

## I. Introduction

The Charlotte Regional Transportation Planning Organization (CRTPO) has developed a process for determining project priorities to be included in the region's Metropolitan Transportation Plan (MTP). Federal legislation under Moving Ahead for Progress in the 21st Century (MAP-21) requires that MPOs utilize a defined process for determining what projects are included in the MTP, and that they address the eight planning factors presented in MAP-21:

- 1) Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;
- 2) Increase the safety of the transportation system for motorized and non-motorized users;
- 3) Increase the security of the transportation system for motorized and non-motorized users;
- 4) Increase the accessibility and mobility of people and for freight;
- 5) Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;
- 6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- 7) Promote efficient system management and operation; and
- 8) Emphasize the preservation of the existing transportation system.<sup>1</sup>

Using these planning factors, CRTPO has developed a project evaluation system that addresses the region's roadway needs. This document outlines this system.

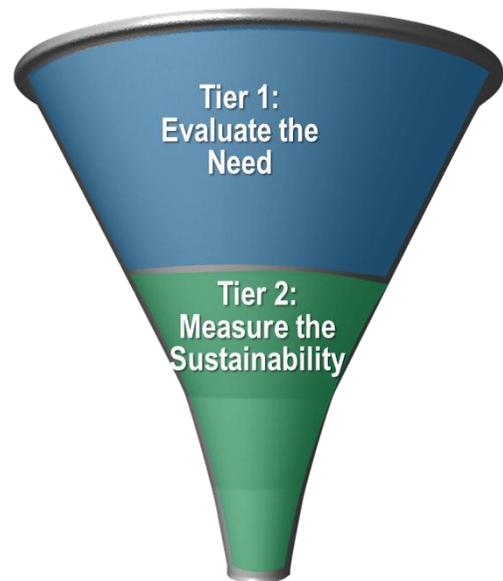
This ranking methodology was presented to the Technical Coordinating Committee (TCC) and the MPO in February and March 2013 and approved by the MPO on March 20, 2013.

## II. Ranking Procedure

The project evaluation process consists of two tiers: Tier 1, in which all submitted projects are evaluated and filtered, and Tier 2, in which a smaller number of projects that advanced through the Tier 1 filter are evaluated using additional criteria. In each tier, evaluation criteria are used to assign point values to projects according to how well they meet CRTPO's transportation priorities.

As projects advance through the Tier 1 screening, those receiving the highest scores, indicating that they best address CRTPO's priorities, will advance to the Tier 2 Screening. Other projects will be dropped from consideration.

Projects advancing to the Tier 2 screening are then evaluated



<sup>1</sup> Title 23, United States Code, Subsection (h), Section 135(d)

based on the additional criteria, and receive additional points based on how well they perform. Each project's Tier 2 score is added to its Tier 1 score, giving a cumulative score at the conclusion of Tier 2. Once these cumulative scores have been totaled, projects are ranked in order from highest to lowest. This priority list of projects then becomes the recommended roadway projects for the CRTPO region.

The maximum score that any project can receive in the ranking process is 300 points. 200 points are available in the Tier 1 evaluation, and 100 points are available in the Tier 2 evaluation. This point breakdown is intended to reflect the importance of the priorities represented by the Tier 1 criteria.

### III. Ranking Criteria

#### A. Tier 1 Evaluation

The Tier 1 evaluation consists of three criteria: congestion, safety, and accessibility to employment centers. These criteria were selected to best measure how well each project responds to the needs of the transportation system. All three criteria are quantitative, relying on data from the Metrolina Regional Model (MRM) and/or historic crash data. Their respective point distributions are defined below.

##### 1. Congestion

The purpose of this criterion is to measure how well each facility functions currently, by measuring the most recent traffic volumes (Annual Average Daily Traffic - AADT) in relation to the existing roadway capacity. AADT are obtained from NCDOT and the roadway capacity limits are obtained from the MRM. The following formula is used to assess congestion score:

$$\text{Congestion Criterion} = (V/C * 100 * 60\%) + (\text{Volume}/1000 * 40\%)$$

Once results are obtained for all projects, they are scaled to a maximum of 100 points.

