



Prioritization 2.0

NCDOT Strategic Planning Office
January 2012



Transportation Reform

Public wanted politics removed from transportation decision-making

Governor Purdue issued Executive Order #2

“The Secretary of the Department of Transportation shall implement throughout the Department a professional approval process for all highway construction programs, highway construction contracts, highway construction projects, and plans for the construction of projects.”

Strategic Planning Office created (3 founding members)

Implemented NCDOT’s first strategic prioritization process in 2009

Currently in middle of Prioritization 2.0 (P2.0)





Prioritization 1.0 vs. Prioritization 2.0

Prioritization 1.0

- Began in 2009
- Department's first Strategic Prioritization Process
- Ranked projects for 2015-2020
- Results released in February 2010
- Projects programmed in Draft STIP (published August 2010)
- Final STIP expected to be adopted in Summer 2011

Prioritization 2.0

- Builds upon P1.0 success
- Data driven methodology for non-highway modes
- Matures process and expands criteria based on stakeholder input
- Projects rankings are for 2018-2022





Process

Workgroup guided development of P2.0 – agreed to all changes

Input from 4 Listening Sessions and Survey

Changes finalized on January 13th

- Presented to MPO Association on January 14th
- Presented to RPO Association on January 28th





P2.0 Changes – Highway Projects

No ranking of infrastructure health and safety projects

- Projects can still be submitted
 - Safety projects → Mobility & Safety Division for consideration in existing programs
 - Infrastructure health projects → Divisions for consideration in existing programs

New “Modernization” category (classified as Infrastructure Health)

New quantitative scoring criteria

- Mobility projects:
 - Benefit-Cost
 - Economic Competitiveness
- Modernization projects:
 - Lane Width
 - Shoulder Width





P2.0 Changes – Highway Projects

Revised quantitative scoring %s

- Subregional tier mobility and modernization projects now scored

“Qualitative” ranking changed to “Local Input” ranking

Local Input ranking changed to Control Total

- Can rank Top 25 or distribute 1300 pts
- Ranking done after all (existing + new) projects have quantitative scores

No submittal of enhancement projects

Continue to submit CMAQ projects with other projects

- Applications evaluated by Transportation Planning Branch
- Two step process





North Carolina Department of Transportation



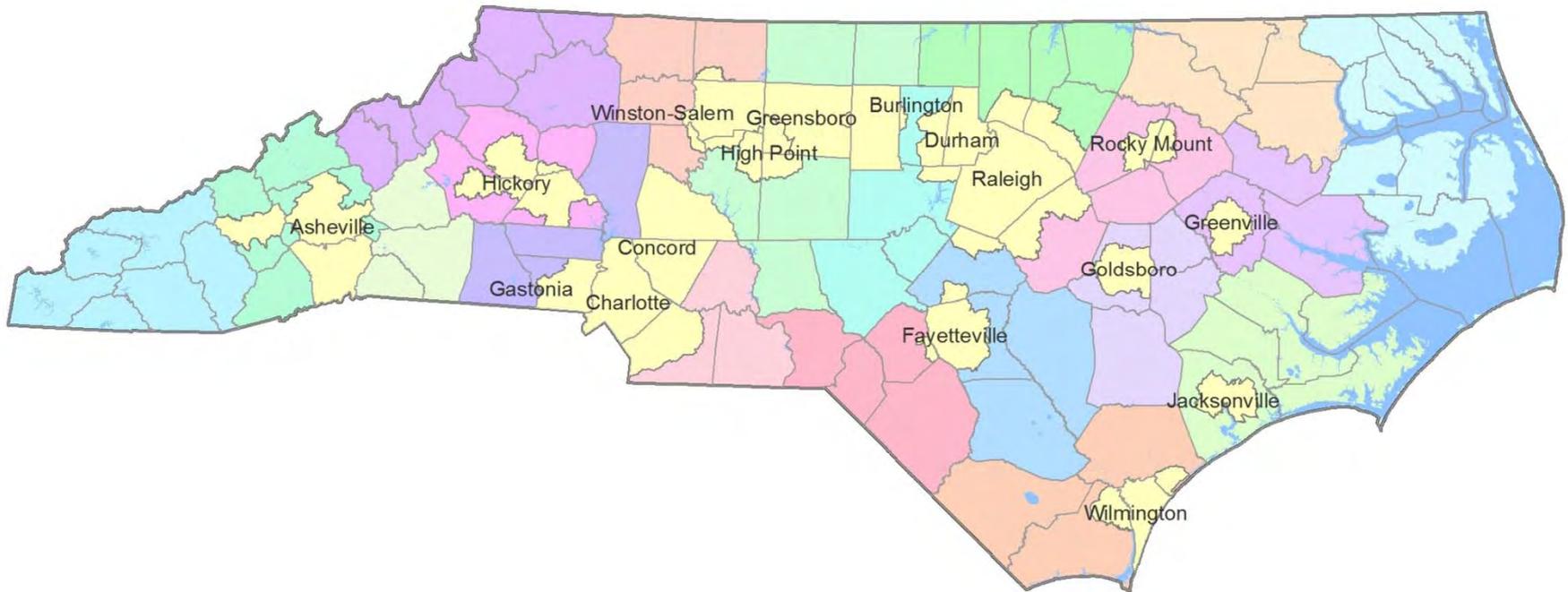
Responsible for 6 modes of transportation:

