

# **Prioritization 3.0 Highway Scoring Criteria Summary Report**

March 2014

In 2013, the North Carolina General Assembly created the Strategic Transportation Investments Act (STI) to strengthen the state's economy and provide a new formula to direct construction funds through strategic transportation investments. Governor Patrick McCrory signed the Act on June 26, 2013. Governor McCrory and the N.C. Department of Transportation (NCDOT) are committed to improving the quality of life for citizens in North Carolina. The desire is to find more efficient ways to better connect all North Carolinians - to jobs, health care, education and recreational experiences. The STI law will help make that possible by better leveraging existing funds to enhance the state's infrastructure, providing greater opportunity for economic growth.

The STI law outlines a new Strategic Mobility Formula (SMF) which is a new way to fund and prioritize transportation projects to ensure they provide the maximum benefit to our state. It allows NCDOT to use its existing revenues more efficiently to fund more investments that improve North Carolina's transportation infrastructure, create jobs and help boost the economy.

The NCDOT Board of Transportation, on November 7, 2013, approved the criteria, weights and measures that will be used in the SMF. The following pages provide a brief description of each criteria, how it will be measured, its data source and what percentage it is of a project's overall score. The hope is that this information provides a clear, concise and transparent view of the data used in the SMF.

Please be aware all criteria are measured on a 0 to 100 point scale. Also, the STI law allowed alternate criteria to be used if all the affected Metropolitan Planning Organizations (MPO), Rural Planning Organizations (RPO's) and the Division Engineer in that area agreed upon alternate criteria. NCDOT paired funding Division's 1 and 4 and Division's 2 and 3 and the respective MPOs and RPs have agreed on alternate criteria and they are defined and outlined at the end of this document.

# Congestion

## **Definition**

A measure of the existing level of mobility along a roadway – measured by a combination of the traffic volume (autos and trucks) and the capacity of the roadway to handle that traffic volume. For projects on new location (such as a bypass or loop facility) the existing data comes from a “parallel route”. The parallel route is defined as the roadway(s) motorists currently use to travel between the beginning and end of the proposed project.

The purpose of this measure is to indicate the severity of congested locations and bottlenecks in the state. The higher the score the greater the indication of congestion.

## **Formula**

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

## **Data Source**

Traffic volumes are provided by NCDOT Traffic Survey Unit and represent the year 2012. Roadway capacity is determined by nationally accepted engineering standards customized for NCDOT by NC State University.

## **Criteria Percent Weight by STI Category:**

Statewide Mobility – 30%

Regional Impact – 25%

Division Needs – 20%

## Benefit / Cost

### **Definition**

Benefit – a measure of the travel time savings the project is expected to provide over 30 years. The calculation uses a combination of existing volumes, a congestion factor (measure volume to capacity ratio of roadway today vs.in the future) and both current facility and proposed project speeds and lengths. The result captures the travel time it takes one vehicle from the beginning and end points of the project improvement. The travel time difference is then calculated by the annual average daily traffic on that roadway over 30 years (using current volumes not future volumes).

To complete the calculation the benefit is converted to productivity savings (represented as dollars) gained by the user due to the construction of the project. The current NC average for this is \$22/hour. If the proposed project is on new location the project travel time savings are calculated using one or more parallel routes which represent how a user traverses a similar distance today.

Cost – a measure of the cost of the project, including right-of-way, utility relocation, construction, and environmental mitigation (if known) costs. Project costs are generated by a new cost estimation tool built by NCDOT's Engineering Applications Development staff and *represent a point in time high-level planning estimate for prioritization scoring purposes only*. The most up-to-date information is used to generate project costs, including standard unit costs for various infrastructure improvements and statewide parcel/tax map data for right-of-way costs. Utility costs are based on a percentage of the right of way costs. The cost estimation tool also accounts for terrain differences throughout the state. The Department will utilize any other up-to-date cost estimates if available and provided by local agencies.

