BROWARD

COMPLETE STREETS

EVALUATION TOOLKIT

USER MANUAL

BROWARD COMPLETE STREETS
Safer, Healthier Streets for ALL Users

broward MPO
metropolitan planning organization

This document was created as part of the Broward MPO Complete Streets Initiative:

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metropolitan planning organization

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Acknowledgments

The Broward Metropolitan Planning Organization (MPO) is Broward County's transportation policy-making board comprised of 19 voting members including representatives from the South Florida Regional Transportation Authority/Tri-Rail (SFRTA), the Broward County School Board, and three Broward County Commissioners. The Broward MPO works with the public, planning organizations, government agencies, elected officials, and community groups to develop transportation plans. The Broward MPO's mission is to influence the expenditure of federal and state funds to provide a regional transportation system that ensures the safe and efficient mobility of people and goods, optimizes transit opportunities, and enhances our community's environmental and economic well being. With the support of the Broward MPO Board, Broward County Government, municipalities throughout Broward County, and many other stakeholders, Complete Streets programs and projects have been initiative throughout the county.

The Broward MPO is the lead organization in implementing the Broward Complete Streets Initiative. The vision of the Broward Complete Streets Initiative is to create a safe and efficient transportation network that promotes the health and mobility of all residents and visitors by providing high quality multi-modal (pedestrian, bicycle, transit and automobile) access throughout Broward. In July 2012, the Broward MPO endorsed Broward Complete Streets Guidelines to facilitate and assist local governments in the implementation of Complete Streets. Over the past few years, the Broward MPO with guidance from the Complete Streets Technical Advisory Committee (TAC) has produced documents and implemented activities to help guide local governments in revising internal policies and regulations to help implement Complete Streets. The Broward MPO would like to thank the TAC members and the Complete Streets Evaluation Subcommittee members for their commitment to the Broward Complete Streets Initiative through their expert input and guidance in developing this evaluation toolkit.

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Definitions

Annual Average Daily Traffic (AADTs)

The total volume of traffic on a highway segment for one year, divided by the number of days in the year, typically calculated by adjusting a short-term traffic count with seasonal (weekly) factors obtained from continuous monitoring sites.

Bicycle Level of Service (BLOS)

The evaluation of the bicycling conditions of shared roadway environments. This measure takes into account: volume and speed of traffic in outside travel lane; heavy vehicle percentage; pavement condition; bicycle lane presence; bicycle lane, shoulder, outside lane widths, and on-street parking utilization.

Bus Level of Service (Bus LOS)

The quantified stratification of quality service for buses.

Canopy Cover at Edge of Pavement (CCEP)

A standard measurement of street tree canopy coverage that measures the percentage of shading that street trees provide streets.

Complete Streets

Streets designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.

Connectivity

The density of connections in path or road networks and the directness of links.

Connectivity Index

The ratio of in path or road network connections (links) to intersections (nodes).

Crash Modification Factors (CMF)

A multiplicative factors used to compute the expected number of crashes after implementing a given countermeasure at a specific site.

Crash Reduction Factors (CRF)

An estimate of the percentage of reduction in crashes due to particular countermeasures.

Goal

Specific, measurable desired outcome of a project, program, or policy that can realistically be achieved in a certain timeframe under predetermined cost constraints.

Green Infrastructure

Infrastructure that uses vegetation, soil, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water; at the scale of a

neighborhood or site, green infrastructure refers to stormwater management systems, like rain barrels, permeable pavement, or street planters that mimic nature by soaking up and storing water. -*EPA*

Incidence

A measure that determines the probability of something occurring during a specified period of time.

Level of Service (LOS)

A quantified stratification of quality service into six letter grades that assesses multimodal service in the roadway environment.

Low Impact Development (LID)

An approach to land development that works with natural elements, like rain gardens and vegetated rooftops, to manage stormwater as close to the source as possible.

Metric

Systematic measure describing how well a project, program, or policy has achieved a specific goal.

Multimodal Level of Service (MMLOS)

Analysis of steady state of conditions during a specified analysis period. MMLOS applies to urban streets with all modes of travel (cars, pedestrians, transit, and bicycles) and assesses the impact of facility design and operation on all users except for commercial vehicles.

Pedestrian Level of Service (PLOS)

Analysis calculated by counting pedestrians who cross a point over a certain period of time (usually 15 minutes), reducing that figure to pedestrians per minute and then dividing by the effective width of the sidewalk, resulting in a flow rate that is categorized in a grade, ranging from A (free flow) to F (virtually no movement possible).

Pedestrian Route Directness (PRD)

The ration of route distance to straight-line distance between two selected points.

Performance Measure

Quantitative measure of the actual or potential performance of meeting a specific goal.

Quality of Service (QOS)

A traveler-based perception of how well a transportation service or facility operates.

Tool

Assessment developed to measure performance.

Vehicle Level of Service (Vehicle LOS)

The quantified stratification of quality service for vehciles.

Vehicle Miles Traveled (VMTs)

VMT is a measure of total vehicle traffic on a public roadway. It is estimated based on average daily traffic volume counts and roadway length.

Introduction

COMPLETE STREETS

What are Complete Streets?

Communities and local governments are increasingly realizing the value of their streets to serve as public spaces that safely accommodate all modes of transportation. Local governments and transportation planning organizations are looking to design more "Complete Streets," or streets that accommodate all types of users, safely and equitably. Complete Streets allow people to easily and safely walk, shop and ride their bikes. They offer public transportation options that run on time, that are clean and that allow people to walk or bike to transit stops. Complete Streets are designed to meet American Disabilities Act (ADA) standards and regulations to accommodate all persons with disabilities. To create these changes, communities have begun to adopt Complete Streets policies directing transportation planning and engineers to implement street designs that provide safe access for users of all ages, abilities and modes of transportation. There is no one template that should dictate the design of a Complete Street; instead, there are many design techniques that can be adopted, in order to accommodate a community's particular needs and unique context.

Why Complete Streets?

Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.

Complete Streets policies direct transportation planners and engineers to systematically incorporate community designs that operate by passing all of the right of way onto all transportation users so that everyone, regardless of mode of transportation, age, or ability, can enjoy safe access to communities. These policies address the problem of "incomplete streets," or streets designed entirely for cars, by including pedestrians', bikers', and transit users' needs to allow for more transportation options for people going to work, to run errands and to move through their lives. Complete Streets policies improve community efficiency, capacity and productivity with limited resource input. Many Complete Streets projects require little resources and by re-prioritizing and reallocating project funds to projects that can improve overall mobility, Complete Streets projects can provide low cost, quick and effective means to creating long-term community benefits, such as:

- **Safety**
- **Equity**
- **Public Health**
- **Capacity**

Broward County's Complete Streets Policy

Broward County's Metropolitan Planning Organization (Broward MPO) has been the leader in implementing the Complete Streets Initiative in Broward County. In 2011, the Broward Regional Health Planning Council (BRHPC) secured a Community Transformation Grant (CTG) from the Centers for Disease Control and Prevention (CDC), known as the Transforming our Community's Health (TOUCH) initiative. As a result, Urban Health Partnerships (UHP), Smart Growth Partnership, Health Foundation of South Florida (HFSF) and the Broward MPO worked countywide to create healthy and safe places that are supportive of active lifestyles. The vision is to create a safe and efficient transportation network that promotes the health and mobility of all residents and visitors by providing high quality multimodal

(pedestrian, bicycle, transit and automobile) access throughout Broward County. The goals of the Broward Complete Streets program include improving walkability, accessibility and aesthetics, and reducing pollution, since Complete Streets tend to improve livability (local environmental quality and affordability).

Broward Complete Streets Guidelines

The Broward MPO will soon be initiating its fourth phase of Complete Streets implementation. In Phase One of implementation, the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**) were created under the guidance of the Broward MPO's Technical Advisory Committee (TAC) and were unanimously endorsed by the Broward MPO Board in July 2012. The *Broward Complete Streets Guidelines* are based on Complete Streets principles that aim to design streets for people of all ages and physical abilities and accommodate all travel modes. The guidelines offer ways to design streets and provide guidance for those municipalities adopting Complete Streets.

Under Title II of the Americans with Disabilities Act (ADA) of 1990, state and local governments and public transit authorities must ensure that all of their programs, services, and activities are accessible to and usable by individuals with disabilities. In Chapter 7 of the *Broward Complete Streets Guidelines*, there is guidance provided on how to meet ADA requirements. Not only do the guidelines provide an overview of the legal framework, they specify some of the design requirements. As a Complete Streets project progresses through design and construction, be sure to coordinate with the local Civil Rights Office/ADA Coordinator to determine if all ADA requirements are being met.

Broward County Complete Streets Goals:

- Walkability
- Accessibility
- Aesthetics
- Reduce pollution
- Livability

Broward County's Complete Streets Implementation

As part of the second phase of implementation, the Broward Complete Streets Technical Advisory Committee (TAC) was convened to create a "Model Policy Taskforce" and "Model Plan Taskforce" to develop a Complete Streets policy and planning framework. In 2013, the Broward MPO, with assistance from Urban Health Partnerships (UHP), developed the Model Plan and Model Policy for cities in Broward County to utilize when adopting Complete Streets Policies, of which several have already incorporated. The Model Plan and Model Policy also can help with identifying and prioritizing Complete Streets corridors, potentially leading to the funding and construction of improvement projects.

During phase III, the Complete Streets Evaluation Subcommittee was created to lead the work of creating a comprehensive evaluation manual for Broward County Complete Streets projects, and that could also be applied to Complete Streets and multimodal transportation evaluations in any setting. The Evaluation Subcommittee guided the development of this *Complete Streets Evaluation Toolkit User Manual*, including the evaluation frameworks and the evaluation tools, and they will pilot two Complete Streets evaluation project demonstrations in Broward County.

In February of 2015, the Broward MPO held a groundbreaking ceremony to kickoff the dedicated of $100 million in funding for pedestrian and bicycle improvements. The five-year Complete Streets program will continue through 2019, and provide significant impacts to many cities within Broward County. Being able to measure these Complete Streets impacts is the reason the *Complete Streets Evaluation Toolkit* is so timely and important.

COMPLETE STREETS EVALUATION TOOLKIT AND USER MANUAL

The *Complete Streets Evaluation Toolkit* is a collection of materials that make up the guides and tools necessary to conduct evaluations of Complete Streets policies and project implementation, as well as evaluations of the success of constructed Complete Street elements. Although the *Complete Streets Evaluation Toolkit* was designed to evaluate Broward Complete Streets, it can be used by cities that may or may not have fully implemented a Complete Streets policy or project.

What's in the Complete Streets Evaluation Toolkit?

The *Complete Streets Evaluation Toolkit* is made up of the following:

- **The *Complete Streets Evaluation Toolkit User Manual***
  The *Complete Streets Evaluation Toolkit User Manual* is this document. The manual walks Complete Streets evaluators through an introduction to evaluating Complete Streets, an explanation on the various evaluation tools that will be employed to evaluate a Complete Streets policy and project implementation, how to conduct baseline and evaluation data collection, and how to interpret evaluation results. The bulk of the manual is comprised of detailed explanations for each evaluation tool, providing information on the purpose of the tool, data collection and results. In the Appendix of the *Complete Streets Evaluation Toolkit User Manual,* evaluators will find links to additional resources and printable copies of *Complete Streets Evaluation Tools*.

- **The *Complete Streets Evaluation Toolkit Spreadsheet and Worksheet Tools***
  The *Complete Streets Evaluation Toolkit Spreadsheet* houses all of the data collected at baseline and evaluation for a Complete Streets policy and project implementation evaluation. The spreadsheet is made up of the *Complete Streets Evaluation Toolkit Worksheet Tools.* The *Complete Streets Evaluation Toolkit Worksheet Tools* are the individual worksheets that in total make up the *Complete Streets Evaluation Toolkit Spreadsheet*. A worksheet, or multiple worksheets, is/are dedicated to housing the baseline and evaluation data for each evaluation metric. The worksheet tabs are labeled at the bottom to make it easy to locate specific worksheets.

- **The *Complete Streets Evaluation Field Data Collection Tools***
  The *Complete Streets Evaluation Field Data Collection Tools* are the Word document tools located in the Appendix section of the *Complete Streets Evaluation Toolkit User Manual*. These are the tools that evaluators will use to collect baseline and evaluation data when in the field.

- **The *Complete Streets Evaluation Framework Tables***
  The *Complete Streets Evaluation Framework Tables* outline the goals, objectives, metrics, and performance measures for both corridor level and program level evaluations.

Purpose of the Manual

The purpose of the *Complete Streets Evaluation Toolkit User Manual* is to provide the necessary information, instruction, tools and guidelines for collecting comprehensive baseline and evaluation data for a Broward County Complete Streets corridor or program. The *Complete Streets Evaluation Toolkit* is designed for application to Broward County Complete Streets projects, but the frameworks and guidelines of the evaluation can be directly applied to Complete Streets or other multimodal transportation projects, anywhere. The goal of this manual is to be:

- **Simple**
  The *Complete Streets Evaluation Toolkit User Manual* and each evaluation tool simply explain how to conduct the necessary data collection for each step in the evaluation process. The tools do as much of the work for the data collector as is possible. The *Complete Streets Evaluation Toolkit User Manual* explains to the data collector: what each tool is, how to use it, where to find the data, and how to interpret the results.

- **Easy-to-use**
  The *Complete Streets Evaluation Toolkit User Manual* and the evaluation tools were designed for anyone to use while performing a Complete Streets evaluation, regardless of previous evaluation experience. The following manual and tools will explain each step that needs to take place in order to successfully evaluate a Complete Streets policy and project implementation.