- Aviation (74 publicly-owned airports)
- Bicycle and Pedestrian
- Ferries – 2nd largest system in US (behind Washington)
- Highways – Maintains 80,000 miles of highways (2nd only to Texas)
- Public Transportation
- Rail





North Carolina Department of Transportation



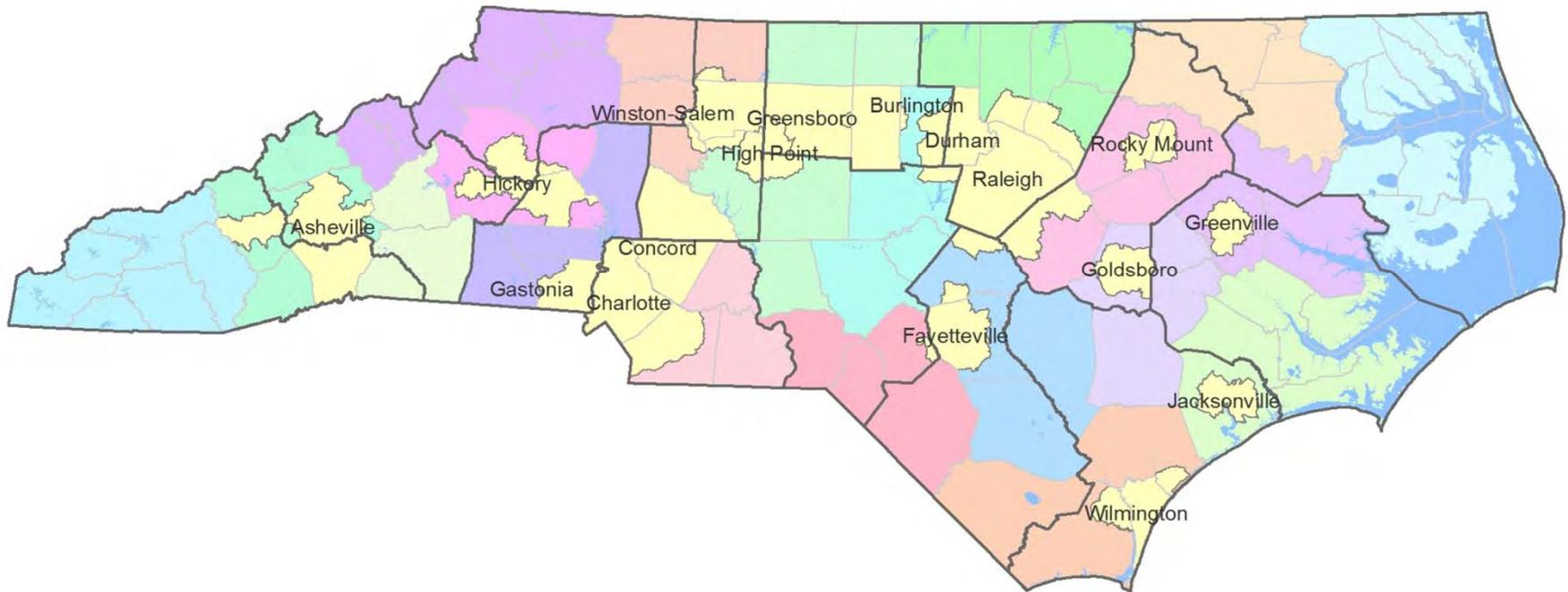
Annual Budget of ~\$4.1 B

- Federal dollars account for ~25% of budget





North Carolina Department of Transportation



Key Partners

- 17 Metropolitan Planning Organizations (MPOs)
- 20 Rural Planning Organizations (RPOs)
- 14 Field Offices (Divisions)



NCDOT

OUR MISSION

*Connecting people and places
in North Carolina – safely and
efficiently, with accountability
and environmental sensitivity*

OUR GOALS

- Make our transportation network **safer**
- Make our transportation network move people and goods more **efficiently**
- Make our infrastructure **last longer**
- Make our organization a place that **works well**
- Make our organization **a great place to work**





Strategic Prioritization and Programming Process

1. Score

Prioritize Projects using

Data

Local Input

Multimodal
Characteristics

2. Strategize

Set Investment Strategy

Classify ranked Projects
into Buckets (Mode, Goal,
Tier)