Ultimately projects costs are the cost to the Department and/or (from the perspective of the Strategic Transportation Investments law) the cost to the state's Highway Trust Fund. Communities can help lower project costs by providing local dollars (non-State and non-Federal) to the Department at the time the project score is generated. If local funds are committed to the project and project is selected for funding up to 50% of the local commitment will be returned to the local area where the funding was provided (at the time the project is let for construction).

### **Formula**

Benefit (in the numerator) divided by the Cost (denominator) equals Benefit/Cost ratio.

### **Data Source**

Travel time savings are generated from NCDOT's state maintained roadway data. Statewide average productivity rates are sourced to the EDR Group (owners of the TREDIS software used in the Economic Competiveness calculation).

### **Criteria Percent Weight by STI Category:**

Statewide Mobility – 30%

Regional Impact – 25%

Division Needs – 20%

# Economic Competitiveness

## **Definition and Data Source**

A measure of the positive impacts to the economy generated by the highway infrastructure improvement. The economic competitiveness “score” is calculated from both the change in gross domestic product (or increased productivity) in a single NCDOT Division (with and without the project) over 30 years and from the expected long term jobs created by the highway infrastructure improvement. Both components of the calculation are equally weighted and the resulting economic output is translated into points associated with the overall quantitative score of the project.

TREDIS (Transportation Research Economic Development Impact System) is a nationally recognized economic model used by NCDOT to produce economic output for this criteria. TREDIS was chosen over other economic models due to its ease of use and cost and its track record (now utilized by over 45 other governmental agencies in the country). A 2012 independent evaluation by the State Smart Transportation Initiative sponsored by the Wisconsin DOT and the Federal Highway Administration scored TREDIS in the highest category for its ability “to be used to measure the economic impact of employment, industry activity, and economic demand...” while some other economic models were “limited in their use”.

## **Change in gross domestic product (50% of the scoring):**

TREDIS uses Bureau of Labor Statistics data to create a baseline of economic conditions in a single NCDOT Division (captures existing industry, workforce and labor market info) without the highway project. It then uses Moody’s economic data to forecast a future economic baseline (30 years) with the highway project in place. The primary inputs in this forecast are travel time savings, project location, and freight traffic. The change in the future condition compared to the current condition is the change in the gross domestic product (or increased productivity) in the NCDOT Division where the project is located. This increased productivity is due to a more efficient movement of people and goods in the area and therefore local industries can better compete, wages increase, and the Division becomes more attractive for job growth. The greater the change in gross domestic product, the greater the score for the project.

## **Job Creation (50% of the scoring):**

TREDIS also measures short-term and long-term employment impacts generated by the highway project, both of which account for direct, indirect, and induced jobs. Short-term employment impacts are excluded since they likely disappear after the project is complete. Typically the more expensive the project, the more short-term jobs are created, regardless of where the projects are located. Long-term employment impacts are considered more important to show the longer term economic ripple affect due to the highway investment. This calculation is also over a 30-year period. The more jobs created, the greater the number of points.

## **Formula**

Number of long-term jobs created (50%) + Value added in dollars \$ based on productivity change in NCDOT Division Economy (50%)

## **Criteria Percent Weight by STI Category**

Statewide Mobility – 10%

# Safety

## **Definition**

A measure of existing crashes along/at the project based upon a three year rolling average of accident statistics (years 2010-2012). The following components (equally weighted) added together constitute the quantitative score for this criteria:

- **Crash Density**: The crash density of the study area versus the average crash density of similar facilities.
- **Severity Index**: Crashes are categorized by five levels of severity. An index is created using crash severity data.
- **Critical Crash Rate**: The most severe crashes within the levels of severity are identified as critical crashes. The critical crash rate along the route is determined vs. the critical crash rate for the study area.

Intersection safety scores will be calculated manually by the Mobility and Safety Division and all other safety scores are automatically generated. Regarding the score for a project the higher the crash density, severity index and critical crash rate, the more points awarded (and therefore indicates poor performing roadway/intersection location).