- **Quantifiable**
  All results from the Complete Streets evaluation provide a numerical evaluation describing the level of success of the implementation of a Complete Streets project. These numbers provide data that show the magnitude and value of each project, in an easy to use format.

The *Complete Streets Evaluation Toolkit User Manual* was designed to provide the most concise, quantifiable and applicable metrics and performance measures for evaluating a Complete Streets or other multimodal transportation project. There are dozens of metrics and performance measures that can and have been applied to measure previous Complete Streets projects. This evaluation framework was developed following thorough research on Complete Streets and other active transportation metrics and performances measures. Through a vetting process that involved stakeholders from multiple sectors, the goals, metrics and performance measures that provided the best evaluation of a Broward County Complete Streets project were selected.

How to Use the Manual

The manual is designed to provide easy-to-use instructions and tools for collecting baseline and evaluation data for a Complete Streets project at the corridor or program level. It contains the: frameworks for corridor and program level evaluations; evaluation tools; instructions for each tool, including guidelines on how to use the tool and data sources; and, information on how to interpret and report results. The manual is designed for use by evaluators of all levels, from the novice to the expert.

The *Complete Streets Evaluation Toolkit* is designed for the evaluation of Complete Streets projects funded by the Broward MPO. Cities within Broward County will work with the Broward MPO to complete corridor level evaluations. Program level evaluations will be conducted by the Broward MPO, using corridor level evaluation data collected by cities. Corridor level evaluation data that's collected will be aggregated by the Broward MPO, for the program level evaluation. Cities with multiple Complete Streets projects can use the program level evaluation to conduct their own program-wide evaluations.

The *Complete Streets Evaluation Toolkit User Manual* was developed for the Broward Complete Streets evaluation team as well as relevant Broward Complete Streets stakeholders and partnering organizations

responsible for, or participating in, the evaluation of a Complete Streets policy and project implementation. The evaluation team and stakeholders may be comprised of a multidisciplinary group of members with all levels of experience in project or program evaluation.

Baseline data for corridor and program evaluations will need to be conducted before or at the early stages of the implementation of a Complete Streets policy or project. Evaluations both at the corridor and program levels will be conducted at select intervals determined during implementation planning. For example, evaluation may take place every five years, and evaluation intervals may be different for corridor evaluations and program evaluations.

Some of the performance measures and corresponding tools will "build off" of the data collected and analyzed in other tools. Instructions on which performance measures and tools need to be collected before others, how to do this, and an explanation of why this needs to be done will be explained in more detail in the **Complete Streets Evaluation Tools** section.

Introduction to the Evaluation

In order to truly understand the value of a Complete Streets investment, it is necessary to assess conditions and behaviors before Complete Streets implementation and make comparisons post-implementation. The evaluation process begins before the implementation of a program or project and may not end until years after that program or project has been completed. Evaluation is a critical component in demonstrating to policy-makers and constituents the benefits that Complete Streets provide, when trying to garner future support for Complete Streets policies and projects.

Complete Streets Evaluation

The Broward Complete Streets evaluation is an outcome evaluation that will evaluate the benefits the Complete Streets implementation has had at the corridor and program levels. The goal of the Broward Complete Streets evaluation is to measure the benefits and impacts Complete Streets projects have had on the local Broward community. This *Complete Streets Evaluation Toolkit User Manual* will facilitate an evaluation through baseline and evaluation data collection and analysis of the Broward Complete Streets policy and project implementation.

> The goal of Broward Complete Streets Evaluation is to measure the benefits and impacts Complete Streets projects have had on the local Broward community.

Best Practices

Smart Growth America, the advocacy organization responsible for the National Complete Streets Coalition program, identified five best practices for measuring the performance of a Complete Streets implementation. These best practices were incorporated into the *Complete Streets Evaluation Toolkit User Manual* to ensure adherence to evaluation standards. The five best practices are:

1) **Collaborate** with others to collect and analyze data
   - ✓ The evaluation team, using the *Complete Streets Evaluation Toolkit User Manual*, will establish working relationships with partner agencies and organizations to collaborate on the collection of data for evaluation.

2) Use rates, rather than straight numbers, to **show changes** in safety and mode shift over time
   - ✓ Percent changes will be used in the evaluation to show the changes from baseline to evaluation pre- and post- Complete Streets implementation.

3) **Establish baseline data** so as to better illustrate successes
   - ✓ The Complete Streets Evaluation Toolkit Manual will walk the evaluation team through collecting both baseline and evaluation data. Baseline data will be collected prior to the implementation of the Complete Streets policy or project to serve as a reference point from which to compare evaluation metrics.

4) Be clear about **measuring outputs versus outcomes**
   - ✓ Each measurement will be identified as an output or an outcome. In the final Chapter, **Reporting Results**, instructions will be provided on why it is important to report this kind of data and how it can be used in an evaluation report.

5) **Create metrics** that are **specific to community goals**[1]
   - ✓ The Broward Complete Streets Evaluation was designed to support and reflect the goals and objectives of the Broward County Long Range Transportation Plan (LRTP) 2040.

[1] Smart Growth America. (2014, December 14). *Measuring Performance.* National Complete Streets Coalition. Retrieved from: http://www.smartgrowthamerica.org/complete-streets/implementation/measuring-performance

Preparing for Evaluation

Identify Team Roles

Evaluating a Complete Streets project implementation will require a collaborative effort between the Broward MPO and the city or entity involved. Therefore, it is recommended to include on the evaluation team at least one staff person from the Broward MPO and at least one staff person from the city.

One suggestion is to have an evaluation team of at least three people: two evaluators that can go into the field to collect data and one desktop evaluator to gather and organize the data that is available online and from different departments. Identify one team member as the evaluation team leader, the person who will ensure that an evaluation is on the right track, hold team members accountable and guide the interpretation of evaluation results. Data collection in the field is estimated to take 8 working days, so keep that in mind when developing the evaluation timeline.

The *Complete Streets Evaluation Toolkit* is designed for evaluators of all levels, from the novice to the expert, so an experienced evaluation team is not necessary to successfully conduct a Complete Streets evaluation using these materials. However, having someone familiar with evaluation on the team is always helpful.

Determining Geographic Scope

Before the evaluation process can begin it is important to determine the geographic scope for the evaluation that will be conducted. Complete Streets projects vary in the level at which they can be implemented: on a one-block street segment, along one corridor, concurrently along multiple corridors, in one neighborhood, citywide or countywide. During the evaluation planning process, determine what geographic area or areas the evaluation will assess. Will it evaluate one particular corridor or a whole program area?

If evaluating a whole program area, are there certain corridors within that area where field data should be collected, in order to serve as representative data for the whole program? Outlining this information beforehand will help determine whether a corridor level (a street or network of streets where Complete Streets elements have been constructed) or program level (Complete Streets policy implemented citywide or countywide) evaluation framework would be most applicable to the Complete Streets project under evaluation. Both frameworks are outlined in the next Chapter, **Evaluation Frameworks.**

Evaluation Frameworks

To determine the relevant goals, metrics, and performance measures necessary to provide a comprehensive evaluation of Broward County Complete Streets projects, a careful review of previous Complete Streets policies, active transportation projects and evaluation frameworks was conducted. Numerous goals, metrics, and performance measures were vetted and narrowed down to those selected for use in the following evaluation frameworks. The Complete Streets Evaluation Frameworks' goals and objectives were developed and designed to align with the Broward County 2040 Long Range Transportation Plan goals and objectives (**Appendix B).**

Broward County Long Range Transportation Plan 2040

The Long Range Transportation Plan (LRTP 2040) is Broward County's long-term strategic plan for investing in transportation assets. Developed by the Broward MPO as the plan for the Commitment 2040 strategies investments in transportation assets, LRTP 2040 prioritizes billions of dollars in public investment over the next 26 years for the Broward County urbanized area. The Broward MPO has developed goals, objectives and measures that will provide a path to follow during the project planning and prioritization process, as well as to serve as benchmarks of how well the LRTP 2040 and projects are meeting the standards. The LRTP 2040 is the framework for a balanced and forward thinking system, with investments toward alternative modes such as mass transit, bicycle, pedestrian and smart growth policies. Put simply, the LRTP 2040 is the County's plan for change over the next two and a half decades **(Appendix B).**

2040 LRTP Goals:

- Move people
- Create jobs
- Strengthen communities

Evaluation Frameworks Development

The Complete Streets Evaluation Subcommittee determined that two separate evaluation frameworks were needed at the corridor and program levels (**Tables 1** and **2** on page 23 and 24 respectively). The subcommittee determined that evaluation results at the individual project level, if compared to a countywide evaluation, would require different types of data results to determine the success of Complete Streets implementation. It was for this reason that separate frameworks were determined to be necessary for evaluation.

Ultimately, the same four goals were selected for the corridor and program level evaluations:

1) Balanced Mobility
2) Safety
3) Economic Vitality
4) Health and Sustainability

Each goal has corresponding objectives, metrics and performance measures that correspond with each of the corridor and program level evaluation frameworks.

The Evaluation Frameworks serve more as suggestive guides than rigid requirements for how to comprehensively evaluate Complete Streets projects, and some evaluators may find that they do not

need to collect information on all of the performance measures for their Complete Streets evaluation. In cases where a standard tool may not provide a certain range in the results, an enhanced evaluation tool is provided for the corridor and program level evaluations. The standard evaluation tools allow for easier evaluation data collection while still providing a solid body of evaluation information. Enhanced evaluation tools are more complex, requiring more time for data collection, and they may be more difficult for those new to the evaluation process.

Carefully consider and determine what information your stakeholders and decision-makers need to know to understand the level of success of the program, and decide which of the metrics' and performance measures' results will inform these needs.

Broward Complete Streets Evaluation Framework Tables

The Corridor and Program Level Evaluation Framework tables (**Table 1** and **Table 2,** on page 23 and 24 respectively) outline the goals, objectives, metrics and performance measures that can be used to quantifiably evaluate Complete Streets policy and project implementation. The evaluation frameworks serve to guide project evaluators through the evaluation process so that evaluation results will inform on the level of success and impact of a Complete Streets policy post-implementation.

Goals

Corridor Level Complete Streets Evaluation Framework:

- 4 Goals
- 12 Objectives
- 14 Metrics
- 18 Performance Measures

Program Level Complete Streets Evaluation Framework

- 4 Goals
- 14 Objectives
- 16 Metrics
- 21 Performance Measures

The Complete Streets Evaluation goals describe the desired results from a successful Complete Streets policy and project implementation. These goals were developed based on a review of the Broward MPO goals that will comprise the 2040 LRTP for Broward County as well as previously used Complete Streets evaluation goals and metrics. The four goals listed in the **Evaluation Frameworks Development** section (p. 22) were selected to comprehensively evaluate corridor and program level Complete Streets policy and project implementation in Broward County. The definition for each goal is defined below.

1) Balanced Mobility
   Create streets that enable safe access for people of all abilities using all multimodal transportation options.

2) Safety
   Create safer walking and biking route options for children, older adults and persons with disabilities, and reduce vehicle crash-related injury and mortality rates.

3) Economic Vitality
   Strengthen the economic vitality along a Complete Streets implementation area.

4) Health and Sustainability
   Promote improved health outcomes and support environmental sustainability.

Objectives

The Complete Streets Evaluation objectives at the corridor and program levels, listed in **Table 1** and **Table 2** (on page 23 and 24 respectively), were developed in line with the objectives presented in the LRTP 2040 goals and objectives. The objectives were developed to be SMART: specific, measurable, actionable, relevant, and time based. These SMART objectives provide detailed instructions on the changes that are expected for a Complete Streets policy and project implementation to be considered successful. The specific percentages expected post-baseline will be determined by Broward MPO after the toolkit has been piloted and updated with lessons learned.

SMART Objectives:

- Specific
- Measurable
- Attainable
- Relevant
- Time based

Metrics and Performance Measures

The metrics listed in the evaluation framework tables (**Table 1** and **Table 2**) are the measures (mode share, vehicle speeds and vacancies) that will be collected to meet objectives. Performance measures provide more specific information on how mode share data will be collected.