Conduct Scenario/Trade-
off Analysis with DOT &
Partners

Constrained only by Total
Available Revenue

3. Schedule

Program Projects

Develop STIP using
Project Rankings &
Investment Strategy

Apply Constraints

Compare Selected
Strategy vs. Applied
Constraints



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Prioritization Buckets



Infrastructure Health



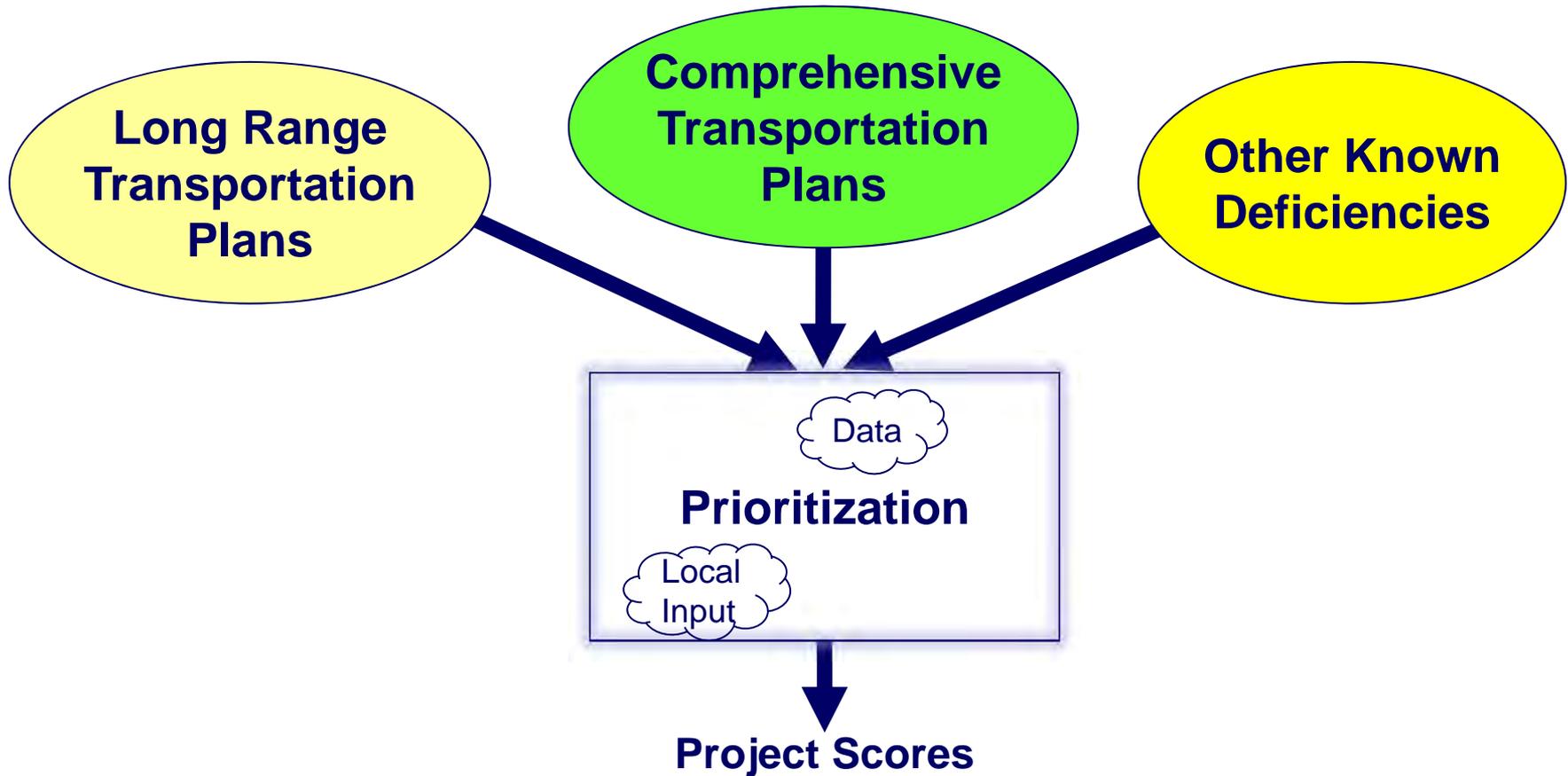


Prioritization Buckets





Where do Projects Come From?





HIGHWAY – Scoring P2.0

Total Score = Quantitative Data + Local Input + Multimodal Pts

Projects classified/scored as either Mobility or Modernization

- Quantitative Data varies for each

Local Input based on

- **MPO/RPO rank/points** (use local methodology)
- **Division rank/points** (use knowledge of area)

Multimodal Points based on multimodal characteristics included in highway project



Example Projects

Mobility

- Widen roadway
- Construct new roadway (on new location or part existing, part new location)
- Upgrade signalized roadway to freeway, expressway, or superstreet
- Upgrade interchange or intersection
- Access management improvements
- Signal Systems (citywide or closed-loop)





Example Projects

Modernization

- Widen roadway lane and/or shoulder width
- Add turn lanes and resurface (more than just intersection)
- Upgrade to design standards (including interstate standards)
- On-road bicycle improvements (larger projects, > \$1M)
- No new travel lanes/through capacity





HIGHWAY – Scoring P2.0

Total Score = Quantitative Data + Local Input + Multimodal Pts

Quantitative Data

- **Congestion** (Volume/Capacity Ratio + AADT)
- **Safety Score** (Critical Crash Rates, Density, Severity)
- **Pavement Score** (Pavement Condition Rating)
- **Benefit/Cost** (Travel Time Savings / Project Cost)
- **Economic Competitiveness** (Value Added in \$)
- **Lane Width** (Existing Width vs. Standard Width)
- **Shoulder Width** (Existing Width vs. Standard Width)

Mobility

Modernization





Scoring for Highway Mobility Projects

Tier	<u>QUANTITATIVE</u>	<u>LOCAL INPUT</u>	
	Data	Division Rank	MPO/RPO Rank
Statewide (Interstates and Major US and NC Routes) 	Congestion = 20% Benefit/Cost = 20% Safety = 10% Pavement Condition = 10% <u>Economic Competitiveness = 10%</u> Total = 70%	20%	10%
Regional (Other US and NC Routes) 	Congestion = 20% Benefit/Cost = 15% Safety = 5% Pavement Condition = 5% <u>Economic Competitiveness = 5%</u> Total = 50%	25%	25%
Subregional (County Routes) 	Congestion = 20% Safety = 5% <u>Pavement Condition = 5%</u> Total = 30%	30%	40%



