Tech Memo 4: Demonstrated Use of Metrics in Project Selection and Evaluation (Safety Emphasis Area)

I. Project Identification, Evaluation and Selection Process

This Technical Memorandum illustrates how recommended enhancements for bicycle and pedestrian project evaluation and selection presented in a previous memo (*Technical Memorandum 3: Recommended Enhancements for Bicycle and Pedestrian Project Evaluation and Selection*) may be applied. While the emphasis of this memo is on applying safety criteria, the intent is to demonstrate how the recommended project selection and evaluation process would work. It discusses data needs, roles of ARC staff and project sponsors, and the outcome of each phase in the evaluation process. Two example projects are presented to illustrate specific considerations during the evaluation process. The example projects are based on locations representing two typical contexts within the Atlanta region: an urban intersection and a suburban corridor. Generally, the project evaluation and selection process is divided into three phases: Project Identification, Project Screening, and Project Selection.

1) Project Identification is the process project sponsors undergo to identify needs and pull together projects they would submit to ARC for funding consideration. Project identification on a rolling basis, or in response to, a call for projects. Local sponsors may seek ARC staff assistance or data resources to help them identify projects that respond to regional goals and identified high priority areas (e.g. crash hotspots). The goal of the project identification phase is to receive high quality project proposals that are in line with the regional vision, meet funding program eligibility requirements and goals, and facilitate ARC's project screening process.
2) Project Screening occurs after project sponsors have identified potential projects, and have submitted these projects to ARC for consideration. Project submittals may be in the form of a letter of interest as discussed in Technical Memorandum 3. In this phase, ARC staff is determining whether a project application is complete, if it is eligible for consideration, whether the proposed improvements address the stated goals for the call for projects (e.g. safety), and how projects compare in terms of addressing defined evaluation criteria. At the end of the project screening phase ARC staff will have selected a short list of projects that meet eligibility requirements and screening criteria. Depending on the number of submitted projects and available funding, ARC staff may further refine the short list of projects by evaluating project sponsor commitment.
3) Project Selection is the phase where ARC staff are conducting a more technical review of projects that have made it past the screening phase. Staff score and rank projects and create a short list of projects that will be selected for funding based on ranking and available

funding. At the end of the project selection process the ARC will have chosen projects that best meet evaluation criteria (i.e. most likely to further regional transportation goals) have the strongest local commitment, and utilize available funding.

Section II of this memorandum discusses project implementation and ongoing coordination.

Safety is among the emphasis areas in the Regional Transportation Plan, and for submitted pedestrian and bicycle projects that have a safety focus, the ARC desires to direct funding towards projects that are most likely to achieve improved safety. The evaluation of the two project examples emphasize safety in order to illustrate how the ARC can select projects that are likely to have the best safety outcomes. Other criteria within the mobility and economic development emphasis areas are not directly addressed in this memo.

A. Project Identification: Planning Resources Available from the ARC

The primary goal of the identification phase is to ensure that proposed projects are addressing identified needs in the most effective manner. In the case of safety-focused projects, the ARC wants to fund projects that are most likely to reduce crashes for instance. There are several planning resources available to assist project sponsors and ARC staff in identification of potential bicycle and pedestrian projects before submitting to the ARC for funding.

1. Regional Strategic Vision

The Regional Transportation Plan (RTP) establishes a strategic vision for developing a multimodal transportation serving the Atlanta Metropolitan region. It establishes emphasis areas for transportation investments. The emphasis areas that are most applicable to bicycle and pedestrian projects are safety, mobility/access and economic development. Local sponsors who are familiar with the RTP and scope their projects with an eye towards the RTP's emphasis areas are more likely to have projects selected.

2. Regional Crash Analysis and Hotspot Identification

The ARC, through its partnership with GDOT, has access to regional data that details crashes on the roadway system, including crashes involving pedestrians and bicyclists. This data is used to identify and map "hotspot" locations where the concentration of crashes is relatively high. Local agencies have access to the "hotspot" map and associated data, which they can use to identify locations in need of safety improvements.