Table 1: Corridor Level Complete Streets Evaluation Framework

Goals	Objectives	Metrics	Performance Measures	Tools
1. Balanced Mobility	1.1 Increase the incidence of bicycling and walking by X% at X months post-baseline.	Mode Share	Change in Bicycle Counts	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools
			Change in Pedestrian Count	
	1.2 Increase the number of transit users by X% at X months post-baseline.	Transit Ridership	Boarding and alighting transit activity along the Corridor	Automatic Passenger Counter Worksheet Tool
	1.3 Provide X% new facilities for bicyclists and pedestrians that improves the roadway environment for all users at X months post-baseline.	Multimodal Facilities	Percentage of Sidewalks and Bicycle Lanes/Paths Facilities	Multimodal Facility Coverage Worksheet Tool
			Multimodal Level of Service (MMLOS)	MMLOS Worksheet Tool
2. Safety	2.1 Decrease crash injury and mortality rates for bicyclists and pedestrians by X% at X months post-baseline.	Crashes and Severity	Number of Crash Injuries and Mortalities	Crash Injury and Mortality Worksheet Tools
	2.2 Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post-baseline.	Vehicle Speeds	Change in Actual Automobile Speeds	Vehicle Speeds Worksheet Tool
		Safer Facilities	Number and Value of Crash Modification Factors (CMFs) and Crash Reduction Factors (CRFs) from Design Countermeasures	CMFs Inventory Worksheet Tool
3. Health and Sustainability	3.1 Reduce vehicle emissions by X% and fuel consumption by X% through increased bicycle/pedestrian activity at X months post-baseline.	Environmental Impacts	Pounds of Carbon Dioxide Car Emissions Reduction from Bicycle and Pedestrian Usage	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools
			Gallons of Fuel Savings	
	3.2 Increase physical activity by X% at X months post-baseline.	Physical Activity	Number of Walking and Biking Trips	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tool
	3.3 Incorporate natural design elements throughout the corridor by X% at X months post-baseline.	Environmental Infrastructure	Percentage Tree Canopy Coverage	Tree Canopy Field Data Collection and Worksheet Tools
			Green Infrastructure for Water and Drainage	National Stormwater Calculator Field Data Collection and Worksheet Tools
	3.4 Increase community support and satisfaction by X% at X months post-baseline.	User Satisfaction	Self-Reported User Satisfaction	Complete Streets User Satisfaction Survey and Worksheet Tools
4. Economic Vitality	4.1 Increase property values and business sales along the corridor by X% at X months post-baseline.	Property Values	Commercial and Residential Property Values	Property Values Worksheet Tool
		Retail Activity	Business Sales Volume	Sales Volume Worksheet Tool
	4.2 Reduce the number of parcel/business vacancies along the corridor by X%/$X at X months post-baseline.	Vacancies	Number of Vacant Parcels	Vacant Parcels Worksheet Tool
	4.3 Reduce healthcare costs by X%/$X at X months post-baseline.	Healthcare Costs	Dollars of Healthcare Cost Savings from Bicycle and Pedestrian Usage	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools

Table 2: Program Level Complete Streets Evaluation Framework

Goals	Objectives	Metrics	Performance Measures	Tools
1. Balanced Mobility	1.1 Increase the incidence of bicycling and walking by X% at X months post-baseline.	Mode Share	Change in Bicycle Counts	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools
			Change in Pedestrian Count	
	1.2 Increase the number of transit users by X% at X months post-baseline.	Transit Ridership	Boarding and alighting transit activity along the Corridor	Automatic Passenger Counter Worksheet Tool
	1.3 Provide X% new facilities for bicyclists and pedestrians that improves the roadway environment for all users at X months post-baseline.	Multimodal Facilities	Percentage of Sidewalks and Bicycle Lanes/Paths Facilities	Multimodal Facility Coverage Worksheet Tool
			Multimodal Level of Service (MMLOS)	MMLOS Worksheet Tool
	1.4 Decrease in traffic volume by X% at X months post-baseline.	Traffic Volume	Number of Annual Average Daily Traffic (AADTs)	
			Number of Vehicle Miles Traveled (VMTs)	
	1.5 Increase network connectivity by X% at X months post-baseline.	Equitable Network Connectivity	Equitable Multimodal Network Connectivity	Connectivity Worksheet Tool
2. Safety	2.1 Decrease crash injury and mortality rates for bicyclists and pedestrians by X% at X months post-baseline.	Crashes and Severity	Number of Crash Injuries and Mortalities	Crash Injury and Mortality Worksheet Tool
	2.2 Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post-baseline.	Vehicle Speeds	Change in Actual Automobile Speeds	Vehicle Speeds Worksheet Tool
		Safer Facilities	Number and Value of Crash Modification Factors (CMFs) and Crash Reduction Factors (CRFs) from Design Countermeasures	CMFs Inventory Worksheet Tool
3. Health and Sustainability	3.1 Reduce vehicle emissions by X% and fuel consumption by X% through increased bicycle/pedestrian activity at X months post-baseline.	Environmental Impacts	Pounds of Carbon Dioxide Car Emissions Reduction from Bicycle and Pedestrian Usage	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools
			Gallons of Fuel Savings	
	3.2 Increase physical activity by X% at X months post-baseline.	Physical Activity	Number of Walking and Biking Trips	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools
	3.3 Incorporate natural design elements in the program area by X% at X months post-baseline.	Environmental Infrastructure	Percentage Tree Canopy Coverage	Tree Canopy Field Data Collection and Worksheet Tools
			Green Infrastructure for Water and Drainage	National Stormwater Calculator Survey and Worksheet Tools
	3.4 Increase community support and satisfaction by X% at X months post-baseline.	User Satisfaction	Self-Reported User Satisfaction	Complete Streets User Satisfaction Survey and Worksheet Tools
4. Economic Vitality	4.1 Increase property values and business sales volume in the program area by X% at X months post-baseline.	Property Values	Commercial and Residential Property Values	Property Values Inventory Worksheet Tool
		Retail Activity	Business Sales Volume	Sales Volume Worksheet Tool
	4.2 Reduce the number of vacant parcels in the program area by X%/$X at X months post-baseline.	Vacancies	Number of Vacant Parcels	Vacant Parcels Inventory Worksheet Tool
	4.3 Reduce healthcare costs by X%/$X at X months post-baseline.	Healthcare Costs	Dollars of Healthcare Cost Savings from Bicycle and Pedestrian Usage	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools

Complete Streets Evaluation Tools

Broward Complete Streets evaluation tools were developed from existing evaluation tools, following a careful vetting and selection process. The tools were designed to be easy to use by evaluators, regardless of previous evaluation experience, and to allow for the evaluation to leverage existing resources and partnerships.

Evaluation Data Collection

The Complete Streets evaluation uses quantitative and qualitative data. Some of the data will need to be collected in the field, whereas some data can be collected from websites or online portals, and some data will be gathered from partners. The manual and toolkit will walk the evaluator through what data will need to be collected and how. Each tool is outlined in this manual and will provide information on both the type of data collection and how many data collectors are suggested.

Although it is not required in this Complete Streets evaluation, photographing Complete Streets changes before and after a Complete Streets project or program implementation offers an opportunity to visually document improvements. Photo documentation can take place while collecting data in the field or as a separate addition to the evaluation. Evaluators may want to take pictures of the changes to a corridor, such as before and after pictures of a whole street, or of different Complete Streets elements that have been implemented, such as before and after pictures of new bicycle facilities, bike lanes, or crash reduction measures. Evaluation tools that offer an opportunity for photo documentation will be noted in the information on that tool.

Tool Information

The tools can be divided into two categories: tools for collecting new data and tools for recording existing data. Tools for new data collection, like the *Complete Streets User Satisfaction Survey Tool* and the *Pedestrian and Bike Counts Worksheet*, will require an evaluation team Data Collector, or team of Data Collectors, to go into the field to collect and gather necessary data. Other tools, like the *Automatic Passenger Counter Worksheet,* will require new data collection from the Complete Streets team's partner organizations. Through prearranged agreements, the partner organization(s) will be responsible for collecting the new data, which will then be shared with the evaluation team to include in the evaluation.

Tools that record existing data, like the *Property Values Worksheet*, require the evaluation team Data Collector(s) to locate data that has already been collected by another party, separate from the Complete Streets Evaluation. The *Complete Streets Evaluation Toolkit User Manual,* and the included tools, will guide the evaluation team Data Collector(s) on where to access this data and provide a simple worksheet to which the evaluation team Data Collector(s) can plug in the appropriate data. The worksheets will automatically calculate additional analytical information, like the percent change between baseline and evaluation (pre- and post-project) data, when necessary.

Some or all of the following information will be given for each of the evaluation tools. This information describes general information about: the tool, the tool's purpose, how to use the tool to collect data, the source of the data collected (if not collected by the evaluators), and how to interpret the data results collected.

Tool Profile

Profiles offering logistical information are provided for each tool. This information provides the evaluation team with: information in regards to what level the tool will be used; the estimated cost of conducting baseline and evaluation data collection with that tool; the estimated number of hours it will take to collect the data; whether the data will be collected in the field, from partners, or online; the estimated number of evaluators needed; and, the level of difficulty of conducting the data collection.

The general breakdown for each page will look like this:

Level of Evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
✓ Corridor ✓ Program	X	Field Desktop	X	Easy, Medium or Difficult

About

Provides general information on the tool and defines any technical terms.

Purpose

Gives details on why you want to be collecting this information for a Complete Streets policy and project implementation evaluation.

Data Collection Guidelines

Provides general instructions on how to collect data for this tool. More detailed instructions will be available on the actual tool.

Data Source

Identifies the source of data for tools that gather data from organizations that conducted the primary data collection.

Results

Describes how the results of the data collection for each particular tool**.**

How to Use the Tools

In this section, you will find information on each of the recommended corridor level and program level Complete Street evaluations. The section starts by providing a checklist of the evaluation tools recommended for each level of evaluation. The two checklists serve as both a simple list of the tools that can be used for each evaluation and can be printed out before starting data collection for the evaluator to keep track of which tools they will be using and which tools may not be relevant to the specific project or program evaluation. The *Complete Streets Evaluation Spreadsheet* should be used to document the tools that will be used to collect data. The last Chapter, **Reporting Results**, provides information on what to do with the evaluation results and how they can be used to inform stakeholders and the public about the changes resulting from the implementation of a Complete Streets project.

Some of the metrics and performance measures, and their results may apply to more than one evaluation goal. For example, the healthcare cost savings results gathered from the *Conserve by Bicycle and Pedestrian Study Benefits Calculator Worksheet Tools* informs on the economic cost savings or expenses following a Complete Streets project, and also on the health benefits (if savings) or drawbacks (if expenses increase) following project implementation. Additionally, some tools will need to be completed before other tools can be used, as the latter tools utilize information from the preceding tools. A note, explaining which tool needs to be completed before another tool, will be placed at the end of the tools that need to be completed first.

The remainder of this section provides information on: the purpose of each tool, data collection guidelines, where data can be collected, and checklists of the recommended tools for corridor and program level evaluations.

Table 3: Evaluation Tools Checklists

The following checklists provide a list of each of the evaluation tools for corridor and program level Complete Streets evaluation. The checklists are grouped by each of the four goals. The tools are not necessarily listed in the order that your evaluation will take place.

Printable versions of these checklists are available in **Appendix C** and **Appendix D**.

Corridor Level Evaluation Tools Checklist

Goal 1: **Balanced Mobility**		
1.	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools	☐
2.	Automatic Passenger Counter Worksheet Tool	☐
3.	Multimodal Facility Coverage Worksheet Tool	☐
4.	MMLOS Worksheet Tools	☐
Goal 2: Safety		
1.	Crash Injury and Mortality Worksheet Tool	☐
2.	Vehicle Speeds Worksheet Tool	☐
3.	Crash Modification Factors (CMF) Inventory Worksheet Tool	☐
Goal 3: Health and Sustainability		
1.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐
2.	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools	☐
3.	Tree Canopy Field Data Collection Tool	☐
4.	National Stormwater Calculator Field Data Collection and Worksheet Tools	☐
5.	Complete Streets User Satisfaction Survey and Worksheet Tools	☐
Goal 4: Economic Vitality		
1.	Property Values Element	☐
2.	Sales Volume Element	☐
3.	Vacant Parcels Element	☐
4.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐

Program Level Evaluation Tools Checklist

Goal 1: **Balanced Mobility**		
1.	MMLOS Worksheet Tools	☐
2.	Automatic Passenger Counter Worksheet Tool	☐
3.	Multimodal Facility Coverage Worksheet Tool	☐
4.	Connectivity Worksheet Tool	☐
Goal 2: Safety		
1.	Crash Injury and Mortality Worksheet Tool	☐
2.	Vehicle Speeds Worksheet Tool	☐
3.	Crash Modification Factors (CMF) Inventory Worksheet Tool	☐
Goal 3: Health and Sustainability		
1.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐
2.	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools	☐
3.	Tree Canopy Field Data Collection and Worksheet Tool	☐
4.	National Stormwater Calculator Field Data Collection and Worksheet Tools	☐
5.	Complete Streets User Satisfaction Survey and Worksheet Tools	☐
Goal 4: Economic Vitality		
1.	Property Values Element	☐
2.	Sales Volume Element	☐
3.	Vacant Parcels Element	☐
4.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐

Goal 1: Balanced Mobility Tools

The following four tools can be used to collect data for **Goal One: Balanced Mobility's Metrics.**

The data collected using these tools will help to determine whether the evaluation objectives

Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	8 hours	Field	2	Easy

About

The Complete Streets *Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools* gathers information on the volume of pedestrians and bicyclists along a single Complete Streets corridor or along selected representative corridors in a Complete Streets program implementation area. Data collected is used to report the change in volume of: adult or child, male or female, unassisted or assisted (skaters, wheelchairs, etc.) pedestrians, and adult or child, male or female bicyclists.

Purpose

Complete Streets are safe streets that accommodate access for all users, despite their abilities or modes of travel. The presence of pedestrians and bicyclists along a Complete Streets corridor or program area demonstrates balanced mobility (**Goal 1**): streets that that provide equal access for pedestrians, bicyclists, transit users, and vehicles.

Community residents are active and getting exercise, and creating more sustainable communities (**Goal 3**). Collecting this information at baseline and during evaluation will allow the evaluation team to measure any changes to active transportation following a Complete Streets policy and project implementation, as well as help determine whether evaluation objectives (**Objectives 1.1 and 3.2**) and goals were achieved.

This section only refers to how data collected using the *Pedestrian and Bicyclist Counts Field Data Collection Tool* informs **Goal 1: Balanced Mobility** and **Objective 1.1**. For information on how the data collected using the *Pedestrian and Bicyclist Counts Survey Tool* can inform **Goal 3: Health and Sustainability** and **Objective 3.2** was met, go to page 62.

Goal 1
Balanced Mobility

Objective 1.1
Increase the incidence of bicycling and walking by X% at X months post baseline.

Goal 3
Health and Sustainability

Objective 3.2
Increase physical activity by X% at X months post baseline.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in pedestrians and bicyclists before and after Complete Streets implementation.