Scoring for Highway Modernization Projects

Tier	<u>QUANTITATIVE</u>	<u>LOCAL INPUT</u>	
	Data	Division Rank	MPO/RPO Rank
Statewide (Interstates and Major US and NC Routes) 	Lane Width = 20% Shoulder Width = 20% Safety = 10% Congestion = 10% <u>Pavement Condition = 10%</u> Total = 70%	20%	10%
Regional (Other US and NC Routes) 	Lane Width = 15% Shoulder Width = 15% Safety = 10% Congestion = 5% <u>Pavement Condition = 5%</u> Total = 50%	25%	25%
Subregional (County Routes) 	Lane Width = 10% Shoulder Width = 10% <u>Safety = 10%</u> Total = 30%	30%	40%



HIGHWAY – Congestion

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	20%	10%
Regional	20%	5%
Subregional	20%	--

$((\text{Existing Volume}/\text{Capacity Ratio} \times 100) \times 60\%) + ((\text{Existing Vol.} / 1,000) \times 40\%)$

- Volume is from 2010 AADTs
- Capacity is generated using NC LOS Capacity Software
- Max points = 100 (values over 100 are capped)





HIGHWAY – Safety

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	10%	10%
Regional	5%	10%
Subregional	5%	10%

Segments → (Crash Density x 33%) + (Crash Severity x 33%) + (Critical Crash Rate x 33%)

Intersections → (Crash Frequency x 50%) + (Severity Index x 50%)

- All data provided by Mobility & Safety Division (3 year moving average)
- Higher scores indicate poorer performance
- Max points = 100





HIGHWAY – Pavement Condition

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	10%	10%
Regional	5%	10%
Subregional	5%	10%

100 – Pavement Condition Rating

- Based on 2010 Pavement Condition Survey
- Higher scores indicate poorer pavement condition
- Max points = 100





HIGHWAY – [Travel Time] Benefit/Cost

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	20%	--
Regional	15%	--
Subregional	--	--

Travel Time Savings / Remaining Project Cost

- Benefits = Travel Time Savings project is expected to provide (based on today's traffic volumes and ability of the roadway to carry that volume for 30 years)
- Cost = DOT prepared cost estimates for all projects (existing + new)
- Max points = 100 based on Raw Score of Travel Time Savings/Cost (values over 100 are capped)





Travel Time Savings Calculation

1. Calculate Travel Time along existing facility

$TT \text{ (Existing)} = \text{Length} / \text{Ideal Speed} \times \text{Congestion Factor}$

2. Calculate Travel Time along improved facility

$TT \text{ (Project)} = \text{Length} / \text{Ideal Speed} \times \text{Congestion Factor}$

Travel Time Savings = TT (Project) – TT (Existing)

Multiply Travel Time Savings by # users x 30 years

Notes:

- For Project Travel Time, Length and Speed could change.
- For Projects on New Location, a current/parallel route is used for existing travel time; and the new route is used for the project travel time
- Future – NCDOT will utilize a statewide travel demand model (NCSTM), currently in development, to more accurately calculate travel time savings
- Congestion Factor based on NCSTM values (volume-delay curves)





Travel Time Savings Calculation

Congestion Factor = Based on Volume/Capacity ratio for highways

- Higher the v/c ratio = higher congestion factor
- Based on data correlating travel times and v/c ratio (also used in traffic models)
- For most highway projects, volume will stay the same for existing and project scenarios; capacity will increase for project calculation – Example (Frwy widen):

	Volume	Capacity	V/C Ratio	Cong. Factor
Existing	83,000	70,000	1.14	3.63
Project	83,000	106,000	0.78	1.10

- For projects on new location, volume & capacity of parallel highway is used for existing; new route is used for project data – Example (Frwy bypass of arterial):

	Volume	Capacity	V/C Ratio	Cong. Factor
Existing	42,000	32,000	1.31	3.78
Project	42,000	102,000	0.41	1.00



HIGHWAY – Economic Competiveness

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	10%	--
Regional	5%	--
Subregional	--	--

Score based on Output from **TREDIS®** (Economic Impact Model)

- Primary input is change in VHT (calculated from travel time savings)
- Output is value added based on % change in NCDOT Division
 - Includes jobs created, wages increased, increased productivity
 - Forecasted 30 years
 - Shows potential impact to region
- **Does NOT include contingent (prospective) development**
- Max points = 100 based on Output x 100,000 (values over 100 are capped)





HIGHWAY – Lane Width

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	--	20%
Regional	--	15%
Subregional	--	10%

Comparison between existing vs. DOT design standard

- Greater the difference, the higher points the project receives
 - 1 ft difference = 25 pts
 - 2 ft difference = 50 pts
 - 3 ft difference = 75 pts
 - 4+ ft difference = 100 pts
- Does NOT mean that project will be constructed to design standard





HIGHWAY – Shoulder Width

<u>Tier</u>	<u>Mobility</u>	<u>Modernization</u>
Statewide	--	20%
Regional	--	15%
Subregional	--	10%

Comparison between existing vs. DOT design standard

- Greater the difference, the higher points the project receives
 - 1 ft difference = 25 pts
 - 2 ft difference = 50 pts
 - 3 ft difference = 75 pts
 - 4+ ft difference = 100 pts
- Does NOT mean that project will be constructed to design standard





