership



NORTH CAROLINA Department of Transportation



COVID-19 Traffic Impacts

Dom Ciaramitaro, PE State Traffic Operations Engineer

I-40 Regional Partnership Meeting, September 10, 2021

COVID-19 Traffic Impacts Overview

December 2019 – September 2020 Recap:

- Traffic volumes decreased
- Interstate congestion decreased
- Overall crashes decreased
- Fatal crashes remained the same



Since September 2020:

 Traffic volumes returned for NC, not as much for Triangle

Background

- Interstate congestion increasing, not to pre-COVID congestion levels
- Overall crashes decreased
- Fatal crashes increased

Source: Google Images

North Carolina Monthly Traffic Volume Trends



- Greatest decrease:
 ~40% in April 2020
- Volumes *returned*: April – July 2021
- August 2021 may show *decrease*
- NC volumes follow national trends

I-40 East of Wade Ave weekday average bi-directional traffic volumes



ncdot.gov



- March 2020: Congestion dropped to nearly zero
- Summer 2020: Congestion less than half of what it used to be
- Summer 2021: Congestion increasing but not back to pre-Covid levels

Source: The Eastern Transportation Coalition's RITIS Probe Speed Data Analytics Portal <u>https://pda.ritis.org/suite/</u>

ncdot.gov



August 2021 average data shows:

- For NC: At the Pre-COVID baseline
- For Raleigh/Cary: <10% below the pre-COVID baseline

Source: NCDOT's Signal System Timing and Operations Group Data derived from traffic signal vehicle detection, typically 6'x6' in-pavement inductive loops

North Carolina Crashes



Source: NCDOT Traffic Safety Unit

COVID-19 Traffic Impacts Summary



Next Impacts to Watch

- Delta variant effects
- School impacts & return from work-from-home effects

- NC Traffic volumes returned
- Triangle area volumes not quite returned
- Interstate congestion increasing, not to pre-COVID congestion levels
- Overall crashes decreased

Fatal crashes have increased

Questions?

Dom Ciaramitaro, PE State Traffic Operations Engineer djciaramitaro@ncdot.gov



State funding

Amna Cameron, NCDOT

I-40 Regional Partnership



NORTH CAROLINA Department of Transportation



NCDOT Revenue Update I-40 Regional Partnership

Amna Cameron

September 10, 2021



ncdot.gov

Revenue Forecast Comparison - Total State Transportation



Revenue Forecast Comparison



ncdot.gov

Forecast Comparison – Motor Fuels



Revenue Loss Due to Increased Fuel Economy is Significant

US Passenger Fuel	
Economy, Combined	
2020	24
2025	26.48
2030	28.55
2035	30.06
2040	31.1
2045	31.7
2050	32.33

Source: US EIA, Annual Energy Outlook 2021 Gallons Lost to Fuel Economy, 2020 MPG Base



139

EVs are Coming

2030

Washington: All EV (vetoed) Ford: All EV in Europe Volvo, Mercedes, Bentley: All EV

2040

Volvo: Climate neutral

2025

North Carolina Executive Order 80 Target

80,000

Zero Emission Vehicles

<u>Manufacturers</u> Jaguar: All EV

2035

States

CA and MA executive orders require 100% of new passenger vehicle sales to be electric

Manufacturers

GM: All EV

2050

90%

of U.S. vehicles need to be electric to meet the Paris Climate Accord agreement

Options to Replace the Gas Tax







MBUF

- Per Mile Fee
 - 10 years away
 - Study/pilots needed
 - User fee philosophy



- Direct Transfer
- Immediate
- Requires cuts or revenue increases



- Dedicated
 - Immediate
 - Significant link to transportation
- New Mobility



Questions?



Amna Cameron

NCDOT Office of Strategic Initiatives & Program Support

919-707-2851

accameron1@ncdot.gov

Twitter: @invest_nc



FINAL REMARKS

I-40 Regional Partnership



I-40 Regional Partnership 13th Annual Meeting

Friday, September 10, 2021

Coordinated by the Regional Transportation Alliance business coalition in cooperation with the NC Department of Transportation and area partners