Step 1
Before beginning data collection, the evaluation team will need to determine two important pieces of information:

1) If the data is being collected for a Complete Streets program area, at baseline data collection, determine where (streets/intersections) the data will be collected. Be sure to note the streets/intersections on the *Pedestrian and Bicyclist Counts Worksheet.* These are the same streets/intersections where evaluation data will be collected from during evaluation.
2) During baseline data collection, determine the exact position on each Complete Streets corridor street, or at each intersection, where data will be collected. These streets/intersections are the same positions from which evaluation data will be collected.

Use the same geographic locations as used in the *Crash Injury and Mortality Worksheet Tool*. This information can be used when reporting results to calculate the rates of bicycle and pedestrian crash injuries and moralities at these locations along the Complete Streets corridor.

Step 2
The data collection time period is suggested at two (2) hours.

The data collector(s) will count adult and children pedestrians and bicyclists crossing the specified data collection point in 15-minute intervals and record this information on the *Pedestrian and Bicyclist Counts Field Data Collection Tool* available in the appendix. For each pedestrian or bicyclist, the evaluator will mark one tally in the corresponding box. A handheld tally counter can help keep track of counting and a timer will keep track of the time without the evaluator having to keep checking.

The data collector(s) will change rows on the worksheet every 15 minutes and record the hour for that time period in the hour column. Bicyclists on the street and sidewalk should be counted as well as the total number of people on a bicycle, not the number of bicycles. Pedestrians to be counted include all people not on bicycles, so people in wheelchairs, on skates, on scooters, etc. are all marked as pedestrians.

Step 3
After the baseline and evaluation data collection, the data collector(s) should enter the field date into the *Pedestrian and Bicyclist Counts Worksheet Tools.* These worksheets not only houses this data with the rest of the baseline and evaluation data for that particular Complete Streets street or corridor, but will automatically calculate the percent change between baseline and evaluation totals. This percent change information will be used in determining whether **Objective 1.1** has been achieved following Complete Streets policy and project implementation and evaluation.

The *Pedestrian and Bicyclist Counts Field Data Collection Tool*, with detailed instructions on use, can be found in **Appendix E**.

Results

Once baseline and evaluation data collection has been completed and entered into the *Pedestrian and Bicyclist Worksheets*, the worksheet results will have already calculated the percent change needed to determine whether the increase in pedestrian and bicyclist activity along a Complete Streets street or corridor has met evaluation **Objective 1.1: Increase the incidence of bicycling and walking by X% at X months post-baseline**. Results can provide insight as to how friendly the streets may be to children and persons with disabilities, in addition to adults.

The worksheet also provides additional information that may be useful for reporting to stakeholders. In addition to the total percent change of pedestrians and bicyclists combined, the worksheet will automatically calculate the percent change and total change in counts among each category of pedestrians and bicyclists, as well as for the general categories of pedestrian and bicyclists.

Pedestrian and Bicyclist Counts Worksheet Tool results will look like the following:

Primary Results	#	%
Baseline total number of bicyclists	✓	
Baseline total number of pedestrians	✓	
Evaluation total number of bicyclists	✓	✓
Evaluation total number of pedestrians	✓	✓

Secondary Results	#	%
Baseline total number of adult bicyclists	✓	
Baseline total number of adult pedestrians	✓	
Baseline total number of child bicyclists	✓	
Baseline total number of child pedestrians	✓	
Baseline total number of male bicyclists	✓	
Baseline total number of male pedestrians	✓	
Baseline total number of female bicyclists	✓	
Baseline total number of female pedestrians	✓	
Evaluation total number of adult bicyclists	✓	✓
Evaluation total number of adult pedestrians	✓	✓
Evaluation total number of child bicyclists	✓	✓
Evaluation total number of child pedestrians	✓	✓
Evaluation total number of male bicyclists	✓	✓
Evaluation total number of male pedestrians	✓	✓
Evaluation total number of female bicyclists	✓	✓
Evaluation total number of female pedestrians	✓	✓

TAKE NOTE!

Complete this tool before using the *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools*

The *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools* use pedestrian and bicyclist count data to calculate benefits. Collect this data first to make for a more efficient evaluation that saves time and money.

Photo Opportunity!

Take picture at baseline and evaluation of pedestrians and bicyclists along a Complete Street.

Automatic Passenger Counter Worksheet Tool

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	1 hours	Desktop	1	Easy

About

The *Automatic Passenger Counter Worksheet Tool* allows for an easy inventory of Broward County transit ridership data for a defined corridor and automatically calculates the percent change from baseline to evaluation ridership. Transit passenger count data will be originally collected by Broward County Transit (BCT). This worksheet serves two purposes: 1) to allow the evaluator to compile the passenger count data in a simple and easy to use format, and 2) to house this data with the rest of the baseline and evaluation data for a particular Complete Streets corridor or program.

Purpose

Transit passenger count data provides insight into transit activity, namely how many people are boarding and alighting (departing) transit along a route or in a program area instead of using another vehicle (such as a single occupancy motor vehicle) to take their daily trips. Transit ridership is an important component of balanced mobility (**Goal 1**) along a Complete Streets corridor or program. Transit riders increase pedestrian activity along a street, reduce the number of vehicle trips, and increase physical activity as transit riders often walk to and from their start and endpoint destinations.

Goal 1 Balanced Mobility
Objective 1.2 Increase the number of transit users by X% at X months post baseline.

Additional information on transit activity is available in **Chapter 10: Transit Accommodations** of the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**).

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in transit ridership before and after Complete Streets implementation. Data for corridor level evaluation will be collected by the cities with the assistance of the Broward MPO. Program level evaluation by the Broward MPO will be an aggregate of corridor level evaluation data.

Ridership data in the monthly reports are available in the aggregate average for the month, week or day of the week at the corridor and county levels. Each month's ridership data is compared to ridership data from the year before. The percent change in monthly ridership, by route, for the current month and the same month of the previous year are provided. Data on monthly fare revenues are also available in total and by corridor.

For corridor level evaluation, evaluators will need to determine which routes are on the Complete Streets corridor. For program level evaluation, evaluators will need to determine which routes are in the Complete Streets program area. Baseline and evaluation data will be compared, based on monthly data. Additionally, yearly data totals can be compared for baseline and evaluation years. Evaluators should select the appropriate month for baseline and evaluation comparisons before collecting data for this tool.

Step 1
Determine the route(s) needed for the corridor or program area's data collection. Broward County route maps can be found online at: http://www.broward.org/BCT/SCHEDULES/Pages/default.aspx.

Step 2
Once a determination of which route's (or routes') data will be collected, the BCT Ridership Reports can be used. Information can be found at: http://www.broward.org/BCT/Reports/Pages/Facts.aspx. The information needed for the data collection can be found in sheets that calculate ridership at a route level:

- Monthly Ridership and Monthly Revenue data are located on the 'Average Daily Ridership' sheet.
- Total passengers per hour can be located in the 'Passengers Per Hour' sheet.
- Information on Year to Date (YTD) can be found on the 'Monthly Ridership By Route' sheet.

Fill in the *Automatic Passenger Counter Worksheet Tool* with baseline and evaluation ridership and fare revenue information.

Step 3
The percent change in ridership numbers and fare revenue dollars will automatically be calculated in the worksheet tool by corridor.

Results

An increase in transit ridership from baseline to evaluation, post-Complete Streets policy and project implementation, can indicate that more people are opting out of taking vehicle trips and are instead becoming pedestrians along Complete Streets as they walk to and from their destinations. As mentioned, the *Automatic Passenger Counter Worksheet Tool* provides two different results. The first result addresses **Objective 1.2: Increase the number of transit users by X% at X months post-baseline**. These results will determine whether the evaluation objective has been met.

The additional piece of information that the worksheet delivers is the change in fare revenue dollars. Although this information is not necessary for the evaluation objective, it may be useful data to report to stakeholders. An increase in fare revenue can provide significant economic benefits to a city or county. The worksheet will calculate the total amount of fare revenue based on the price of a single ride fare multiplied by the cumulative difference in baseline and evaluation transit ridership numbers.

Automatic Passenger Counter Worksheet Tool results will look like the following:

Results	#	%
Baseline total number of passenger boardings	✓	
Baseline total number of passenger boardings	✓	
Evaluation total number of passenger alightings	✓	✓
Evaluation total number of passenger alightings	✓	✓

Multimodal Facility Coverage Worksheet Tool

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	1 hours	Desktop	1	Medium

About

The *Multimodal Facility Coverage Worksheet Tool* houses an inventory of the total number of sidewalk and bike lane miles in a Complete Streets program area before and after implementation to determine the level of coverage of these pedestrian and bicyclist facilities. Once baseline and evaluation data has been entered, the worksheet will automatically calculate baseline percentages, evaluation percentages, and the percent change between baseline and evaluation percentages.

The *Multimodal Facility Coverage Worksheet Tool* are a simple method for measuring multimodal facilities, which is the reason this tool is listed as a standard tool. An enhanced alternative tool for measuring multimodal facilities at the corridor level is the *MMLOS Worksheet Tool*, which provides a more detailed evaluation of multimodal facilities.

Purpose

To have more balanced mobility (**Goal 1**) for all transportation users, there must be facilities present for walkers, bikers and transit users to equally and safely share the right of way with vehicles. Studies have shown that the more pedestrian and bicyclist facilities present along a corridor, the more people are likely to walk or bike. The increased presence of multimodal facilities provides a number of benefits for a community, such as:

- **Safety**
  More sidewalks, bike lanes, bike racks and other multimodal facilities offer community residents protective and exclusive spaces for travel away from motor vehicles, making pedestrians and bicyclists feel safer.
- **Less car travel**
  Multimodal facilities increase biking, walking and the use of transit, which can in turn provide economic, health and environmental benefits to the surrounding community.

Goal 1
Balanced Mobility

Objective 1.3
Provide X% new facilities for bicyclists and pedestrians that improves the roadway environment for all users at X months post baseline.

Implementing the appropriate multimodal facilities, to meet the unique needs of the users on a particular street, will vary by street as well as community-to-community. There is no one checklist of the facilities that are needed to make the Complete Streets project implementation a success. There are also different versions of facilities that could be implemented for specific reasons.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in multimodal facility coverage before and after Complete Streets implementation. GIS data from the FDOT will be used to collect the data, although other data may soon be available from the Broward MPO.

Step 1
GIS data depicting sidewalks and bike lanes is available on the FDOT's website, at:
http://www.dot.state.fl.us/planning/statistics/gis/bike-ped.shtm.

Step 2
Once access to the data has been granted, enter in the number of miles of sidewalks and bike lanes along a Complete Streets corridor or program into the baseline and evaluation cells in the *Multimodal Facility Coverage Worksheet Tool.* The worksheet will automatically calculate baseline and evaluation percentages and the percent change between these values.

Results

The percent coverage of pedestrian sidewalks and bike lanes is a simple way to come up with a number that represents pedestrian- and bike-friendly Complete Streets to decision makers and stakeholders. To evaluate whether **Objective 1.3: Provide X% new facilities for bicyclists and pedestrians that improves the roadway environment for all users at X months post-baseline** was met for the evaluation goal of balanced mobility from a Complete Streets policy and project implementation, an evaluation can look at the percentage of new sidewalks and bike lanes along a corridor or program area. The percent change comparing the percentage of sidewalks and bike lanes along roadways before and after project implementation can give stakeholders a better idea of the level of impact the implementation of these facilities will have on pedestrians and bikers.

In addition to reporting the percentage of multimodal facility coverage, the baseline and evaluation numbers of miles of coverage may help provide a better description of the change to a community, when addressing stakeholders. For example, 10 miles of sidewalk in a community of five square miles, versus 10 miles of sidewalk in a community of 15 square miles, indicates a greater potential impact on the community than a percent increase of, for example, 17%.

Multimodal Facility Coverage Worksheet Tool results will look like the following:

Results	#	%
Baseline total number of miles of sidewalks	✓	
Baseline total number of miles of bike lanes	✓	
Evaluation total number of miles of sidewalks	✓	✓
Evaluation total number of miles of bike lanes	✓	✓

Multimodal Level of Service (MMLOS) Worksheet Tools

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	10 hours	Field	2	Medium

About

The *MMLOS Worksheet Tools* record the data needed to determine the levels of service (LOS) for pedestrians, bicyclists, vehicles and bus transit. The LOS takes into account a number of factors for each LOS, such as: street features, speed, usage, density and facilities, to name a few. The resulting LOS for each mode of transportation is a quantitative ranking by letter grade of the quality of service. The MMLOS is an analysis of the state of conditions during a specified analysis period. MMLOS applies to urban streets with all modes of travel (cars, pedestrians, transit and bicycles) and assesses the impact of facility design and operation on all users except for commercial vehicles.

The *MMLOS Worksheet Tools* are an enhanced tool for evaluating LOS at the corridor level. This tool is considered a standard tool for evaluation at the program level.

Purpose

LOS measures are available for each type of transportation user on a street: pedestrian LOS (PLOS), bicycle LOS (BLOS), auto or motor vehicle LOS and bus LOS. The results are a quantified stratification of quality service into six letter grades that assess multimodal service in the roadway environment. These LOS measures are important to look at when developing and evaluating a corridor or program area, because they provide a simple, quantifiable measure for a number of factors that, in total, provide information on the quality of "service" a corridor provides for each user of that corridor. For example, the PLOS takes into account traffic volume, speed limits, sidewalk width and sidewalk buffers, to determine the PLOS score for that corridor and the corresponding letter grade.

Additional information on multimodal level of service in Complete Streets is available in **Chapter 5: Traveled Way Design** in the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**).