Crash data may also be used to determine crash rate, which can be a useful measure when comparing the relative safety risk of two or more projects in varying contexts. In its simplest form crash rate is an expression of the number of crashes contrasted against the total volume of bicyclists and pedestrians. Crash rate can be more telling than the simple number of crashes, as it provides a more complete picture of what is happening on the ground over a given timeframe. Determining crash rates is not something ARC has much history with and would require bicycle and pedestrian volume data or data extrapolation. As such, crash rate may be an area in which to focus future efforts for safety analysis.

3. Technical Assistance and Resources

ARC staff can provide technical assistance or direct project sponsors to resources to help them gather data and conduct analysis that may inform project identification and support their project proposal. As noted above, staff may direct project sponsors to available crash data and assist in crash rate calculations. Staff may also direct project sponsors to information on Crash Reduction/Modification Factors so that project sponsor's project proposals are more likely to include countermeasures that have been proven to effectively reduce crashes.

Additional ways in which ARC staff may provide technical assistance and resources include:

- Conducting a pre-submittal workshop for all potential project sponsors that reviews regional goals and funding program objectives, directs sponsors to resources useful for the identification phase, and addresses questions related to the application process.
- Mapping – ARC currently has an online mapping tool that allows project sponsors to map the extent of proposed projects. ARC has plans to further develop its online mapping tools to allow project sponsors to layer in additional data that supports their proposal such as crashes, land use, transit, etc.
- Best Practices – ARC staff can direct project sponsors to resources and best practices to help them develop supporting data that addresses project evaluation criteria. FHWA has many resources available on its Pedestrian and Bicycle Safety webpage (http://safety.fhwa.dot.gov/ped_bike/tools_solve/). Examples of resources that may be most pertinent to project sponsors include:
    - Pedestrian and Bicycle Road Safety Audit Guidelines
    - Bicycle and pedestrian countermeasure selection tools

Other best practice resources that project sponsors should be made aware of include:

- AASHTO Guide for the Development of Bicycle Facilities
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
- NACTO Urban Bikeway Guide

Project Identification Outcome

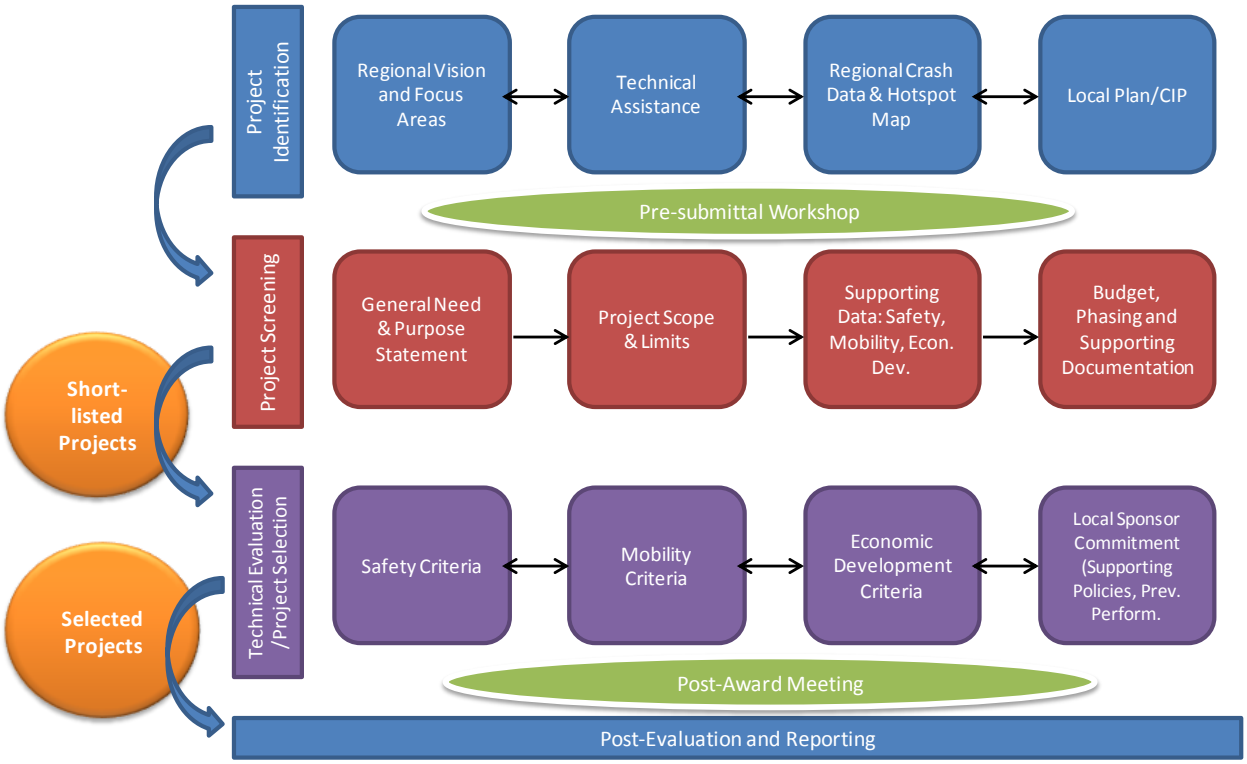
The goal of the project identification phase is to receive high quality project proposals that are in line with the regional vision, meet funding program eligibility requirements and goals, and facilitate ARC's project screening process.