On-Road Bicycle Projects

Submitted/Evaluated as either a Bike & Ped project OR Modernization project

DOT will review all on-road projects and may shift projects between Bike & Ped and Modernization based on:

- Project scope (i.e., involves more than just adding bike lanes/striping, such as horizontal or vertical roadway realignment)
- Cost (projects above \$1,000,000 will be considered Modernization)
- Any shifts will occur prior to MPO/RPO/Division ranking window



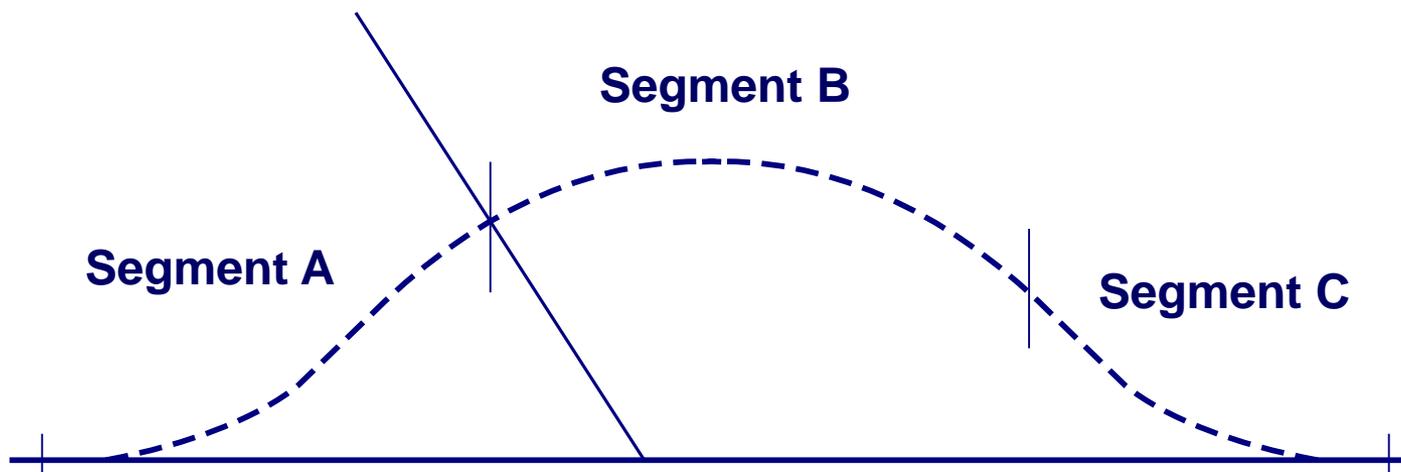


HIGHWAY – Calculating Quantitative Scores

Projects/segments on existing location, scores based on segment limits

Projects/segments on new location, scores based on entire project limits

- Quantitative scores will be the same for each segment, based on parallel route





Local Input

Each MPO/RPO & Division receives equal # of pts → 1,300

Can choose between Top 25 project ranking (for easy explanation to TCC/TAC reps) or Control Total (no limit on # of project rankings)

Top 25	OR	Control Total
#1 = 100		Can rank projects as desired
#2 = 96		Max 100 pts per project
#3 = 92		Min 4 pts per project
...		
#25 = 4		Can transfer points to other areas*

* Must be agreement between giving and receiving organizations



Multimodal Scoring (Mobility & Modernization Projects)

Bonus Points if the **highway** project includes one or more of the following new or additional multimodal components (select all that apply).

Multimodal Options → 8 points:

HOV / HOT, light rail, bus rapid transit, or bus-on-shoulder w/in the highway ROW

Multimodal Connections → 5 points:

Direct connection (property line) to a transportation terminal (airport, seaport, rail depot, ferry terminal, transit terminal, freight intermodal terminal, major military base, or park and ride lot)

Military Base or Seaport Connections → 5 points:

Direct connection (property line) to a major military base or seaport. These projects receive an extra 5 points in addition to the 5 points for Multimodal Connections

Multimodal Design Features → 3 points:

Sidewalks, pedestrian crossings, striped bicycle lanes, wide outside shoulders (greater than or equal to two feet), bus pullouts, transit bypass lanes, transit signal prioritization, bus shelters

Multimodal Projects must be ranked and must be included in an adopted Comprehensive Transportation Plan, Long Range Transportation Plan, or a mode-specific plan to receive pts.



New Project Submittal

In P1.0

- No limit on new candidate projects (could rank up to 25)
- Over 300 new candidate projects (out of 1100 total highway projects)
- \$45B in highway needs vs. \$9B in revenue

In P2.0

- Limit new candidate Mobility and Modernization projects to 15 (total) per MPO/RPO and Division
- No limit on Infrastructure Health and Safety projects (projects submitted to respective NCDOT units)





Highway Projects to Evaluate in P2.0

Projects expected to be let for construction in 2018-2020 or later (years 8,9, and 10 in Draft Work Program)

Projects not programmed/unfunded in P1.0

Limited number of projects that have slipped from years 1-7

New candidate Mobility and Modernization projects (up to 15 total)



Green = First 5 Yrs in Work Program → Committed Projects & 95% Delivery Rate (Goal)

Blue = Projects to Evaluate through Prioritization Process



Bicycle and Pedestrian - Scoring

Same scoring for Bicycle or Pedestrian Projects

18 pts max.