Corridor and Program Goal 1
Balanced Mobility
Corridor and Program Objective 1.3
Provide X% new facilities for bicyclists and pedestrians that improves the roadway environment for all users at X months post baseline.
Program Objective 1.4
Decrease in traffic volume by X% at X months post baseline.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in MMLOS before and after Complete Streets policy and project implementation.

Step 1

The FDOT has developed a Quality/Level of Service (Q/LOS) tool that is available for use. This tool uses the 2010 Highway Capacity Manual methodologies to calculate LOS for automobiles, bicycles, pedestrians, and buses. The first step is to download the tool, available at: http://www.dot.state.fl.us/planning/systems/programs/sm/los/los_sw2M2.shtm. Within the LOSPLAN 2012, ARTPLAN is the software for arterial facilities. Gather the information needed to run the tool; this includes information on intersections, traffic volume, pedestrian facilities, etc. Record LOS results onto the *MMLOS Worksheet Tools.* FDOT's Q/LOS Handbook can be found at:
http://www.dot.state.fl.us/planning/systems/programs/SM/los/pdfs/2013%20QLOS%20Handbook.pdf

Step 2 (Enhanced Step)
The Auto LOS score generated by LOSPLAN 2012/ARTPLAN is simplified and can be unreliable on a corridor where there are few intersections. For more reliable data results, the FDOT Generalized Level of Service Tables can be used to get the Auto LOS score. Find information on the tables online, at: http://www.dot.state.fl.us/planning/systems/programs/sm/los/pdfs/fdot%202012%20generalized%20service%20volume%20tables.pdf. If it is decided to take the extra step of calculating the Auto LOS based on the FDOT Generalized Level of Service Tables, those results should be recorded and documented in the *MMLOS Worksheet Tools.*

Step 3 (Enhanced Step)
The Broward MPO with the help of Kimley-Horn and Associates, Inc. created an Excel spreadsheet to improve the way pedestrian conditions were being modeled. As an enhanced step, this tool can be found in the *Complete Streets Evaluation Toolkit Spreadsheet.* If it is decided to take the extra step of inputting additional data into the *Pedestrian LOS Alternative Worksheet Tool*, those results can be documented and recorded onto the *MMLOS Worksheet Tools.*

Step 4
Kimley-Horn and Associates, Inc. also conducted an extensive analysis of Alternative LOS Methodologies. Through this process, the Broward MPO, with the help of Kimley-Horn and Associates, Inc., created adjustment factors that could be applied to the pedestrians, bicycle, and bus LOS results. The adjustment factors have been tested and provide a better measure than just solely using the traditional roadway-based level of service tool. These adjustment factors can be multiplied to the LOS results calculated through LOSPLAN 2012/ARTPLAN in Step 1 and to the Pedestrian LOS results from Step 3. The *Adjustment Factors Worksheet* can be found in the *Complete Streets Evaluation Toolkit Spreadsheet.* The adjustment factors are calculated based on pedestrian connectivity, pedestrian features, and urban form characteristics. Details on these adjustment factors can be found in **Appendix I**.

Step 5
The *MMLOS Worksheet Tools* will require some development of excel functions to calculate the updated LOS results based on the data input on the *Adjustment Factors Worksheet.*

Data Source

The FDOT developed the computational application Q/LOS tool and LOSPLAN 2012 based on the 2010 Highway Capacity Manual methodologies. Kimley-Horn and Associates, Inc. and the Broward MPO created the adjustment factors that can be applied to LOS results.

Results

The scores and corresponding letter grades calculated using the *MMLOS Worksheet Tools* will increase as the quality of the experience for users of a roadway improves, with the exception of the bus LOS which is the opposite, and is ideally what should happen once the Complete Streets policy or project has been implemented. There are two changes you may look for in your LOS evaluation. First, you can look at the changes in MMLOS scores. You may want to look at the MMLOS scores for individual roadways or look at the average of MMLOS scores for a program area. Since collecting the necessary information for each of the four modes of transportation for each roadway affected by a Complete Streets program may be too time/resource intensive, you may also choose to measure the MMLOS results of a few roadways that have been determined to be representative of the program area.

LOS scores provide a more nuanced evaluation of changes resulting from a Complete Streets project, whereas LOS grades provide a simplified, more descriptive evaluation that is easier for lay people to understand the quality of Complete Streets outcomes on roadways. LOS scores may be a more confusing measure for decision makers and stakeholders to understand, when considering the changes in LOS. PLOS and BLOS scoring rates smaller score numbers with higher, or better, grades. People may naturally associate higher scores as correlating with higher quality (like how 10 is usually best when rating something on a scale of 1 to 10) and therefore may think of lower LOS scores as conditions worsening. Further adding to the confusion could be that bus LOS scores are the opposite of PLOS and BLOS scores, with higher numbers correlating to better grades. LOS grades are much easier for anyone to understand, whereas an “A” grade is better than an “F” grade.

Again, how evaluators will evaluate the MMLOS of a Complete Streets policy or project should be determined early on in the planning stages, before the implementation of the project.

MMLOS Worksheet Tool results at the corridor level will look like the following:

Results	#	%
Bicycle LOS	✓	
Pedestrian LOS	✓	
Bus LOS	✓	
Auto LOS	✓	
Annual Average Daily Traffic (AADT)	✓	
Vehicle Miles Traveled (VMT)	✓	

TAKE NOTE!

Complete this tool before using the *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools*

The *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools* use pedestrian and bicyclist count data to calculate benefits. Collect this data first to make for a more efficient evaluation that saves time and money.

Connectivity Worksheet Tool

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
✓ Program level	2 hours	Desktop	1	Easy

About

The *Connectivity Worksheet Tool* is a simple tool that allows the evaluator to assess how well connected a Complete Streets program area is, following project implementation. Connectivity refers to the density of connections in path or road networks and the directness of links. The ratio of these connections to intersections, or links to nodes, is one method for measuring the connectivity of an area, and can be expressed by calculating the Connectivity Index, or Connectivity Ratio. For continuity, the manual will refer to this measure as the Connectivity Index.

The *Connectivity Worksheet Tool* calculates the Connectivity Index and the percent change in Connectivity Index based on the baseline and evaluation data input into the worksheet. The Connectivity Index formula is the number of links divided by the number of nodes (**Connectivity Index = Number of Links/Number of Nodes).**

Program Goal 1
Balanced Mobility

Objective 1.5
Increase network connectivity by X% at X months post baseline.

Another option for a more enhanced connectivity measure at the program level is the Pedestrian Route Directness (PRD) measure. This measure is not included in the toolkit set of tools, but it is an additional option for those looking for more connectivity information. PRD is the ratio of route distance to straight-line distance between two selected points. More information on PRD can be found online at: http://reconnectingamerica.org/assets/Uploads/TRB2004-001550.pdf.

Purpose

Street connectivity is an indicator of a good street and neighborhood design, as well as balanced mobility (**Goal 1**). It is possible that the implementation of a Complete Streets policy will create more equitable networks of streets, sidewalks and bike paths, by creating an improvement in roadway and path connectivity. Street networks that more closely represent grid-like patterns in their layout are preferable to cul-de-sacs, dead end streets, or streets with long blocks, because grid patterned streets meet the two objectives of connectivity: 1) allowing for more direct travel between destinations as travel distances are decreased and 2) route options are increased. The shorter distances and more varied routes associated with grid-like patterns encourage: walking and biking, physical activity, making the streets safer for travelers and reductions in fuel costs to the economy and the environment. Grid-like connectivity also creates easier access for emergency responders and more potential links to economic and social activity. Altogether, better-connected street networks create a more balanced environment that respects all users of the roads, paths and sidewalks.

Additional information on connectivity and the connectivity index is available in **Chapter 2: Vision, Goals, Policies and Benchmarks Table 2.1: Broward County Complete Streets Elements and Policies; Chapter 4: Street Networks and Classifications; Chapter 5: Traveled Way Design**; **Chapter 9: Bikeway Design;** and **Chapter 9: Retrofitting Suburbia** in the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**).

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in street connectivity before and after Complete Streets implementation. Street network link and node data will be collected using GIS data. Baseline information will come from 2010 GIS census data.

Step 1
The first point that must be determined before collecting baseline and evaluation data will be to determine the geographic area from which street network link and node data will be collected. This may include the entire Broward County Complete Streets program implementation area or specific areas in the program implementation area that are representative of the program area.

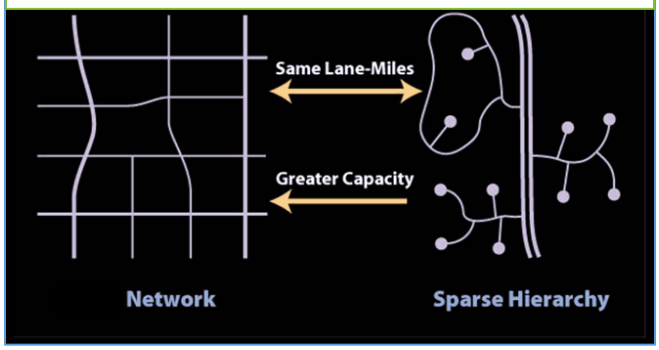
Step 2
Once the geographic area has been determined, count all non-arterial roadway segments (the links) connected to the nodes in the Complete Streets project area. Record this total in the 'Total Number of Links' row in the *Connectivity Worksheet Tool*.

Step 3
Count all non-arterial intersections and cul-de-sac intersections (the nodes) in the Complete Streets project area. Record this total in the 'Total Number of Nodes' row in the *Connectivity Worksheet Tool*.

Connectivity Example:

The Network image (below-left) represents a well-connected network of streets that can allow for more direct travel and more route-options for travelers.

The Sparse Hierarchy image (below-right) illustrates a limited number of route options that make for longer travel times and limit transportation options for travelers.



Step 4
Once this information has been input, the *Connectivity Worksheet Tool* will automatically calculate the Connectivity Index. After evaluation data is included, the worksheet will also automatically calculate the percent change in the Connectivity Index from baseline to evaluation.

If Connectivity Index results of the link/node ratio are not providing the MPO with enough detail at the program level, consider using the PRD measure.

Data Source

GIS data used for calculating the Connectivity Index is collected by Broward County. Coordinate directly with the Broward MPO to obtain the information.

Results

There is no one magic number of the Connectivity Index between zero (0) and one (1) that indicates good street connectivity. Desirable levels of connectivity will vary by streets as well as community-to-community, depending on the unique needs of these areas. The goal for connectivity in this Complete Streets policy program area implementation is determined by the expected increase in connectivity measured in **Objective 1.5: Increase network connectivity by X% at X months post-baseline.**

The percent change calculated in the *Connectivity Worksheet Tool* provides the percent changed necessary to compare to **Objective 1.5** to determine whether this objective has been met. However, the baseline and evaluation Connectivity Indices and the change in these numbers may be useful information for future Complete Streets evaluations. Again, if the Connectivity Index is not providing enough detail at the program level consider using the PRD measure.

Connectivity Worksheet Tool results will look like the following:

Result	#
Connectivity Index	✓

Goal 2: Safety Tools

The following three tools can be used to collect data for **Goal Two: Safety's metrics**.

The data collected using these tools will help to determine whether the evaluation objectives have been met and inform future decision-making for Broward Complete Streets policy and/or project implementation.

Crash Injury and Mortality Worksheet Tool

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	2 hours	Desktop	1	Easy

About

The *Crash Injury and Mortality Worksheet Tool* organizes and compares baseline and evaluation Complete Streets policy and project implementation crash injury and mortality data. The worksheet synthesizes data collected from Signal Four Analytics, a system that provides geo-located crash data available through interactive maps, charts and tables. The worksheet allows the evaluator to consolidate cumulative data on the numbers of, and percent changes in, car crashes involving pedestrians and bicyclists that resulted in reported injuries and fatalities.

Purpose

One of the key goals of Complete Streets, and active transportation projects in general, is to make streets and sidewalks safer for everyone, regardless of their mode of transportation (**Goal 2**). A fundamental piece of information to evaluating this is whether a Complete Streets policy and project implementation has made streets safer for all modes. This can be determined by looking at the change in car and pedestrian or bicycle-related crash injury and mortality rates. Reducing car-related injuries and fatalities along a Complete Street improves the safety of the overall street, which can lead to streets with denser human presence. Together, these improvements can translate into social, health and economic benefits for the community as a whole.

Corridor and Program Goal 2
Safety

Objective 2.1
Decrease crash injury and mortality rates for bicyclists and pedestrians by X% at X months post baseline.

- **Social**
  Greater pedestrian and bicyclist presence on streets creates more social activity along those routes.
- **Health**
  Less pedestrian, bicyclist and motorist injuries, disabilities and fatalities translate into healthier and safer individuals and communities.
- **Economic**
  Increased pedestrian and bicyclist presence leads to increased economic activity along streets traveled. A reduction in car crash injuries and fatalities translates to large cost savings from reduced expenses caused by: injuries, disabilities, deaths and property damage.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in crash injuries and mortalities before and after Complete Streets implementation. Cities will collect the data for this tool and provide this information to the Broward MPO for program evaluation.

To complete the *Crash Injury and Mortality Worksheet Tool*, the data can be found online at Signal Four Analytics System, located online, at: http://s4.geoplan.ufl.edu/. Simply input your data into the worksheet. Data on Signal Four Analytics is user-defined, through filters such as dates and geographic ranges, and can be viewed spatially on maps that can be used in an evaluation report, in charts or in tables.

Step 1
Request access to Signal Four online, at: https://s4.geoplan.ufl.edu/analytics/NewUserRequest.aspx.