B. Project Screening

The information in this section and the following section addressing technical review of projects directly reflects recommendations for project evaluation and selection provided in Technical Memorandum 3, which is generally depicted in Figure 1. Two example projects are presented to illustrate considerations and data needs that may apply to a particular project type.

The information presented below represents what ARC would initially request from project sponsors during a project solicitation or rolling application process, in addition to standard application information (e.g. name of project sponsor, contact information, etc). Additional information would be requested for project proposals that have been shortlisted to undergo technical review, which is discussed in Section C below.

Figure 1: Project Development and Selection Process



1) General need and purpose statement

Project Sponsor Role: Local sponsor provides general information about the project and the problem/issue it is addressing.

ARC Role: Information provided by project sponsor, along with more detailed project scope information, is used by ARC staff to determine project eligibility and the most appropriate funding program for the proposed project. For example, a project that is a spot improvement versus one that is larger (e.g. corridor improvements, rebuilding an entire intersection) may potentially be funded through different programs.

Example Project 1

This project will address safety issues at a signalized intersection where there have been a high number of pedestrian crashes associated with turning vehicles.

Example Project 2

This project will address safety issues along a one mile segment of a major regional thoroughfare where there have been a high number of crashes associated with pedestrians darting across the road at locations outside of designated crossing s.

2) Project Limits and Scope

Project Sponsor Role: Local sponsor provides more detailed information about the scope of the proposed project, including project limits which should also be shown graphically in a sketch diagram.

ARC Role: ARC staff reviews information to determine how project addresses regional goals and to understand any relationship that might exist between the proposed project and other existing or proposed facilities.

3) Supporting Data

Project Sponsor Role: Local sponsor provides a snapshot of data that supports the need for the proposed project in each of the emphasis areas (safety, mobility, economic development). As noted above, ARC staff may direct project sponsors to available tools and/or provide direct assistance to help project sponsors locate, collect and assemble data and information for the initial project submittal.