35 pts max. Rank Top 5 Projects:

- #1 = 35 pts
- #2 = 28 pts
- #3 = 21 pts
- #4 = 14 pts
- #5 = 7 pts

5 pts max. Three or more bicycle/vehicle or pedestrian/vehicle crashes within last 5 years



15 pts max. Direct access to transit / school / CBD / high-density residential or linkage to a large system of interconnected bicycle / multiuse facilities

15 pts max. Recognition of a project in an adopted bicycle / pedestrian plan

12 pts max. Greater densities = higher points





Public Transportation - Scoring

Expansion – 25 points max. # of new services hours provided due to capital investment

Connections – 12 points max. # of new synchronized connections (to other modes or other transit services)

Technology/Safety – 16 points max. Surveillance cameras, security measures, real time info on bus arrival time

Age of Fleet – 27 points max. Ability of the project to reduce the age of the fleet

Improved Facilities – 20 point max. Ability of project to extend life and service space

Local Input (MPO only Ranking) – 550 points/area; max 100 points per project.





Other Modes of Transportation

Aviation – Contact Rick Barkes:

rbarkes@ncdot.gov
(919) 840-0112 ext. 227

Ferries – Contact Arthur Smith

arthursmith@ncdot.gov
(252) 447-1055

Rail – Contact Cheryl Hannah

cwhannah@ncdot.gov
(919) 707-4046





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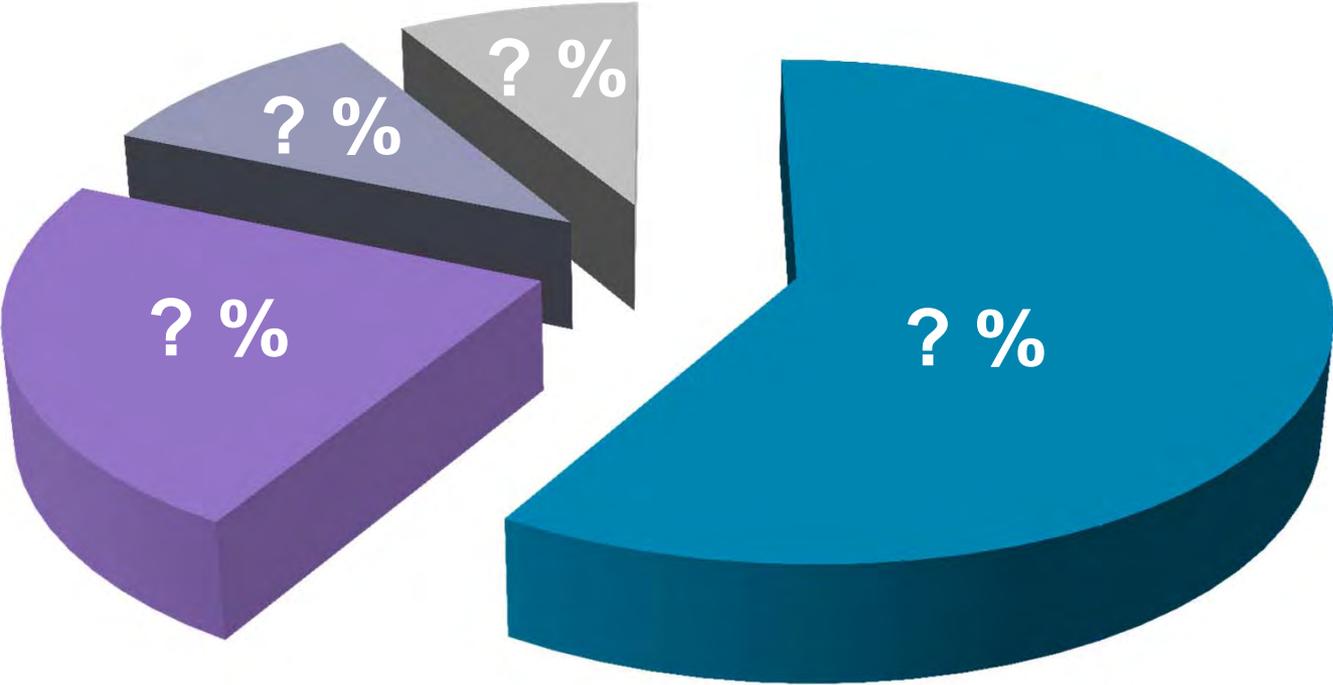
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How to Divide the Pie? - Determining the Investment Strategy





Prioritization Buckets



Infrastructure Health





Performance Level of Service (LOS)

Quality of service provided to the user

Different than Highway Capacity Manual

Criteria for determining LOS

- Measures are reliable, repeatable, and affordable
- Current measure and targets are realistic (graded on A-F scale)
- Data is readily available, easy to collect and update