Step 2
Once access has been granted, the evaluator is ready to collect the data. Select the date and geographic filters that apply to the baseline timeframe and location, or evaluation timeframes and locations (for example, evaluators may evaluate by year, so the baseline year and each evaluation year should be the timeframes selected). Choose any other filters applicable, such as the type of behavioral factors, like distractions, that were involved in the accident. The filters used will be documented on the *Crash Injury and Mortality Worksheet Tool.*

Use the same geographic locations as used in the *Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools*. This information can be used when reporting results to calculate the rates of bicycle and pedestrian crash injuries and moralities at these locations along the Complete Streets corridor.

Step 3
Once the data has been retrieved, plug the data into the *Crash Injury and Mortality Worksheet.* The worksheet will automatically calculate the percent change between the baseline and evaluation data for crash injuries and fatalities.

Data Source

While Signal Four Analytics is an interactive web-based crash analysis and mapping tool from the GeoPlan Center at the University of Florida, the crash data is collected by Florida Highway Patrol officers at crash sites throughout the state, then transmitted directly to the GeoPlan Center where the data is uploaded nightly.

Results

Following a Complete Streets policy and project implementation, a street will likely see a reduction in car crash injuries and fatalities as streets become safer for all transportation users. The percent change calculated in the *Crash Injury and Mortality Worksheet Tool* will provide the necessary information to evaluate whether the Complete Streets policy and project implementation has met **Objective 2.1: Decrease crash injury and mortality rates for bicyclists and pedestrians by X% at X months post-baseline**.

The worksheet also allows for the evaluator to disaggregate the injury and mortality data, information that may be of value in communicating Complete Streets benefits to stakeholders. The total numbers of injuries and fatalities across these categories can serve to depict the magnitude of the problem, while percent changes help to describe trends in safety between baseline and evaluation of the Complete Streets implementation.

The worksheet allows for the catalogue of baseline and evaluation numbers for the following crash categories, as well as percent changes:

- Crashes with property damage
- Crashed involving pedestrians
- Crashes involving bicyclists
- Fatal crashes involving pedestrians
- Fatal crashes involving bicyclists

Crash Injury and Mortality Worksheet Tool results will look like the following:

Primary Results	#	%
Baseline total number of crash fatalities	✓	
Baseline total number of crash injuries	✓	
Evaluation total number of crash fatalities	✓	✓
Evaluation total number of crash injuries	✓	✓

Secondary Results	#	%
Baseline total number of crashes with property damage	✓	
Baseline total number of crashes involving pedestrians	✓	
Baseline total number of crashes involving bicyclists	✓	
Baseline total number of fatal crashes involving pedestrians	✓	
Baseline total number of fatal crashes involving bicyclists	✓	
Evaluation total number of crashes with property damage	✓	✓
Evaluation total number of crashes involving pedestrians	✓	✓
Evaluation total number of crashes involving bicyclists	✓	✓
Evaluation total number of fatal crashes involving pedestrians	✓	✓
Evaluation total number of fatal crashes involving bicyclists	✓	✓

TAKE NOTE!

Complete this tool before completing the *Crash Modification Factors Inventory Worksheet Tool*

The *Crash Injury and Mortality Worksheet Tool* collects data that will inform the *CMFs Inventory Worksheet Tool* in terms of how vehicle-related injury and mortality rates have changed at the implementation of CMFs.

Vehicle Speeds Worksheet Tool

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	1 hours	Desktop	X	Easy

About

The *Vehicle Speeds Worksheet Tool* houses results from a vehicle speed study. The vehicle speed study takes inventory of car speeds and volume over a 24-hour period of time at a particular location. Vehicle volumes are provided in hourly intervals with the average vehicle speeds provided for each hourly time period.

Purpose

Reducing speed limits is an essential element in providing safe streets (**Goal 2**), requiring appropriate reasonable speed limits, indicated on visible signs, to maintain safety on the roads. The speed at which cars move along streets affects the likelihood and severity of crashes. The faster a car goes, the more likely a crash will occur and be severe. Speed limit signs and their posted speed limits are good indicators of how safe a street or corridor is for users of all modes of transportation, one of the goals of the Complete Streets evaluation. The general rule is that on local street speeds should be set at 20 to 25 miles per hour or less, avenue speeds should be 30 mph or less, and boulevards should be 35 mph or less.

Corridor and Program Goal 2 Safety
Objective 2.2 Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post baseline.

Additional information pertaining to vehicle speeds is available from the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**), within the following Chapters: **Chapter 4: Street Networks and Classifications; Chapter 5: Traveled Way Design; Chapter 6: Intersection Design; Chapter 8: Pedestrian Crossings; Chapter 9: Bikeway Design;** and **Chapter 11: Traffic Calming.**

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in vehicle speeds before and after Complete Streets policy and project implementation. Cities may request the vehicle speeds study from Broward County Engineering.

Additionally, cities may complete their own vehicle speeds data collection by partnering with law enforcement to gather speed-related data from enforcement tickets and accident reports.

Data Source

Data on vehicle speeds will be collected by, and can be requested from, Broward County Highway Construction and Engineering.

Results

Ideally, there will be a decrease in the average of speeds and total vehicle volume after a Complete Streets policy and project implementation. Some evaluations may also include a speed study of whether motorists actually are abiding by the new speed limits, but this kind of an evaluation is beyond the scope of this *Complete Streets Evaluation Toolkit*.

Use these results to inform decision-makers and stakeholders on the total change, ideally a decrease, in speeds along a Complete Streets route or program area.

Vehicle Speeds Worksheet Tool results will look like the following:

Results	#	%
Hourly Vehicle Volume		
Total Vehicle Volume		
Hourly Average Speed		
Average of Speeds		

TAKE NOTE!

Complete this tool before using the *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools*

The *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools* uses vehicle speeds data to calculate benefits. Collect this data first to make for a more efficient evaluation that saves time and money.

Crash Modification Factors (CMFs) Inventory Worksheet Tool

** Complete this tool after completing the Crash Injury and Mortality Worksheet Tool **

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	2 hours	Desktop	1	Medium

About

The *CMFs Inventory Worksheet Tool* serves as a database on information for individual traffic safety countermeasures and their CMFs or Crash Reduction Factors (CRFs). A CRF is an estimate of the percentage of reduction in crashes due to particular countermeasures. A CMF is the multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure at a specific site. Throughout the Evaluation Manual, countermeasure effectiveness will be indicated as a CMF. CMFs represent long-term expected reductions in crashes and are based on estimates from a limited number of studies, and actual crash reduction numbers will vary. For example, a CRF of 32 means that the countermeasure is expected to reduce crashes by 32%. Therefore, the CMF for a CRF of 32 would be: 1- (32/100) = .68. Countermeasures that do not reduce the number of crashes, rather they increase the number of crashes are represented by negative CRFs (for example, -32%) and CMFs with a value greater than 1 (for example, CMF=1.01).

Examples of Countermeasures:

- Bike lanes
- Countdown signals
- Rectangular rapid flashing beacons
- Audible pavement markings
- Restricted crossing U-turn intersections
- Pedestrian refuge islands

CMFs and CRFs provide information on how traffic safety countermeasures can be evaluated during the design phase of a project to create safer streets after construction.

Additional information on CMFs and CRFs is available in **Chapter 8: Pedestrian Crossings** of the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**).

Purpose

A reduction in the number of crashes on a street indicates that a street is safer for users of all modes of transportation (**Goal 1**). When designing a street during Complete Streets policy implementation, street elements with the best CMFs should be used to design features like crossings, medians or speed humps, to name a few. With more appropriate countermeasures implemented, a street should see a reduction in the number and severity of car crashes and a safer street should be the result.

Corridor and Program Goal 2
Safety

Objective 2.2
Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post baseline.

Data Collection Guidelines

Baseline data for this tool is the existing road design, already in place, before the implementation of the Complete Streets project. Data will only need to be collected at each evaluation point to determine what new countermeasures have been installed since Complete Streets implementation.

For program level evaluations, evaluators will need to identify the geographical area that encompasses the program area, before gathering countermeasures data.

The Broward MPO will be selecting specific CMFs that can be used as default measures for the evaluation. Evaluators are encouraged to research and use another countermeasure that meets the conditions of the project better than the Broward MPO defaults. Please contact the Broward MPO for more information on the default countermeasures. It may be beneficial to coordinate with a safety specialist for additional guidance on implementing this tool.

Step 1
At the corridor level, evaluators should collect the information on the countermeasures that have been made along the Complete Streets policy and project implementation corridor. If the evaluation is at the program level, evaluators should compile the countermeasure information on all countermeasures that have been completed since the implementation of the Complete Streets project.

Step 2

Record each countermeasure in the *CMFs Inventory Worksheet Tool.* If the following corridor information is available, record in the worksheet the following:

- **Crash Type**
  (Motor vehicle/bicycle, motor vehicle/pedestrian, nighttime, etc.)
- **Crash Severity**
  (Fatal, serious injury, minor injury, property damage only)
- **Roadway Type**
  (Local, minor arterial, etc.)
- **Area Type**
  (Urban, suburban, rural)
- **Intersection Type**
  (Roadway/bicycle path or trail, roadway/roadway [not interchange related], etc.)
- **Intersection Geometry**
  (3-leg, 4-leg, more than 4 legs, not specified)
- **Traffic Control**
  (Yield sign, signalized, roundabout, etc.)

This information will help the evaluators narrow down the countermeasures most specific to the countermeasure implemented along the Complete Streets project area. Some common countermeasures, such as bike lanes, will have different CMF depending on these specific characteristics. This information will give the evaluators a more precise CMF for each countermeasure.

Step 3
Visit the Crash Modifications Clearinghouse (CMF) website, located at: http://www.cmfclearinghouse.org/ to search for each countermeasure on the website's homepage. Using the information in Step 2, select the CMF that best fits each countermeasure. Record each CMF in the *CMFs Inventory Worksheet Tool.*

The evaluation team can also use the countermeasures that the Broward MPO has preselected to meet the general condition of Broward County. Please contact the Broward MPO for more information on the default countermeasures.

If more than one countermeasure is applied to one location, or corridor, to target similar crash types, it is possible to multiply the CMFs of the countermeasures to estimate the combined effect of the countermeasures. However, if multiple countermeasures are applied independently at the same location targeting different crash types, the CMFs should not be multiplied, but should be reported independently of one another. There is limited research on the combined effects of

multiple treatments. A combined CMF may overestimate or underestimate the true crash effects. Please review FHWA website before calculating a combined CMF (http://safety.fhwa.dot.gov/tools/crf/resources/cmfs/intro.cfm#ref3).

Data Source

The CMF Clearinghouse (http://www.cmfclearinghouse.org/) is an online database of CMFs and CRFs by countermeasures and specifications, with relevant supporting research available. CMF Clearinghouse compiles all documented CMFs into one central location that is updated regularly to add recently developed and documented CMFs identified via a periodic review of published literature. The CMF Clearinghouse summarizes published information on each CMF, including how it was developed (e.g., study design, sample size and source of data) and what are its statistical properties (e.g., standard error).

Results

CMFs, when incorporated into street planning and design, can help meet **Objective 2.2: Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post-baseline** and the goal of safety. This information can inform on a number of aspects of a Complete Streets project:

- An increased in safety levels as a result of decreases in crash estimates ;
- An increase in safety gains using limited financial resources;
- The success of cost-effective strategies at particular locations in street planning;
- The validity of cost-benefit analyses.

CMFs provide estimations for each of these aspects. These estimations can be reported to decision-makers and stakeholders to inform on safety estimations and the cost-effectiveness of safety strategies.

CMFs Inventory Worksheet Tool results will look like the following:

Countermeasure	CMF #	%
Countermeasure 1		
Countermeasure 2		
Countermeasure 3		
Countermeasure 4		
Countermeasure 5		
Countermeasure 6		
Countermeasure 7		
Countermeasure 8		

Goal 3: Health & Sustainability Tools

The following three tools can be used to collect data for **Goal Three: Health and Sustainability's metrics**.

The data collected using these tools will help to determine whether the evaluation objectives have been met and inform future decision-making for Broward Complete Streets policy implementation.

Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tool

*** Complete this tool **after** completing the Pedestrian and Bicyclist Counts Tools, Vehicle Speeds Worksheet Tool and MMLOS Worksheet Tools.***

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	6 hours	Desktop	2	Medium

About

The FDOT Conserve by Bicycle and Pedestrian Study Benefits Calculator (Benefits Calculator) are spreadsheet calculation tools that estimate at the corridor and program levels pedestrian and bicycle travel mode splits and resulting daily reductions of fuel usage (in gallons of gasoline), health care costs (in dollars), and carbon dioxide emissions (in pounds). The *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tool will store and calculate the data collected at baseline and evaluation.*

Purpose

The fuel usage and fuel and health care cost savings information gathered and reported in the *Benefits Calculator* helps to determine the Health and Sustainability (**Goal 3**) of the Complete Streets program or project. Fuel and health care cost savings also inform on the Economic Vitality (**Goal 4**) of a Complete Streets evaluation. An important component of sustainability is reducing the reliance on coal burning transportation and reducing the amount of carbon dioxide emissions to help offset the effects of climate change. An important health indicator of the impacts a Complete Streets project and program will have on the areas affected is the health care cost savings that the area will see following program implementation. Not only is this an important indicator of improved health through reduced costs, it's important for creating a sustainable system in terms of health, through the improvement of health outcomes related to transportation.

Corridor and Program Goal 3
Health and Sustainability
Objective 3.1
Reduce vehicle emissions by X% and fuel consumption by X% through increased bicycle/pedestrian activity at X months post baseline.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in Benefits Calculator results before and after Complete Streets policy and project implementation. The Broward MPO will complete the Benefits Calculator at both the corridor and program levels. If cities want to complete the tool themselves, the *Benefits Calculator User Guide* (link to it within **Appendix A**) can serve as a resource.