ARC Role: Generally, ARC staff are looking for a complete picture of the safety issue being addressed by the proposed project. Pedestrian or bicycle crash data is often used to identify a potential safety issue. At a minimum the total

Example Project 1

It is important for the project sponsor to present a thorough understanding of the contributing factors of crashes. Given this project is addressing pedestrian crashes at an intersection location, pertinent factors include poor sight lines, intersection geometrics that facilitate high-speed turning movements, signal phasing, and volume of all roadway users. Other non-infrastructure factors such as poor motorist compliance may also come into play, which are more effectively addressed through better enforcement and

number of crashes is considered i.e. the more crashes, the more severe the potential problem. Crash data that also contains information related to the severity of crash and crash cause (e.g. failure to yield, right-hook) can help provide a better understanding of the potential safety risk and nature of the issue(s). Conducting a field assessment or Roadway Safety Audit is also helpful for understanding behaviors of roadway users and potential contributing causes of crashes. As noted above, ARC staff may direct project sponsors to available tools and/or provide direct assistance to help project sponsors locate, collect and assemble data and information during the identification phase.

> Example Project 2
>
> Unlike intersections, crashes along corridors tend to be more dispersed, and thus it is more difficult to pinpoint specific locations in need of improvement. Crash data that specifies the cause of crash, and field observations are very important for determining what safety improvements may be needed.

4) Budget, Phasing & Supporting Documentation

Project Sponsor Role: Local sponsors are asked to provide a general budget and phasing plan (for larger projects) and supporting documentation which can be used to gauge the degree to which the proposed project has been planned/designed, as well as project sponsor commitment. At a minimum, project sponsors should provide documentation of match. For larger projects a phasing plan shows how requested funding will be applied to the larger project helps to demonstrate that the project sponsor has a targeted need for requested funding. Other project sponsor commitment criteria discussed in Tech Memo 3 include urgency of project (in relation to existing opportunities), and project readiness, which may be reflected in the phasing plan for larger projects.

> Example Project 1
>
> Intersection projects are likely to be discrete in terms of project limits and timeframe. They may be comprised of multiple elements that are implemented as one project.

> Example Project 2
>
> Corridor projects are more likely to be large in scope, may be longer term, and may include several phases. Corridor projects may address specific pedestrian safety issues in an incremental way or all as one component.

ARC Role: ARC staff reviews information to determine if the requested amount of funding is appropriate given the scope of the project and project sponsor commitment to the project.

Project Screening Outcome

At the end of the project screening phase ARC staff will have selected all projects that meet eligibility requirements and screening criteria. Depending on the number of submitted projects and available funding, ARC staff may further refine the short list of projects by evaluating project sponsor commitment.

Conducting a workshop for project sponsors whose projects have been shortlisted would provide an opportunity for ARC staff go over the technical review phase and the information project sponsors will need to provide. This may also be an opportunity to introduce requirements for and approaches to project evaluation and reporting.

ARC staff may also provide feedback to those project sponsors with projects that have not been selected for technical review. Feedback would focus on aspects of the project, or local commitment that could be strengthened to make the project more competitive, and direct project sponsors to good project examples.

C. Project Selection

During the project selection phase ARC staff conduct a more technical evaluation of projects, and ultimately score and rank projects. Staff may provide additional assistance or guidance to project sponsors to ensure the project is directly addressing eligibility requirements and selection criteria.

For projects where safety is the focus an emphasis should be put on reducing crash risk. There are a number of pedestrian countermeasures for which Crash Reduction Factors (CRFs) or Crash Modification Factors (CMFs) have been developed based on thorough before/after studies of the countermeasure application. Where a CRF or CMF is available for a proposed project, or component of a proposed project, this should be the primary consideration.

Where a CRF or CMF is not available for a proposed project, emphasis should be on determining if a proposed treatment reduces pedestrian or bicyclist exposure by eliminating or reducing potential conflicts between motorized and non-motorized traffic.

Crash Modification/Reduction Factors

A crash modification factor (CMF) is used to compute the expected number of crashes after implementing a given countermeasure at a specific site. A crash reduction factor (CRF) is used to estimate the percentage reduction in crashes after implementing a given countermeasure. A CRF is essentially the inverse of a CMF.