## **Formula**

The calculation of safety scores varies depending on whether the project is located along a roadway segment or at an intersection:

Segments --  $(\text{Crash Density} \times 33\%) + (\text{Severity Index} \times 33\%) + (\text{Critical Crash Rate} \times 33\%)$

Intersections --  $(\text{Crash Frequency} \times 50\%) + (\text{Severity Index} \times 50\%)$

## **Data Source**

All crash related data, rates and statistics come from NCDOT's Traffic Safety Unit.

## **Percent Weight by STI Criteria**

Statewide Mobility – 10%

Regional Impact - 10%

Division Needs – 10%

## **Multimodal [& Freight + Military]**

### **Definition**

This is a measure of existing congestion along key military and truck routes, and routes on projects that make connection to transportation terminals. A multi-component combination of the following are added to constitute the project score for this criteria.

**25%** - Volume/Capacity Ratio on projects along Non-Interstate STRAHNET Routes. STRAHNET routes are US military designated routes to move military traffic.

**25%** - Volume/Capacity Ratio on projects along routes that provide direct connection (touch the property line) to a transportation terminal along a roadway with an access point (airport, seaport, rail depot, ferry terminal, transit terminal, major military base, and freight intermodal terminal (includes air/truck/rail/pipeline terminals). These are defined as FHWA's National Highway System Intermodal Terminals (plus 9 others recommended by the P3.0 Workgroup).

**50%** - Truck Volumes / 100.

### **Formula**

$((V/C \text{ Ratio [STRAHNET]} \times 100) \times 25\%) + ((V/C \text{ Ratio [Route to Transportation Terminal]} \times 100) \times 25\%) + (\text{Truck Volumes} / 100 \times 50\%)$

### **Data Source**

STRAHNET route (US Military) and Federal Highway Administration definitions for terminals. Truck volumes are sourced to NCDOT's Traffic Survey Unit.

### **Percent Weight by STI Criteria**

Statewide Mobility – 20%

## Accessibility / Connectivity

### Definition

Goal: To improve reliability of commuter travel and efficient goods movement statewide. This will be measured as a highway scoring criteria using three components:

- 20% - County Tier Designation – Points are based on the Department of Commerce’s county tier designation and the traffic volume along the roadway.
- 40% - Does a project upgrade impact roadway function? – Points are based on whether the project upgrades the roadway to one which provides a higher level of mobility by enhancing traffic flow, eliminating/bypassing signalized sections, increasing control of access, and accounting for the traffic volume along the roadway.
- 40% - Commuting times by census tracts – Points are based on the average commuting time in the census tract(s) in which the project is located.

### Formula

#### 1. Department of Commerce County Tier Designation

- Project in a  
**Tier 1 County = Volume / 200**  
(20,000+ vpd = 100 pts)
- Project in a  
**Tier 2 County = Volume / 300**  
(20,000+ vpd = 67 pts)
- Project in a  
**Tier 3 County = Volume / 600**  
(20,000+ vpd = 33 pts)

#### 2. Upgrade Roadway Function

- Focus on improving how the roadway functions, with emphasis on enhancing traffic flow, removing/bypassing traffic signals, and increasing access control
- Applicable to Statewide Mobility and Regional Impact network routes (all primary routes)
- Eligibility based on combination of Existing Facility Type and Project Facility Type (see table on next page)
- If eligible, project volume/ 200 = score

Existing Facility Type (From)	Project Facility Type (To)
Two Lane Highway	Freeway
Two Lane Highway	Multilane Highway (Expressway)
Two Lane Highway	Superstreet
Multilane Highway (Expressway)	Freeway
Arterial (Signalized Roadway)	Freeway
Arterial (Signalized Roadway)	Multilane Highway (Expressway)
Arterial (Signalized Roadway)	Superstreet
Superstreet	Freeway
Superstreet	Multilane Highway (Expressway)

### 3. Commute Times

- Based on Average Commute Times from 2010 using Census Tracts
  - (Average Commute Time – 20) x 5
  - (40+ minute commute time = 100 pts)
- Use weighted average commute time for projects that cross multiple Census Tracts
- Commute times > 20 minutes receive points