The Benefits Calculator is designed to be used at the corridor level as a predictive model, but can be applied to evaluate the effects of things like providing sidewalks along a corridor. It can also be used to evaluate a program area by being applied to a number of corridors within a program area.

Step 1
Review the *Benefits Calculator User Guide* to become familiar with the data collection guidelines for the necessary spreadsheet variables and for information on employing the estimation spreadsheet.

Step 2
Download the FDOT Conserve by Bicycle and Pedestrian Study Benefits Calculator (Benefits Calculator) from http://www.dot.state.fl.us/safety/4-Reports/Bike-Ped-Reports.shtm. Gather all the necessary data including information collected on the *Pedestrian and Bicyclist Counts Tools, Vehicle Speeds Worksheet Tool and MMLOS Worksheet Tools.* Input the relevant data into the Benefits Calculator input screens and relevant cells.

Step 3
Collected the results calculated on the Report Worksheet of the *Benefits Calculator*. Input those results into *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tool*.

Data Source

Based on a two-part study on bicycle and pedestrian usage along several corridors, conducted by FDOT and commissioned by the Florida State Legislature, predictive models were created for mode choice and induced recreational bicycle travel. These complex models required a significant number of inputs in order to predict corridor level bicycling and walking use, so FDOT developed the *Conserve by Bicycle and Pedestrian Study Benefits Calculator and User Guide* to serve as a user-friendly and well-designed tool for calculating the energy and health cost-saving benefits from bicycle and pedestrian usage.

Some data for the Benefits Calculator can be found online. Annual Average Daily Traffic (AADT) data for Broward County is available online, and can be found on the FDOT interactive AADT website (http://www2.dot.state.fl.us/FloridaTrafficOnline/viewer.html). Area demographics are available online, at: http://www.broward.org/PLANNINGANDREDEVELOPMENT/DEMOGRAPHICSANDECONOMICS/Pages/Default.aspx.

Results

As listed above in the *About* section, the *Benefits Calculator* provides information on:

- Daily and annual reductions of fuel usage, in gallons
- Daily and annual fuel cost savings, in dollars
- Carbon dioxide reductions, in pounds

The resulting benefits inform **Objective 3.1: Reduce vehicle emissions by X% and fuel consumption by X% through increased bicycle/pedestrian activity at X months post-baseline**, and:

- Daily and annual healthcare benefits, in dollars at the corridor level

The healthcare benefits support **Objective 4.3: Reduce healthcare costs by X%/$X at X months post-baseline.** These simple results provide an easy way to inform decision makers and stakeholders on the energy and health care cost savings of the Complete Streets implementation in Broward County.

Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tool results will look like the following:

Results	#
Baseline total number of gallons of annual reductions of fuel usage	# gallons
Baseline total number of dollars in annual fuel cost savings	# dollars
Baseline total number of pounds in carbon dioxide reductions	# pounds
Baseline total number of dollars in daily and annual healthcare benefits	# dollars
Evaluation total number of gallons of annual reductions of fuel usage	# gallons
Evaluation total number of dollars in annual fuel cost savings	# dollars
Evaluation total number of pounds in carbon dioxide reductions	# pounds
Evaluation total number of dollars in daily and annual healthcare benefits	# dollars
Percent change in total number of gallons of annual reductions of fuel usage	%
Percent change in total number of dollars in annual fuel cost savings	%
Percent change in total number of pounds in carbon dioxide reductions	%
Percent change in total number of dollars in daily and annual healthcare benefits	%

Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools

*** This worksheet is a repeat from the first tool listed in Goal 1: Balanced Mobility section. Information about this tool, the data collection guidelines, and the layout of the results for this tool can be found on page 30. ***

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	8 hours	Field	2	Easy

Purpose

Complete Streets create healthy and sustainable streets and communities by creating safer street surroundings that protect and enhance the experiences of pedestrians, bicyclists and transit users. Community residents who actively walk and bike are getting exercise that reaps many, many health benefits (**Goal 3**), such as:

- Reducing many types of chronic diseases;
- Improving mental well-being;
- Improving cardiovascular health; and
- Maintaining a healthy body weight and lowering the risk of overweight or obesity.

Corridor and Program Goal 3

Health and Sustainability

Objective 3.2

Increase physical activity by X% at X months post baseline.

Pedestrian and bicyclist activity along a Complete Streets route also creates more sustainable communities (**Goal 3**), by: improving the health and well-being of the community, increasing economic activity and property values along street routes, and improving access to goods and services.

This section only refers to how data collected using the *Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools* inform **Goal 3: Health and Sustainability** and **Objective 3.2**.

Results

Once baseline and evaluation data collection has been completed and entered in to the *Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools*, the worksheet results will have already calculated the percent change needed to determine whether the increase in pedestrian and bicyclist activity along a Complete Streets street or corridor has met the evaluation **Objective 3.2: Increase physical activity by X% at X months post-baseline.**

The worksheet also provides additional information that may be useful for reporting to stakeholders. In addition to the total percent change of pedestrians and bicyclists combined, the worksheet will automatically calculate the percent change and total change in counts among each category of pedestrians and bicyclists, as well as for the general categories of pedestrian and bicyclists.

TAKE NOTE!

Complete this tool before using the *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools*

The *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools* use pedestrian and bicyclist count data to calculate benefits. Collect this data first to make for a more efficient evaluation that saves time and money.

Photo Opportunity!

Take picture at baseline and evaluation of pedestrians and bicyclists along a Complete Street.

Tree Canopy Field Data Collection and Worksheet Tools

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	8 hours	Desktop	1	Easy

About

The *Tree Canopy Field Data Collection and Worksheet Tools* are made up of a simple ground survey that is conducted in the field, on foot by one data collector, with few materials needed and a worksheet for inputting results. The *Tree Canopy Field Data Collection and Worksheet Tools* measure the percentage of tree canopy coverage on a given street using the canopy cover at edge of pavement (CCEP), a standard measurement of street tree canopy coverage that measures the percentage of shading that street trees provide streets.

Purpose

Tree canopy coverage along sidewalks and streets provides both environmental and health benefits to multimodal transportation users, by:

- **Lowering temperatures**
  Tree canopy coverage reduces surface temperatures by offsetting the heat effects of surface pavement on streets and sidewalks, creating a cooler environment.
- **Providing shade**
  Shade from canopy coverage allows for breaks from sun exposure and high temperatures, creating an environment friendlier to walking, gathering, biking and waiting at transit stops.
- **Providing Protection**
  Canopy coverage can provide protection against the harmful effects of prolonged UV sun exposure.
- **Removing air pollutants**
  Tree canopy holds onto air pollution, helping to offset the harmful environmental and health effects of poorer air quality and creating a cleaner and safer environment.
- **Creating oxygen**
  Tree canopy absorbs carbon monoxide and produces oxygen.
- **Reclaiming street water**
  Trees absorb and reduce stormwater runoff, allowing the water to nourish the trees rather than go to waste.
- **Creating aesthetics**
  Trees increase neighborhood beautification.
- **Increasing property values**
  Better aesthetics and more pedestrian- and bicyclist-friendly neighborhoods tend to have higher property values.
- **Saving money on utility bills**
  The cooling through canopy shade of the surface pavement on and around properties reduces commercial and residential properties' utility bills.
- **Reducing noise pollution**
  Trees create a sound buffer that decreases levels of ambient noise.
- **Providing a buffer**
  Trees double as a crash mitigation strategy, providing: a buffer between pedestrians and vehicles, making pedestrians feel safer, and it can calm traffic speeds.

Goal 3 Health and Sustainability
Objective 3.3 Incorporate natural design elements throughout the corridor by X% at X months post baseline.

An increase in tree canopy coverage, especially in areas where pedestrians and bicyclists travel, can improve both health and environmental sustainability.

Additional information on urban forestry is available in **Chapter 12: Streetscape Ecosystem** of the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**).

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in tree canopy coverage before and after Complete Streets policy and project implementation.

Step 1
Before you start collecting any data on tree canopy coverage, there are two factors to determine:

1) **Determine the unit of measurement for each point where canopy coverage will be recorded**. This could be: every foot, every three feet, every three steps or whatever the evaluator decides. This is what the unit of measurement will be for the tree canopy survey data collection at baseline and evaluation, for both the corridor and program levels of evaluation. Be sure to record the unit of measurement in the designated box on the second page of the survey.
2) **Determine what time of day and year that the survey will be conducted**. Be sure to record this in the designated box on the second page of the survey, as this will be the time the evaluator will collect this data the second time (the first time this information is collected is the baseline data, the second time will be the evaluation data). Different times of day, and different days of the year, will have varying amounts of shade because of the position of the sun. The more consistent your time and date collection are, the more accurate your results will be. Also, tree canopies may be less dense in the fall or winter than in the spring or summer, so this should be taken into consideration when determining surveys and data collection strategies.

Step 2
Fill out the two information boxes on the second page of the survey. This information will help the evaluator keep track of the exact location and distance of each street corridor measured using this survey. Be sure to record this information on the Tree Canopy Worksheet Tool.

Step 3
The *Tree Canopy Field Data Collection Tool* is conducted by walking along the edge of the pavement and recording direct tree canopy shade at evenly spaced points, for example every three steps, along the route. The survey is a dotted grid representing the street and sidewalk of the street under evaluation. Circle the dots to indicate where shade is located along the street. A yard stick, lightweight pole, or similar tool will help to better determine the accuracy of tree canopy directly overhead providing shade. These tools will allow the evaluator to sight a point directly overhead and project a line vertically from the edge of pavement upward towards the canopy to increase the accuracy of the evaluation.

Step 4
Record results from the survey in the Tree Canopy Worksheet Tool. Each time a Tree Canopy Field Data Collection Tool is conducted for a Complete Streets project, record these results on the same project's Tree Canopy Worksheet Tool to track and evaluate periodic CCEP measurements for a Complete Streets corridor. The worksheet will automatically determine the percent of the street with canopy coverage using the following simple formula:

$$\frac{\text{Shaded tree canopy points}}{\text{Total number of points in survey area}} = \text{Percent canopy}$$

The *Tree Canopy Field Data Collection Tool*, with detailed instructions on use, can be found in **Appendix F**.

Results

A higher percentage of canopy coverage is better. Higher percentages directly indicate cooler street-level temperatures and less exposure to the sun's rays. Additionally, high percentages of tree canopy can indicate environmental benefits like cleaner air, as it is assumed there are more trees converting carbon dioxide into oxygen and better management of stormwater due to more soil and tree roots that can filter and divert stormwater.

Tree Canopy Field Data Collection and Worksheet Tools' results will look like the following:

Results	%
Canopy Cover at Edge of Pavement	✓

Photo Opportunity!

Take picture at baseline and evaluation of tree canopy coverage along a Complete Street. If a tree planting event is planned as a part of the Complete Streets project or program implementation, take pictures during the planting.

National Stormwater Calculator Field Data Collection and Worksheet Tools

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
✓ Corridor level ✓ Program level	8 hours	Desktop Field	1	Easy

About

The *National Stormwater Calculator Field Data Collection and Worksheet Tools* collect and house results from data gathered on green infrastructure and water conservation efforts present along a Complete Streets project using the EPA's National Stormwater Calculator desktop application. The Stormwater Calculator, developed by the EPA, estimates the annual amount of rainwater and frequency of runoff from a specific site anywhere in the United States based on local soil conditions, land cover and historic rainfall records. The Stormwater Calculator accesses several national databases that provide soil, topography, rainfall and evaporation information for the chosen site.

The *National Stormwater Calculator Field Data Collection and Worksheet Tools* are enhanced tools for both the corridor and program evaluation levels.

Purpose

Green infrastructure promotes the natural movement of water, reducing how much of it washes into streets and down storm drains. Green infrastructure also has the added benefit of beautifying neighborhoods and increasing property values. Clean water is essential to keeping our families and the environment healthy, and green infrastructure helps protect and restore the environmental integrity of our waterways. Green infrastructure and water conservation are an important part of the overall sustainability of a project, especially in a place like South Florida that is vulnerable to the impacts of climate change.

Additional information on green infrastructure and streetwater management is available in **Chapter 12: Streetscape Ecosystem** of the *Broward Complete Streets Guidelines* (**www.browardmpo.org/services/complete-streets/guidelines**).

Corridor and Program Goal 3

Health and Sustainability

Objective 3.3

Incorporate natural design elements throughout the corridor by X% at X months post baseline

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in green infrastructure and stormwater runoff before and after Complete Streets policy and project implementation.

Data Notes

- The National Stormwater Calculator cannot be downloaded to a MAC operating system.
- Leave the climate change projections in the National Stormwater Calculator as "none".
- Program level data will be the aggregate of all of the corridor level data.

The only data that needs to be collected by evaluators is information on the evaluation site's land cover (forest, meadow, lawn, desert and impervious) and low impact development (LID) controls. LID controls are practices that work with nature to manage stormwater as close to its source as possible, like by using green infrastructure at your site's location (i.e. rain gardens, green roofs, permeable pavement, disconnection, rain harvesting, street planters and infiltration basins). If this data collection is not feasible, the evaluator can use the default suggestions offered in the software program.

LID controls information will need to be collected by an evaluator who will survey the site, recording the different types of green infrastructure present along the Complete Streets corridor or throughout the program area. The *National Stormwater Calculator Worksheet* is where you can record this information as you collect LID controls data. Once the data has been collected for your evaluation area, plug this information into the National Stormwater Calculator program.