##### 2. Safety

The safety criterion is used to determine the historic safety deficiencies along the existing roadway facility. This criterion uses three year historical crash data to identify locations that currently experience high crash activity. This data is provided by NCDOT for all roadway facilities in the CRTPO Planning Boundary. The following formula is used to assess safety score:

Roadways:

$$\text{Safety Criterion} = (\text{Crash Density} * 33\%) + (\text{Crash Severity} * 33\%) + (\text{Critical Crash Rate} * 33\%)$$

Intersections:

$$\text{Safety Criterion} = (\text{Crash Frequency} * 50\%) + (\text{Severity Index} * 50\%)$$

Results are scaled to a maximum of 50 points.

##### 3. Accessibility to Employment Centers

The purpose of this criterion is to evaluate how well candidate projects would serve the region's employment. Using MRM, a select link analysis was performed to estimate the number of trips the traffic analysis zones (TAZs) are contributing to the selected roadway links. A weighted

average score is then obtained based on the number of trips and employment density of each TAZ. The employment density, or the number of employees per square mile, is estimated using the 2010 MRM socio-economic data input. The following methodology is used:

- TAZs with greater than 10,0000 employment density (ED): 40 percent
- TAZs with ED between 7,500 and 10,000: 30 percent
- TAZs with ED between 5,001 and 7,500: 20 percent
- TAZs with ED between 2,501 and 5,000: 10 percent
- TAZs with less than or equal to 2,500 ED: 0 percent

The following formula is used to assess accessibility to employment centers score:

$$\begin{aligned} \text{Accessibility to Employment Center} &= (\text{No. of trips in TAZs with greater than 10,0000 ED} * 40\%) + \\ &(\text{TAZs with ED between 7,500 and 10,000} * 30\%) + (\text{TAZs with ED between 5,001 and 7,500} * 20\%) + \\ &(\text{TAZs with ED between 2,501 and 5,000} * 10\%) \end{aligned}$$

Results are scaled to a maximum of 50 points.

## B. Tier 2 Evaluation

The second tier in the project evaluation process is meant to measure how each candidate project addresses the sustainability of the overall transportation system. Both qualitative and quantitative criteria were chosen to effectively measure how candidate projects address and respond to the economic, social, and environmental pressures that are placed on the transportation system currently and into the future. These criteria include the following, and are defined in the following sections.

- Environmental Justice Impacts,
- Natural Resources Impacts,
- Historical Resources Impacts,
- Community Resources Impacts,
- System Connectivity, and
- Benefit/Cost Ratio.

### 1. Environmental Justice Impacts

The environmental justice impacts criterion is used to ensure that environmental justice communities are not adversely affected by candidate projects in the MTP. This criterion uses data from the 2010 U.S. Census to identify populations of six demographic groups: Black, Hispanic, American Indian and Alaskan Native, households in poverty, carless households, and households with limited English proficiency. The regional population averages of these groups are used to determine if a candidate project has no impact, minor impact, moderate impact, or major impact on environmental justice communities. Points are assigned as follow:

- Potential Right of Way Impacts on Environmental Justice Communities:
  - No Impact: 9 points

- 100 percent of the project is located in areas with no groups exceeding regional averages
- Minor Impact: 6 points
  - Over 25 percent of the project is located in areas with 1 to 2 groups exceeding regional averages.
- Moderate Impact: 3 points
  - Over 50 percent of the project is located in areas with 1 to 2 groups exceeding regional averages.
  - Over 25 percent of the project is located in areas with 3 to 4 groups exceeding regional averages.
- Major Impact: 0 points
  - Over 75 percent of the project is located in areas with 1 to 2 groups exceeding regional averages.
  - Over 50 percent of the project is located in areas with 3 to 4 groups exceeding regional averages.
  - Over 25 percent of the project is located in areas with 5 to 6 groups exceeding regional averages.

Projects can receive up to nine points for this criterion, based on the level of potential impact on identified environmental justice communities.

## 2. Natural Resources Impacts

The purpose of this criterion is to determine the level of potential impact that candidate projects could have on surrounding natural resources. This is a GIS-based assessment, where GIS data is used to locate natural resources such as streams, wetlands, ponds, floodplains, and threatened and endangered species, and candidate projects are then assessed for their proximity to these resources. Projects are evaluated based on project type with the following approach, with the most points given to projects with the least amount of potential impact:

- No Impact: 9 points
  - Resources are beyond ¼-mile distance from the candidate project.
- Minor Impact: 6 points
  - Candidate project is a road widening with a single creek crossing.
  - Candidate project is a road widening within ¼-mile of a resource.
- Moderate Impact: 3 points
  - Candidate project is a road widening with multiple creek crossings.
  - Candidate project is a road widening through a resource.
  - Candidate project is a new alignment project with a single stream crossing.
  - Candidate project is a new alignment project within ¼-mile of a resource.
- Major Impact: 0 points
  - Candidate project is a new alignment project along a stream.
  - Candidate project is a new alignment project with multiple stream crossings.
  - Candidate project is a new alignment project through a resource.

