



REGIONAL BICYCLE AND PEDESTRIAN STUDY

*A Strategic Vision for Walking and Bicycling in the
Greater Nashville Region*

Project Evaluation Methodology

Technical Memorandum # 4

November 2009



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1.0 INTRODUCTION

In 2008, the Nashville Area Metropolitan Planning Organization (MPO), the regional transportation planning organization in the Middle Tennessee area, initiated the development of the region's first comprehensive Bicycle and Pedestrian Study for the greater Nashville region. The Regional Bicycle and Pedestrian Study is intended to establish a strategic vision for walking and bicycling in the region. This strategic vision will feed into the MPO's overall Long Range Transportation Plan and provide the basis by which future funding priorities of the MPO are established for bicycle and pedestrian accommodations within Davidson, Rutherford, Sumner, Wilson and Williamson counties, plus the cities of Spring Hill and Springfield.

Working with local governments, businesses, non-profit organizations, and the general public the Nashville Area MPO developed the Regional Bicycle and Pedestrian Study as a mechanism to foster a better understanding of bicycle and pedestrian needs within the region. The Study is also intended to serve as a means of guiding policies, programs, and investments intended to maximize opportunities for greater walking and biking activity now and in the future within the greater Nashville region.

In general, the Regional Bicycle and Pedestrian Study:

- Provides a comprehensive inventory of existing and currently proposed on and off-road bicycle and pedestrian facilities in the greater Nashville region
- Increases the region's understanding of how non-motorized modes add to system-wide capacity by improving connectivity between residential areas, employment centers, schools, retail centers, recreational centers, and other attractions
- Serves as a framework for identifying and selecting bicycle/pedestrian projects for the region's Long Range Transportation Plan and Transportation Improvement Program; and
- Provides guidance for engineering, education, enforcement, encouragement, and evaluation activities to help improve the safety of non-motorized travel modes.

This Technical Memorandum presents a recommended project prioritization process to assist the MPO in the evaluation of candidate bicycle and pedestrian projects for funding consideration.

2.0 PROPOSED EVALUATION METHODOLOGY

With an ever shrinking amount of available funding and a growing level of competition for funds the use of a systematic process by which candidate projects are evaluated, scored, and ranked is an essential planning practice that the MPO and its member jurisdictions must have in place.

To assist the MPO with prioritizing project needs, the following evaluation methodology has been established. This process was tested and used to identify the MPO's Regionally Designated Bicycle Facilities Network and proposed Sidewalk Accommodation Policy. These programs are further described in Technical Memorandum #5.

This prioritization process is to be used to assist the MPO as it considers funding bicycle and pedestrian investments throughout the MPO region. The prioritization process is flexible enough that it can be used at a regional, sub-regional or sub-area level. The methodology uses data collected as part of the Regional Bicycle and Pedestrian Study and can use newer data as such changes within the region occur.

The first step in the prioritization process includes an assessment of facility needs for both bicycle and pedestrian accommodations. The analysis is based on facility level of service and non-motorized demand. The second step in the process takes into consideration the following factors:

- LOS and Non-Motorized Potential Trips (Results of Step 1)
- Connectivity
- Safety
- Congestion Mitigation
- Community Goals
- Health Impact

The following describes the proposed project evaluation methodology and process that has been developed based on citizen input and the objectives and strategies of the Regional Bicycle and Pedestrian Study. The intent of this prioritization process is to assist the MPO as it considers funding bicycle and pedestrian investments throughout the region.

2.1 PRIORITIZATION METHODOLOGY FOR ON-ROAD FACILITIES

Bicycle and pedestrian priorities are evaluated separately but follow the same evaluation methodology.