FHWA maintains a clearinghouse of both CMFs and CRFs at: http://www.cmfclearinghouse.org/index.cfm

Project Sponsor Role: The project sponsor should include in their application CRFs or CMFs for the proposed project or any component of the proposed project for which this information is available. In some cases, there may be unique conditions that may impact the direct applicability of a CRF/CMF, which the sponsor should specify and discuss how they propose mitigating those conditions. When a CRF/CMF is not available for a given treatment within a project proposal it is the project sponsor's responsibility discuss in detail how the proposed treatments mitigate existing safety issues.

Example Project 1

CRFs/CMFs are more common for intersection treatments because this is where the majority of pedestrian crashes occur.

ARC Role: ARC staff will review information and assign points to projects based on the degree to which they reduce crash risk or pedestrian exposure.

For CRFs/CMFs scoring should be proportional to the multiplicative factor (CMF) or percent reduction in crashes (CRF). For example, CMFs are on a scale from 0.0 to 1.0, the higher the CMF, the lower the expected impact on reducing crashes. A CMF of 0.81 would be scored lower than a CMF of 0.2. CRFs are presented as a percentage - the higher the percentage, the higher the estimated reduction in crashes. Generally, when a CMF is available for a given treatment a CRF is also available.

For treatments that do not have CRFs/CMFs, ARC staff may take other factors into consideration to determine crash risk reduction. For example, vehicle speed, vehicle volumes, number of vehicle travel lanes, crossing distances, conflict points, traffic operations at intersections all impact pedestrian exposure or the potential severity of conflicts. Projects that entail building new facilities that eliminate or reduce the conflict factor may be scored according to these roadway conditions. For example, projects on high speed roadways may be scored higher, or projects that reduce conflict points between bicyclists/pedestrians and motor vehicles may score higher.

Example Project 2

CMFs/CRFs for more corridor-applied countermeasures (e.g. sidewalks) tend to be lower mainly because fewer crashes tend to occur along corridors when compared to intersections. For the example project pedestrian safety issues are likely related long distances between intersections (long blocks) where pedestrians are expected to cross the street. This condition encourages mid-block crossing of roadways with high vehicle speeds and multiple lanes.

Project Selection Outcome

At the end of the project selection process the ARC will have chosen projects that best meet evaluation criteria (i.e. most likely to further regional transportation goals) have the strongest local commitment, and utilize available funding.

II. Implementation and Reporting

A. Coordination with implementing agency

Occassionally, problems arise due to miscommunication or different understanding of projects between GDOT and the local sponsor. The Project Development Process (PDP) meetings held by GDOT for some projects have proven to be good for ensuring that all stakeholders involved in a project understand both the technical details of a project as well as the administrative requirements of the contract and funding program. This will help facilitate smoother project delivery, management of contractors and administration of the project.

B. Project Evaluation and Reporting

A key responsibility of the ARC is to track progress towards meeting regional goals, and ensure that ARC funds are being used effectively. With regards to safety, one of the best ways for measuring project performance is through before and after studies. For example, the performance of safety improvements

is most directly measured by comparing the number of crashes (or crash rates if available) before improvements are made to the number of crashes after the improvements are made. Such comparisons are most useful when made over the same duration of time, and over a number of years to evaluate longer term trends.

ARC Role: ARC must inform project sponsors that they will be required to evaluate the performance of their ARC-funded project. ARC should provide a reporting form to project sponsors that defines the performance measures and details the data that is needed evaluate project performance and how to go about collected the data. For example, if the performance of a bike facility is measured by the number bicyclists counted, then it is important for project sponsors to collect bicycle volume data within the same corridor before the project is implemented.

Project Sponsor Role: The project sponsor is responsible for collecting all data all before and after data, analyzing the data, and reporting findings on project performance. Failure to submit an evaluation report within the specified time period (should be a year or two out from project construction) may impact local agencies from future funding.