### Data Source(s)

Department of Commerce County Tier Designations, 2010 Census commute statistics, NCDOT roadway database

### Percent Weight by STI Criteria

Regional Impact – 10%



## **Lane Width**

### **Definition**

Measure the existing lane width vs. DOT design standard. The existing Lane Width – DOT design standard Lane Width

### **Formula**

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

### **Data Source**

NCDOT Roadway database

### **Percent Weight by STI Criteria**

Not used in Statewide “default” criteria.

It is used in Alternate Criteria for Divisions 1 and 4 as follows:

- Regional Impact - 10%
- Division Needs - 10%

## Shoulder Width

### **Definition**

Measure the existing paved shoulder width vs. DOT design standard. The existing Paved Shoulder Width – DOT design standard Paved Shoulder Width

### **Formula**

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

### **Data Source**

NCDOT Roadway database

### **Percent Weight by STI Criteria**

Not used in Statewide “default” criteria.

It is used in Alternate Criteria for Divisions 1 and 4 as follows:

- Regional Impact - 10%
- Division Needs - 10%

## ALTERNATE CRITERIA FOR DIVISIONS 1 & 4 - PRIORITIZATION 3.0

### Highway Scoring

Funding Category	Quantitative Data	Local Input	
		Division Rank	MPO/RPO Rank
<b>Statewide Mobility</b>	<p><b>[Travel Time] Benefit/Cost = 30%</b></p> <ul style="list-style-type: none"> <li>Travel time savings the project is expected to provide over 30 years divided by the cost of the project to NCDOT.</li> </ul> <p><b>Congestion = 30%</b></p> <ul style="list-style-type: none"> <li>Comparison of the existing traffic volume to the existing capacity of the roadway (depending on data availability, Congestion may be measured by comparing congested travel speeds to uncongested speeds).</li> </ul> <p><b>Economic Competitiveness = 10%</b></p> <ul style="list-style-type: none"> <li>Estimate of the number of long-term jobs and the % change in economic activity within the NCDOT Division the project is expected to provide over 30 years.</li> </ul> <p><b>Safety = 10%</b></p> <ul style="list-style-type: none"> <li>Evaluation of the number, severity, and frequency of crashes along the roadway.</li> </ul> <p><b>Multimodal [&amp; Freight + Military] = 20%</b></p> <ul style="list-style-type: none"> <li>Measure of existing congestion along key military and truck routes, and routes that provide connections to transportation terminals.</li> </ul> <p><b>Total = 100%</b></p>	N/A	N/A
<b>Regional Impact</b>	<p><b>[Travel Time] Benefit/Cost = 20%</b></p> <ul style="list-style-type: none"> <li>Travel time savings the project is expected to provide over 30 years divided by the cost of the project to NCDOT.</li> </ul> <p><b>Congestion = 15%</b></p> <ul style="list-style-type: none"> <li>Comparison of the existing traffic volume to the existing capacity of the roadway (depending on data availability, Congestion may be measured by comparing congested travel speeds to uncongested speeds).</li> </ul> <p><b>Safety = 15%</b></p> <ul style="list-style-type: none"> <li>Evaluation of the number, severity, and frequency of crashes along the roadway.</li> </ul> <p><b>Lane Width = 10%</b></p> <ul style="list-style-type: none"> <li>Comparison of existing lane width to NCDOT Design standards. The greater the difference the higher the points awarded.</li> </ul> <p><b>Shoulder Width = 10%</b></p> <ul style="list-style-type: none"> <li>Comparison of existing paved shoulder width to NCDOT Design standards. The greater the difference the higher the points awarded.</li> </ul> <p><b>Total = 70%</b></p>	<b>15%</b>	<b>15%</b>
<b>Division Needs</b>	<p><b>[Travel Time] Benefit/Cost = 10%</b></p> <ul style="list-style-type: none"> <li>Travel time savings the project is expected to provide over 30 years divided by the cost of the project to NCDOT.</li> </ul> <p><b>Congestion = 10%</b></p> <ul style="list-style-type: none"> <li>Comparison of the existing traffic volume to the existing capacity of the roadway (depending on data availability, Congestion may be measured by comparing congested travel speeds to uncongested speeds).</li> </ul> <p><b>Safety = 10%</b></p> <ul style="list-style-type: none"> <li>Evaluation of the number, severity, and frequency of crashes along the roadway.</li> </ul> <p><b>Lane Width = 10%</b></p> <ul style="list-style-type: none"> <li>Comparison of existing lane width to NCDOT Design standards. The greater the difference the higher the points awarded.</li> </ul> <p><b>Shoulder Width = 10%</b></p> <ul style="list-style-type: none"> <li>Comparison of existing paved shoulder width to NCDOT Design standards. The greater the difference the higher the points awarded.</li> </ul> <p><b>Total = 50%</b></p>	<b>25%</b>	<b>25%</b>