STEP 1

The first step is based on the bicycle or pedestrian level of service (BLOS or PLOS) and the potential for walking and biking trips. This step of the prioritization methodology is used to determine the roadway segment improvements that will benefit the region the most based on the segment's current conditions and the walking and biking demand for the facility. The formula determines a numerical priority value for each roadway segment. The highest priority projects, i.e. the projects that will provide quality facilities where the demand is highest, will be given a score of 24-points. The variables of the Step 1 process include:

$$\text{Step 1: 24-Points Max} = 12\text{-pts (LOS)} + 12\text{-pts (NP)}$$

Level of Service (*Goal – Provide Facilities*)

Pedestrian and Bicycle (LOS) - is determined for each roadway segment separately based on the existing conditions. A few of the roadway characteristics used to determine the BLOS and PLOS include outside lane width, presence of sidewalks, buffers, or barriers, shoulder widths, traffic volumes, and speed. The LOS analysis for Bicycles and Pedestrians is described in more detail in Technical Memorandum 2. The LOS is determined to be an A through F with A being the best level of service and F the worst. Based on the LOS a numerical score ranging from 2 to 12 points is assigned to the results with LOS A receiving 2-points, LOS B 4-points, LOS C 6-points, LOS D 8-points, LOS E 10-points, and LOS F 12-points. This allows a roadway segment with poor biking and walking conditions to have a higher priority.

Non-Motorized Potential Trips (*Goal – Provide Facilities*)

Non-Motorized Potential (NP) - is a factor related to the number of potential bicycling or walking trips along a particular road segment as assessed by the non-motorized demand analysis. The non-motorized demand analysis is described in more detail in Technical Memorandum 2. Based on the demand analysis the potential pedestrian trips within ½ mile for each segment are assigned to that roadway segment. Also based on the demand analysis the potential bicycle trips within 1 mile for each roadway segment are assigned to that segment. The demand is assigned a numerical score ranging from 2 to 12 points for each roadway segment analyzed based on the potential non-motorized trips. To normalize trips, the total trips for the segment should be converted to an equivalent number of trips per block as given by the following equation:

$$NP = 0.075 (n/l)$$

Where n = walking trips in ½ mile buffer area or biking trips in 1 mile buffer area
l = length of segment in miles

All trips are divided into 6 quantiles. The roadway segments that are expected to accommodate the most non-motorized trips would receive 12-points (e.g. top quantile) and the roadway segment expected to accommodate the least non-motorized trips would receive 2-points (e.g. lowest quantile).

Summary

There are two types of criteria for assigning points in this part of the evaluation process. The first criteria assigns 24-points to all roadway segments on the MPO's Regionally Designated Bicycle Facilities Network and on all Arterial roadways within an Urban Growth Boundary in the MPO. The second criteria assigns points to the remaining roadway segments in the evaluation pool using the formula for Step 1. Again, this candidate listing would depend on the level of geography being evaluated (e.g. regional level, sub-regional level, or sub-area level).

STEP 2

The second step in the process is to consider the five other variables that help shape the overall prioritization system and add them to the results from Step 1. This step of the prioritization methodology is used to determine the roadway segment from Step 1 that provides the greatest opportunity for system connectivity (e.g. linking and/or extending a bicycle or sidewalk facility to another); addresses and/or improves a safety issue; serves as a congestion mitigation strategy which is consistent with the MPO's congestion management process; supports community goals as defined in locally adopted plans that include bicycle and pedestrian recommendations; and

serves as a viable investment to high health impact areas within the MPO. These variables include:

Step 2: 24-Points Max = 6-pts (CN) + 6-pts (SAF) + 6-pts (CM) + 3-pts (PLC) + 3-pts (HHI)

Connectivity (Goal – Provide Facilities)

System Connectivity (CN) – this is a factor related to linking/connecting existing and future sidewalk and bikeway improvements to increase overall system connectivity. If a candidate segment links both ends, or has multiple connections to an existing sidewalk or bikeway facility (which is greater than a ¼ mile in length), a maximum of 6-points are assigned to that segment. If the segment connects to one end or has one connection to an existing sidewalk or bikeway facility (again, which is greater than a ¼ mile in length), 3-points are assigned to the segment. If no connection occurs, zero points for connectivity are assigned.

Safety (Goal – Provide Facilities)

Safe (SAF) – the safety factor is based on crash data. The roadway segments with high crash rates involving bicyclists and/or pedestrians will be given a higher priority. If a candidate segment is determined to have a high crash rate based on crash data, a maximum of 6-points are assigned to that candidate segment. If no crash data exists and/or is not considered a high crash rate location, zero points for safety are assigned.

Congestion (Goal – Create Policies & Programs)

Congestion Mitigation (CM) – the congestion mitigation factor is based on the MPO's Congestion Management Process. If the segment is on the list of congested corridors or identified as part of the MPO's Congestion Management Process, the segment is assigned a maximum of 6-points for being considered a congested corridor and/or serving as a congestion mitigation strategy. Zero points are assigned to the segment if it is not considered a congested corridor.