Projects can receive a maximum of nine points for this criterion.

### 3. Historical Resources Impacts

The purpose of this criterion is to determine the level of potential impact that candidate projects could have on surrounding historical resources. This is a GIS-based assessment, where GIS data is used to locate historical resources such as national, state, and local historic properties and districts, and candidate projects are then assessed for their proximity to these resources. Projects are evaluated based on project type with the following approach, with the most points given to projects with the least amount of potential impact:

- No Impact: 9 points
  - Resources are beyond ¼-mile distance from the candidate project.
- Minor Impact: 6 points
  - Candidate project is a road widening project within ¼-mile of a resource.
- Moderate Impact: 3 points
  - Candidate project is a road widening project through a resource.
  - Candidate project is a new alignment project within ¼-mile of a resource.
- Major Impact: 0 points
  - Candidate project is a new alignment project through a resource.

Projects can receive a maximum of nine points for this criterion.

### 4. Community Resources Impacts

The purpose of this criterion is to determine the level of potential impact that candidate projects could have on surrounding community resources. This is a GIS-based assessment, where GIS data is used to locate community resources such as churches, parks, and schools, and candidate projects are then assessed for their proximity to these resources. Projects are evaluated based on project type with the following approach, with the most points given to projects with the least amount of potential impact:

- No Impact: 9 points
  - Resources are beyond ¼-mile distance from the candidate project.
- Minor Impact: 6 points
  - Candidate project is a road widening project within ¼-mile of a resource.
- Moderate Impact: 3 points
  - Candidate project is a road widening project through a resource.
  - Candidate project is a new alignment project within ¼-mile of a resource.
- Major Impact: 0 points
  - Candidate project is a new alignment project through a resource.

Projects can receive a maximum of nine points for this criterion.

### 5. Connectivity

The connectivity criterion assesses how candidate projects will impact the overall continuity of the transportation network. Candidate projects are evaluated to determine if and to what

extent they fill gaps in the transportation system, whether that gap is the lack of a roadway facility in a given area, or in the number of lanes between roadway segments. Points are given using the following methodology:

- Candidate project closes a full segment gap: 14 points
- Candidate project connects two Comprehensive Transportation Plan (CTP)-designated roadways: 14 points
- Candidate project closes a full lane gap: 7 points
- Candidate project continues or connects the roadway functionality: 7 points

A total of 14 points are available for this criterion. If none of the above conditions are met, a candidate project receives no points.

## 6. Benefit-Cost Ratio

The benefit to cost (B/C) ratio criterion measures the value of benefits that a candidate project provides in a year, and if the benefits outweigh costs.

The benefit that a candidate project provides is the amount that it reduces travel delay per day, determined using the MRM. The reduction in travel delay is the difference between delays estimated for automobiles under the 2040 MRM No Build network and the 2040 MRM Build network. This delay is calculated separately for passenger cars and trucks and an estimated value of delay (\$16.79 per hour for passenger cars and \$86.81 per hour for trucks<sup>2</sup>) is assigned to calculate the benefit of a candidate project. This value is multiplied by 365 to estimate benefit for a year.

The cost is the project's planning level construction and right of way cost estimate, minus any local municipality cost-share and/or NCDOT's managed lanes incentive.

Using the formula below, a benefit to cost ratio is established for each candidate project, which represents the project's reduction in travel delay for every dollar spent.

$$\frac{B}{C} = \frac{\text{Cost of Annual Savings in Travel Delay}}{\text{Planning Level Construction and Right of Way Cost Estimate}}$$

Projects can receive up to 50 points for this criterion. Once the B/C ratio is determined for each candidate project, the results are scaled to a maximum of 50 points.

## IV. Next Steps

In January 2013, the CRTPO requested jurisdictions in its planning area boundary to submit candidate projects for the 2040 MTP. In response, CRTPO received over 270 roadway candidate projects. These projects will be evaluated using the ranking methodology presented in this document. Following the project ranking, fiscal constraint will be applied to identify a list of candidate projects to be included in the 2040 MTP. A ranking committee has been established to complete this process.

<sup>2</sup> 2012 Urban Mobility Report, Texas Transportation Institute, December 2012