## ALTERNATE CRITERIA FOR DIVISIONS 2 & 3 - PRIORITIZATION 3.0

### Highway Scoring

Funding Category	Quantitative Data	Local Input	
		Division Rank	MPO/RPO Rank
<b>Statewide Mobility</b>	<p><b>[Travel Time] Benefit/Cost = 30%</b></p> <ul style="list-style-type: none"> <li>Travel time savings the project is expected to provide over 30 years divided by the cost of the project to NCDOT.</li> </ul> <p><b>Congestion = 30%</b></p> <ul style="list-style-type: none"> <li>Comparison of the existing traffic volume to the existing capacity of the roadway (depending on data availability, Congestion may be measured by comparing congested travel speeds to uncongested speeds).</li> </ul> <p><b>Economic Competitiveness = 10%</b></p> <ul style="list-style-type: none"> <li>Estimate of the number of long-term jobs and the % change in economic activity within the NCDOT Division the project is expected to provide over 30 years.</li> </ul> <p><b>Safety = 10%</b></p> <ul style="list-style-type: none"> <li>Evaluation of the number, severity, and frequency of crashes along the roadway.</li> </ul> <p><b>Multimodal [&amp; Freight + Military] = 20%</b></p> <ul style="list-style-type: none"> <li>Measure of existing congestion along key military and truck routes, and routes that provide connections to transportation terminals.</li> </ul> <p><b>Total = 100%</b></p>	N/A	N/A
<b>Regional Impact</b>	<p><b>[Travel Time] Benefit/Cost = 20%</b></p> <ul style="list-style-type: none"> <li>Travel time savings the project is expected to provide over 30 years divided by the cost of the project to NCDOT.</li> </ul> <p><b>Safety = 25%</b></p> <ul style="list-style-type: none"> <li>Evaluation of the number, severity, and frequency of crashes along the roadway.</li> </ul> <p><b>Multimodal [&amp; Freight + Military] = 25%</b></p> <ul style="list-style-type: none"> <li>Measure of existing congestion along key military and truck routes, and routes that provide connections to transportation terminals.</li> </ul> <p><b>Total = 70%</b></p>	<b>15%</b>	<b>15%</b>
<b>Division Needs</b>	<p><b>Congestion = 20%</b></p> <ul style="list-style-type: none"> <li>Comparison of the existing traffic volume to the existing capacity of the roadway (depending on data availability, Congestion may be measured by comparing congested travel speeds to uncongested speeds).</li> </ul> <p><b>Safety = 20%</b></p> <ul style="list-style-type: none"> <li>Evaluation of the number, severity, and frequency of crashes along the roadway.</li> </ul> <p><b>Multimodal [&amp; Freight + Military] = 10%</b></p> <ul style="list-style-type: none"> <li>Measure of existing congestion along key military and truck routes, and routes that provide connections to transportation terminals.</li> </ul> <p><b>Total = 50%</b></p>	<b>25%</b>	<b>25%</b>