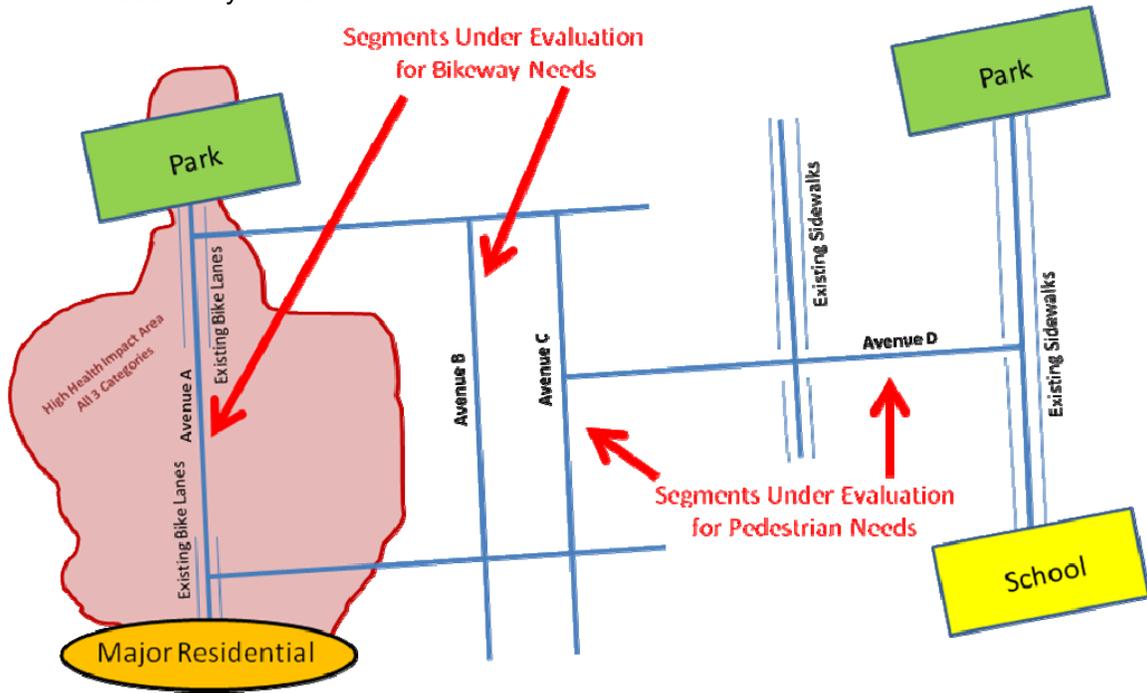
Consistency with Local Plans (Goal – Create Policies & Programs)

Consistent with Locally Adopted Plans (PLC) – this factor is included in the evaluation process to identify and add significance to roadway segments if the improvement is identified in a locally adopted plan such as a bicycle and pedestrian plan, greenway plan, corridor study, subarea study, streetscape plan, and/or community plan. Three-points (3-points) are assigned to the local plan variable if the improvement on the segment is in a locally adopted plan. Zero points are assigned to the segment if the improvement is not on a locally adopted plan.

High Health Impact Area (Goal – Create Policies & Programs)

High Health Impact Area (HHI) – this factor in the evaluation process is included to account for areas that are considered high risk health areas, which typically have a higher percentage of people that are low-income, minority, or elderly (over the age of 65). Each of the high risk health categories was divided into four quartiles. If a segment falls within a top quartile for below poverty level, over the age of 65, or minority, 3-points are assigned to the segment. If the segment falls within two of the three high health area categories top quartiles, 2-points are assigned to the segment. If the segment falls within one of the three high health area categories top quartiles, 1-point is assigned to the segment. If the segment does not fall within the top quartile for any of the high health area categories, zero points are assigned to the segment for high health impact.