Determine existing LOS and baseline LOS for 10 years in future

Translate LOS into \$\$ needed to maintain and improve performance





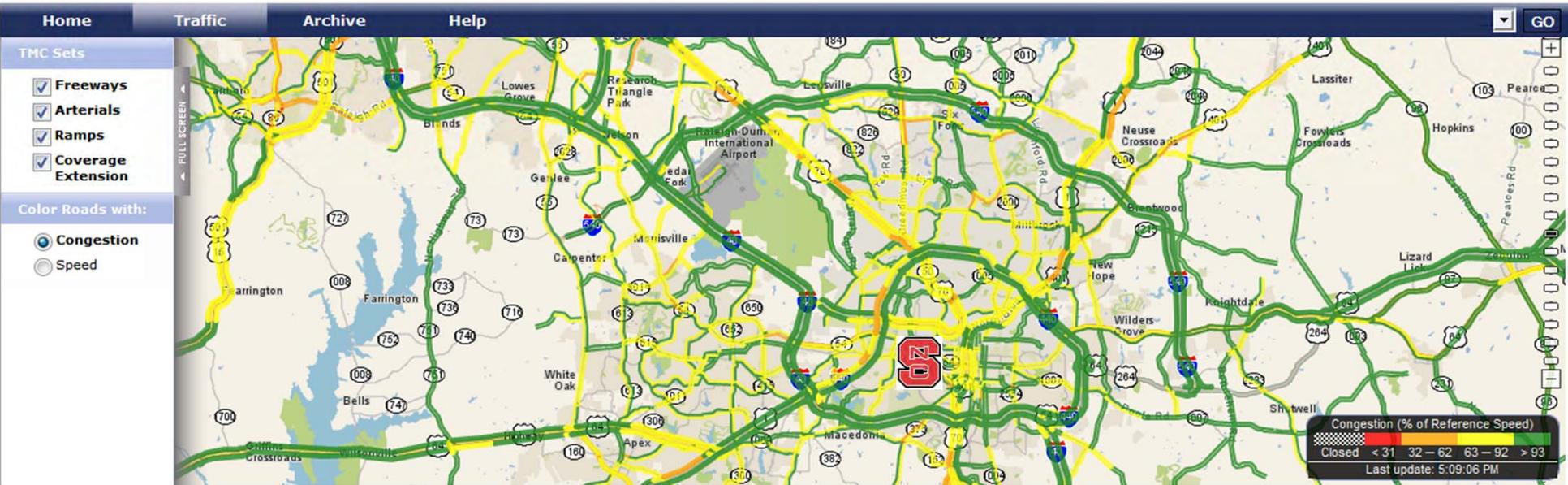
Performance Level of Service (LOS) – Example Measures

Highway Mobility – % of miles with Travel Time Index < 1.05



I-95 CORRIDOR COALITION

I-95 TRAFFIC MONITORING





Performance Level of Service (LOS) – Example Measures

Highway Mobility – % of miles with Travel Time Index < 1.05

Highway Modernization – % of miles that meet NCDOT's Paved Shoulder Policy where paved shoulders are required

Highway Pavement – % of miles w/ Pavement Condition Rating \geq 80

Bike/Ped – Bike-Pedestrian Index

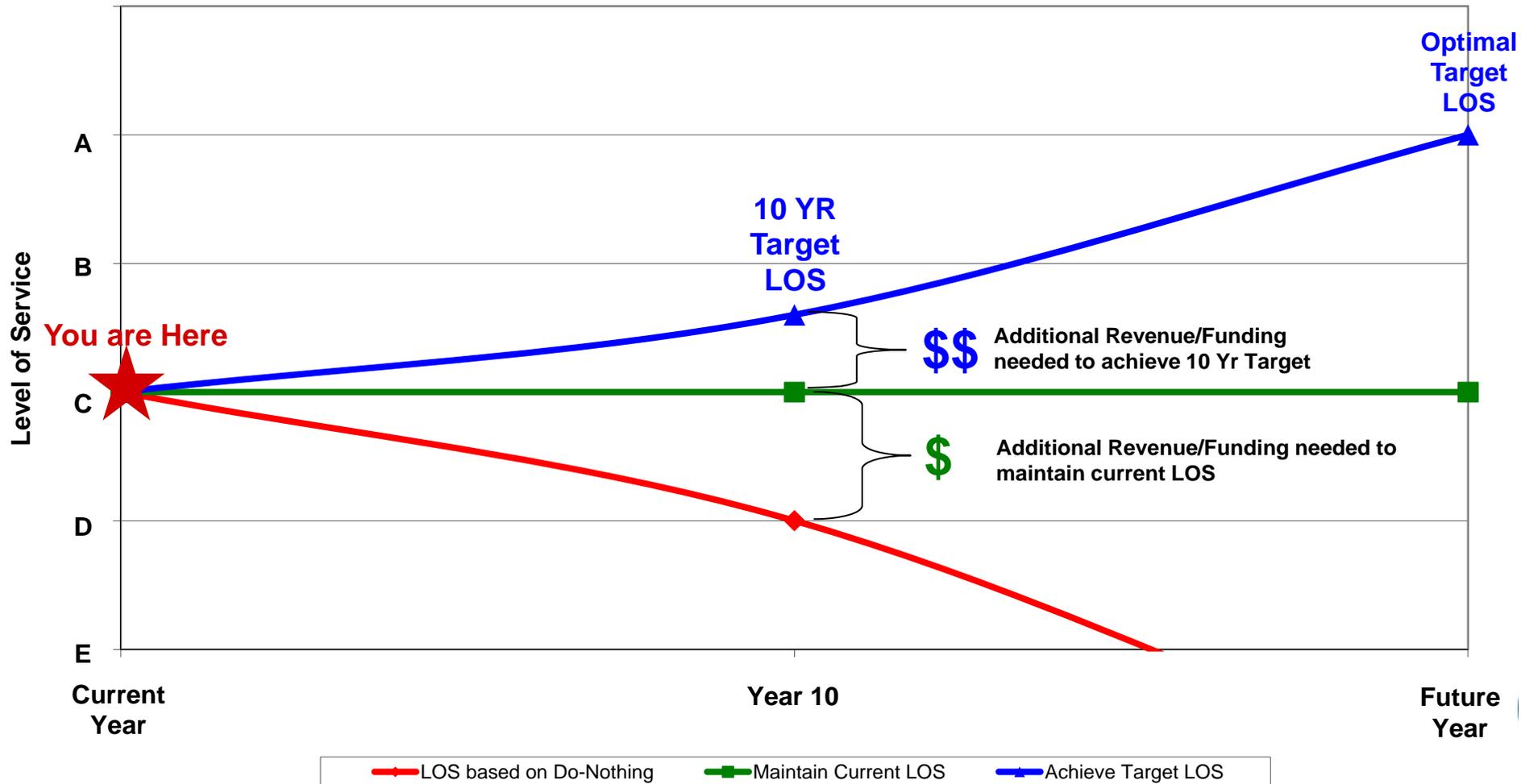
Ferry – # vehicles left behind at terminals per year