The following is an example of how this evaluation process would work in evaluating both sidewalk and bikeway needs:



Bicycle Project Evaluation Process

Current Conditions							
Segment	BLOS	Non-Motorized Potential	Connectivity	High Crash Location	Congested Corridor	Local Plans	Health Impact
Avenue A	D	High	2	Yes	Yes	Yes	3
Avenue B	C	Low	0	No	No	No	0

Evaluation Process & Point Results								
Segment	BLOS	NP	CN	SAF	CM	PLC	HHI	Evaluation Score
Avenue A	8	12	6	6	6	3	3	44
Avenue B	6	2	0	0	0	0	0	8

Pedestrian Project Evaluation Process

Current Conditions							
Segment	PLOS	Non-Motorized Potential	Connectivity	High Crash Location	Congested Corridor	Local Plans	Health Impact
Avenue C	F	Low	0	Yes	Yes	Yes	0
Avenue D	F	High	2	Yes	Yes	Yes	0

Evaluation Process & Score Results								
Segment	PLOS	NP	CN	SAF	CM	PLC	HHI	Evaluation Score
Avenue C	12	2	0	6	6	3	0	29
Avenue D	12	12	6	6	6	3	0	45

2.2 PRIORITIZATION METHODOLOGY FOR OFF-ROAD FACILITIES (GREENWAYS)

The proposed methodology for prioritizing greenway projects within the MPO is based on two variables: non-motorized potential trips and connectivity of the facility. Greenways should be analyzed by applying the total number of walking and biking trips that will likely be seen on the greenway as determined by the non-motorized assessment. The evaluation process determines a numerical value for the evaluated greenway segments. The highest priority projects would consist of the projects that will accommodate the most walking and biking trips and provide connectivity of two or more facilities.

The greenway prioritization variables for this evaluation process include:

$$24\text{-Points Max} = 12\text{-pts (NP)} + 6\text{-pts (CN)} + 3\text{-pts (PLC)} + 3\text{-pts (HHI)}$$

Non-Motorized Potential Trips (*Goal – Provide Facilities*)

Non-Motorized Potential (NP) - is a factor related to the number of potential bicycling or walking trips and can be assigned to a greenway facility much like trips are assigned to a roadway segment. Once the demand is assigned to the greenway facility a ranking of 2-12 points for each facility analyzed based on the potential non-motorized trips. To quantify associated trips for each facility a buffer analysis of 1 mile for each greenway segment should be performed. All trips are divided into 6 quantiles. The greenway facilities that will accommodate the most non-motorized trips would receive 12-points (e.g. top quantile) and the facilities accommodating the least non-motorized trips would receive 2-points (e.g. lowest quantile).

Connectivity (*Goal – Provide Facilities*)

System Connectivity (CN) – this is a factor related to linking/connecting existing and future greenway improvements to increase overall system connectivity. If a candidate greenway links both ends, or has multiple connections to an existing greenway, bikeway facility, or sidewalk system (which is greater than a ¼ mile in length), a maximum of 6-points are assigned to that candidate facility. If the greenway connects to one end or has one connection to an existing greenway or bikeway facility (again, which is greater than a ¼ mile in length), 3-points are assigned to the candidate greenway. If no connection occurs, zero points for connectivity are assigned.

Consistency with Local Plans (*Goal – Create Policies & Programs*)

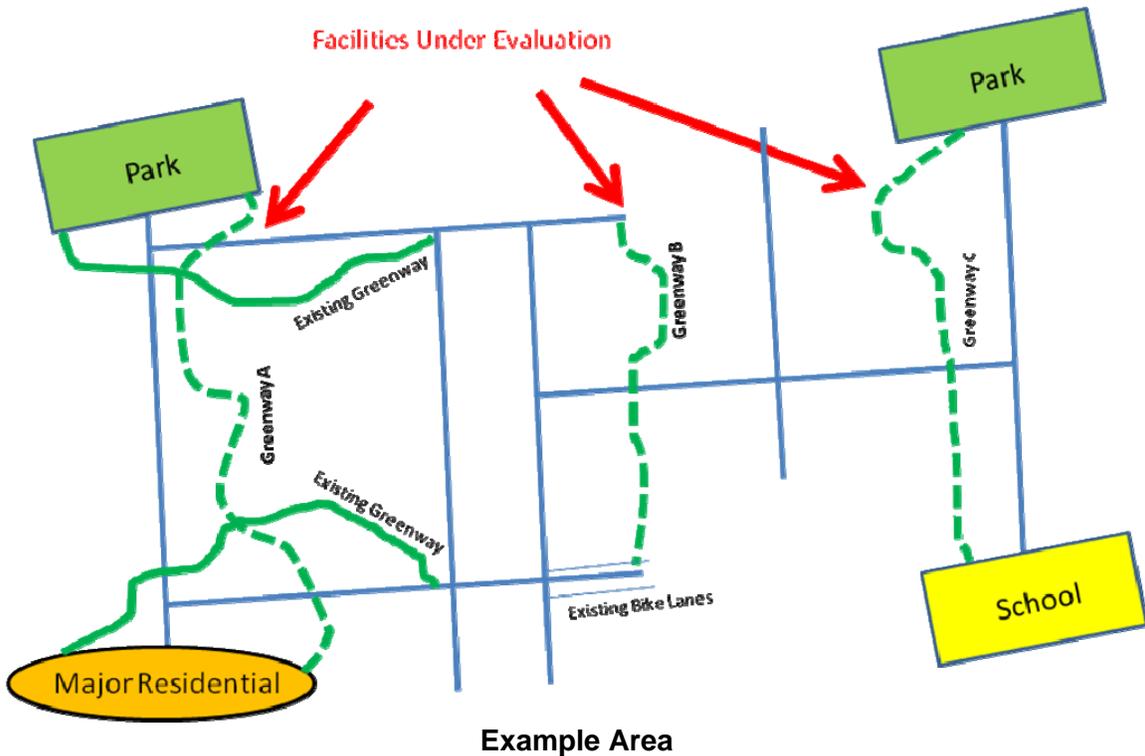
Consistent with Locally Adopted Plans (PLC) – this factor is included in the evaluation process to identify and add significance to greenway segments identified in a locally adopted plan such as a bicycle and pedestrian plan, greenway plan, corridor study, subarea study, streetscape plan, and/or community plan. Three-points (3-points) are assigned to the local plan variable if the greenway segment is in a locally adopted plan. Zero points are assigned if the greenway segment is not on a locally adopted plan.

High Health Impact Area (*Goal – Create Policies & Programs*)

High Health Impact Area (HHI) – this factor in the evaluation process is included to account for areas that are considered high risk health areas, which typically have a higher percentage of people that are low-income, minority, or elderly (over the age of 65). Each of the high risk health categories was divided into four quartiles. If a facility falls within a top quartile for below poverty level, over the age of 65, or minority, 3-points are assigned to the

facility. If the facility falls within two of the three high health area categories top quartiles, 2-points are assigned to the facility. If the facility falls within one of the three high health area categories top quartiles, 1-point is assigned to the facility. If the facility does not fall within the top quartile for any of the high health area categories, zero points are assigned to the facility for high health impact.

It is important to note that the On-Road Facilities Prioritization Methodology process results may be considered for a greenway facility priority should it be clear that the greenway facility under evaluation provides for the same movement and function of the on-road facility accommodation. Typically in this case, the greenway would serve as a parallel facility to the roadway.



Greenway Project Evaluation Process

Current Conditions				
Facility	Non-Motorized Potential	Connectivity	Local Plans	Health Impact
Greenway A	High	2	Yes	0
Greenway B	Low	1	Yes	0
Greenway C	High	0	Yes	0

Evaluation Process & Results					
Segment	NP	CN	PLC	HHI	Evaluation Score
Greenway A	12	6	3	0	21
Greenway B	2	3	3	0	8
Greenway C	10	0	3	0	13

3.0 IMPLEMENTATION OF PRIORITIZATION

The prioritization methodology provides a consistent yet flexible means for selecting bicycle and pedestrian facility improvement projects for funding. The process is intended to provide the MPO with an objective and quantifiable way for assessing both walking and biking project needs that are consistent with the MPO's regional goals and objectives.

The methodology uses data collected as part of the Regional Bicycle and Pedestrian Study and is designed to use newer data as such changes within the region occur. As roadway and facility conditions within the region change the variables that are identified as part of this evaluation methodology can be updated, adjusted, and/or modified to account for such changes. Additionally, as other data become available for assessing project priorities, the MPO can modify these evaluation methods to take into consideration such available data.

Lastly, the prioritization process is flexible enough that it can be used at a regional, sub-regional or sub-area level.