Transit – Passenger trips per year





Performance Level of Service (LOS)





Investment Strategy Summits

Summits throughout NC

- Partner and public input opportunity

Purpose is to provide analysis of where to apply expected revenue

- What are the high-level priorities?
- What is the investment needed to achieve those priorities?
- Revenue is based on expected 10 Year total, unconstrained

Participants allocate \$ (from 10 Year total) to Prioritization Buckets

Use LOS to determine return on investment

(i.e., if \$X are allocated to Bucket “Y”, expected 10 Year LOS is “Z”)

Outcome is a “picture of where transportation \$ should be spent”

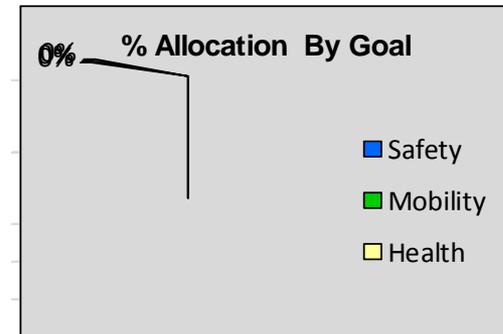




Investment Strategy Summits – Example Only

Bucket	Current LOS	Allocated	10 YR Resulting LOS	10 YR Desired Target	Chart
Safety	C	\$0	D	A	
Mobility	C	\$0	D	B	
Health	D	\$0	F	C	

Total Revenue	\$1,500
Total Allocated	\$0
Total Remaining	✓ \$1,500





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Programming Considerations

Geographic Funding Allocation Formulas

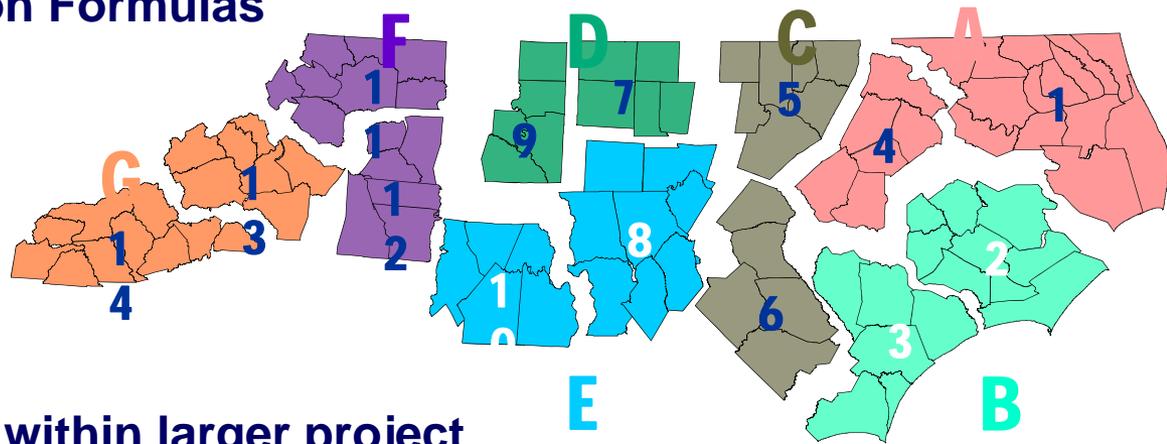
Project Cost

Deliverability/Schedule

Logical segment progression within larger project

Special funding eligibility (earmarks, dedicate funding sources, etc.)

Fiscal Year Cash Balancing



Prioritization Results ≠ Programming





Schedule

May 2011: Launch Partner Connect

May 2011: Education Sessions on Prioritization 2.0 (May 11, 12, 18)

June 3: MPOs/RPOs review/provide existing highway project data

July 5 – 29: MPOs, RPOs, Divisions submit new projects (hwy, bike/ped, transit) and provide additional data for transit projects

August 26: Minimum Problem Statements Due

August – Sept. 2011: SPOT QAs/QCs projects and calculates quantitative scores

October 3 – December 16, 2011: MPOs, RPOs, & Divisions rank projects

January 2012: Project Rankings Released

February – March 2012: Investment Strategy Summits

Spring 2012: Develop Draft 10YR Work Program





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