Examples of Green Infrastructure:

- Rain gardens
- Rainwater harvesting
- Green roofs
- Bioswales
- Permeable pavement
- Downspout disconnection

Step 1
Access the GIS data used in the *Connectivity Worksheet* or download Google Earth (https://www.google.com/earth/download/ge/agree.html), to estimate the land cover for the area under evaluation. Based on GIS imagery, determine the percentage of land that is: forest, meadow, lawn, desert, and impervious. Calculate the percentage of impervious area treated with LID controls presently in the Complete Streets implementation area. Record this information on the *National Stormwater Calculator Field Data Collection Tool*.

Step 2
Review the National Stormwater Calculator Field Data Collection Tool and determine the details of each of the LID controls that have been implemented in the field. Collect and record the data on the tool.

Step 3
Download the calculator available online, at: http://www2.epa.gov/water-research/national-stormwater-calculator. Go through each tab on the National Stormwater Calculator, filling in the information for each of the tabs on local soil conditions, rainfall, etc., including filling in the data collected on land cover and LID controls.

Step 4
Once all the data has been filled in on the Stormwater Calculator, the results will appear in the final tab 'Results'. Results will show in the summary statistics, bar graphs and line graphs, for 'Rainfall/ Runoff Frequency,' 'Rainfall Retention Frequency,' 'Runoff by Rainfall Percentile,' and 'Extreme Event Rainfall/ Runoff.' Record these results and the data collected from the *National Stormwater Calculator Field Data Collection Tool* in the *National Stormwater Calculator Worksheet Tool.*

The *National Stormwater Calculator Field Data Collection Tool* can be found in **Appendix G.**

Data Source

The National *Stormwater Calculator* was created by the EPA to estimate the annual amount of rainwater and frequency of runoff from specific sites, based on local soil conditions, land cover, and historic rainfall records.

The Stormwater Calculator accesses several national databases that provide soil, topography, rainfall and evaporation information for the chosen site. The user supplies information about the site's land cover and selects the types of LID controls they would like to use.

Results

Not only does the information collected and calculated in the *National Stormwater Calculator Worksheet Tool* give an inventory of the green infrastructure along a project corridor and program area, it also calculates the environmental impact of the green infrastructure. What would be good to see in the collection of baseline and evaluation Complete Streets results are: an increase in green infrastructure present along a Complete Streets project, an increase in rainwater runoff collection and a decrease in runoff.

National Stormwater Calculator Worksheet Tool results will look like the following:

Results	#	%
Rainfall/Runoff Frequency	✓	✓
Rainfall Retention Frequency	✓	✓
Runoff by Rainfall Percentile	✓	✓
Extreme Event Rainfall/Runoff	✓	✓
Number of LID Elements	✓	✓

Photo Opportunity!
Take picture at baseline (if possible) and evaluation of green infrastructure along a Complete Street.

User Satisfaction Survey and Worksheet Tools

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	36 hours	Field	2	Easy

About

The *User Satisfaction Survey Tool* is a quick, easy survey of people living, working and traveling along a Complete Streets project implementation corridor or program area. Gathering the perceptions and opinions of the people that are affected by a Complete Streets policy and project implementation is an important measure for understanding the sustainability, or how long-lived the project's resulting effects may be. Results from the *Complete Streets User Satisfaction Survey Tool* are housed in the *User Satisfaction Worksheet Tool.*

Purpose

Understanding the opinions and perceptions of the people that are most affected by a Complete Streets policy can be one of the most important indicators of the success of a Complete Streets project. The use and satisfaction of travelers along a street or route is a crucial component of: the sustainability of a Complete Streets policy, the continued use of active transportation and the sustainability of the surrounding community (**Goal 3**).

Goal 3
Health and Sustainability

Objective 3.4
Increase community support and satisfaction by X% at X months post baseline.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in user satisfaction before and after Complete Streets implementation.

The *User Satisfaction Survey Tool* takes inventory of participants' mode share and satisfaction with the multimodal amenities available along a complete street. A simple way to allow people to access the survey and to receive an automatic descriptive survey analysis is to make the survey available on SurveyMonkey, or on a similar free online survey website, for easier access by participants. SurveyMonkey will automatically gather, analyze and present data findings that can easily be extracted for reporting results.

Surveys can also be administered in-person, along a Complete Street. Evaluators can enlist partner organizations in the Complete Streets project area to help promote and recruit survey participants. Evaluators may also contact local businesses and organizations in the Complete Streets implementation project area to help promote the survey at their businesses or on their websites and social media accounts. Additionally, promote the survey on the Broward MPO's website and through local government social media. If the resources are available, evaluators may want to offer an incentive for survey participants, like a free pedometer or other tool that could help promote active modes of transportation.

Step 1
Among the evaluation team, determine the logistics of the survey:

- How many surveys would the evaluation team like to have completed?
- How will the survey be distributed: online or in-person?
- What day of the week, and time of day, would be best to recruit participants?
- Is there an existing event in the community that the surveys could be conducted at?

Step 2
If the survey is going to be available online, create an account at one of the free online survey websites, like SurveyMonkey (https://www.surveymonkey.com/), and upload the survey. If the survey is going to be administered in-person, begin to gather the materials needed to do in-person data collection. These materials will include:

- Physical copies of the surveys (printed)
- Pens
- Clipboards
- Incentive gift (if needed)

Step 3
Collect survey responses online or in-person.

Step 4
Once survey results have been collected, depending on how the surveys were collected, online or in-person, results will either be automatically available through the online method or will need to be entered into the *User Satisfaction Worksheet Tool* from paper surveys. Simple descriptive statisticswill automatically be calculated for results entered into the worksheet to gather findings for reporting.

The *User Satisfaction Survey Tool*, with detailed instructions on use, can be found in **Appendix H**.

Results

The results of the *User Satisfaction Survey and Worksheet Tools* use percentages of satisfaction, mode use and average trip lengths, as well as times to inform decision-makers on self-reported increases in the use of multimodal transportation options, users' trip habits and how they perceive the quality of transportation options available.

The *User Satisfaction Survey and Worksheet Tools'* results will look like the following:

- Demographic percentages for survey participants
- Percentage of people who find Broward County public transit to be very reliable
- Percentage of people somewhat unsatisfied with bike facilities in a Complete Streets neighborhood
- Percentage of people who walk from their home to a service provider about 1 time per week
- Percentage of people who take a bus trip more than 10 times a week

Goal 4: Economic Vitality Tools

The following four tools can be used to collect data for **Goal Four: Economic Vitality's metrics**.

The data collected using these tools will help to determine whether the evaluation objectives have been met and inform future decision-making for Broward Complete Streets policy implementation.

Economic Vitality Worksheet Tools

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	3 hours	Desktop	1	Easy

About

The Property Values elements of the Economic Vitality Worksheet Tool guides the evaluator through the reporting of commercial and residential property values before and after the implementation of a Complete Streets project, both at the corridor and program levels. The worksheet tracks baseline and evaluation property values, and the percent change in property values since a Complete Streets project or policy implementation.

The Sales Volume elements of the Economic Vitality Worksheet Tool houses sales volume information from businesses at baseline and evaluation measurements of commercial sales since Complete Streets project or policy implementation.

The Vacant Parcels elements of the Economic Vitality Worksheet Tool allows evaluators to track property vacancies both before and after the implementation of a Complete Streets project. The worksheet tracks baseline and evaluation changes in parcel vacancies and the percent rate change in property values to show the percent that property values changed since the Complete Streets policy and project implementation.

Purpose

Property Values Element:
Commercial and residential property values along a Complete Streets project corridor or located within a Complete Streets program area provide information on the economic changes and benefits that can result from an increase in multimodal transportation options. For example, creating more pedestrian- and bike-friendly streets encourages residents to spend more time along the street rather than in their cars. This increase in time spent along the street, makes people more likely to stop at nearby local businesses, improving the economic vitality (**Goal 4**) of the street and the community.

Goal 4

Economic Vitality

Objective 4.1

Increase property values and business sales volume along the corridor by X% at X months post baseline.

Sales Volume Element:
Following the implementation of a Complete Streets project, the increase in people walking and biking along a corridor or throughout a program area typically translates into an increase in business profits along the corridor. The idea is that businesses are more accessible to people who aren't in vehicles, allowing more people to visit businesses in the area.

Vacant Parcels Element:
Vacant parcels provide information on the economic impact resulting from the implementation of a Complete Streets policy both at the corridor and program levels. Tracking the implementation of more infrastructure or other changes that promote more multimodal transportation methods, like walking, biking or transit, will result in an area where businesses will thrive and residents will want to live.

Data Collection Guidelines

Data will be collected at baseline and at each evaluation point to determine the change in the different elements before and after Complete Streets implementation.

This data will be collected and reported through Infogroup to the Broward MPO. Findings reported from Infogroup can be transferred to the *Economic Vitality Worksheet Tool* to be housed with the rest of the Complete Streets evaluation results. Cities may request this information from the Broward MPO to obtain data regarding property values.

Goal 4
Economic Vitality
Objective 4.2
Reduce the number of parcel/business vacancies along the corridor by X%/$X at X months post baseline.

Data Source

Data for the *Economic Vitality Worksheet Tools* was collected by Infogroup and reported to the Broward MPO. Infogroup is the leading provider of business and residential data. Founded in 1972, Infogroup has over 40 years of experience in data compilation. Infogroup updates and verifies their database on a daily basis, ensuring all of their information is highly accurate. Infogroup Government Services specializes in providing custom solutions to state and local government offices across the nation.

Results

Property Values Element:
Following the implementation of a Complete Streets policy, streets and communities will often experience an increase in commercial property values as more people spend time and money in the area. Ideally, the Complete Streets policy and project implementation will draw more business activity to the area and the community. The property value results will be used to determine whether **Objective 4.1 Increase property values and business sales along the corridor by X% at X months post-baseline was achieved.** Property values and the sales volume results, together, create a more comprehensive picture of the commercial gains from a Complete Streets policy and project implementation.

Sales Volume Element:
Following the implementation of a Complete Streets project, you should expect to see an increase in commercial sales volume, as more walkers and bicyclists have access to stores and their neighborhood livability improves. Determining the value change and the percentage change in sales volume provides decision-makers and invested stakeholders the value, in dollars, of economic gains from a Complete Streets project. These results will pair well with reporting the property values results to create a more comprehensive picture of the commercial gains from a Complete Streets project.

Vacant Parcels Element:
Generally, what you would expect to see along a Complete Streets corridor or throughout a Complete Streets program would be a decrease in vacancies as livability and commerce is improved from more pedestrians, bicyclists and transit users traveling through a Complete Streets implementation area.

Photo Opportunity!
Take picture at baseline (if possible) and evaluation of vacant parcels and new buildings; and/or new businesses; and/or renovated or fixed up buildings along a Complete Street.

Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools

This worksheet is a repeat from the first tool listed in Goal 3: Balanced Mobility. Information about this tool, the data collection guidelines, and the layout of the results for this tool can be found on page 54.

Tool Profile

Level of evaluation	Estimated Hours	Field or Desktop Data Collection	Number of Evaluators Needed	Level of Difficulty
Corridor level Program level	6 hours	Desktop	2	Medium

Purpose

The fuel usage and fuel and health care cost savings information gathered and reported in the *Benefits Calculator* helps to determine the Health and Sustainability (**Goal 3**) of the Complete Streets program or project, while fuel and health care cost savings also inform on the Economic Vitality goal of a Complete Streets evaluation. An important component of sustainability is reducing the reliance on coal burning transportation and reducing the amount of carbon dioxide emissions to help offset the effects of climate change. An important indicator of the impacts a Complete Streets project and program will have on the health of the areas affected are the health care cost savings that the area will experience following program implementation. Not only is this an important indicator of improved health through reduced costs, it's also important to creating a sustainable system in terms of health, through the improvement of health outcomes related to transportation.

Goal 4

Economic Vitality

Objective 4.3

Reduce healthcare costs by X%/$X at X months post baseline.

Results

As listed above in the *About* section, the *Benefits Calculator* provides information on:

- Daily and annual reductions of fuel usage, in gallons
- Daily and annual fuel cost savings, in dollars
- Carbon dioxide reductions, in pounds

The resulting benefits inform **Objective 3.1: Reduce vehicle emissions by X% and fuel consumption by X% through increased bicycle/pedestrian activity at X months post-baseline**, and

- Daily and annual healthcare benefits, in dollars at the corridor level.

The healthcare benefits support **Objective 4.3: Reduce healthcare costs by X%/$X at X months post-baseline.** These simple results provide an easy way to inform decision makers and stakeholders on the energy and health care cost savings of the Complete Streets implementation in Broward County.

Reporting Results

Once all the baseline and evaluation data collection has been completed and input into the Complete Streets Evaluation Toolkit Spreadsheet, the evaluation is almost complete. By now, the evaluation team has all of the information needed to report on the evaluation of the Broward Complete Streets implementation, a Broward Complete Streets corridor or program areas.

Outputs and Outcomes

This information includes valuable data on the output and outcomes resulting from Complete Streets implementation. As discussed in the **Best Practices** section, having a clear picture of the outputs (changes made during implementation) and outcomes (changes resulting from implementation) can help understand the benefits of a successful Complete Streets project or program is important.

The following are the outputs and outcomes measured in the *Complete Streets Evaluation Toolkit*:

Outputs

- More multimodal amenities
- More amenities for persons with disabilities
- More countermeasures implemented, resulting in less crashes
- More trees planted
- More green infrastructure implemented

Outcomes

- Increased transit ridership
- Increased user satisfaction
- Decrease in crash-related injuries and deaths
- Increased number of pedestrians and bicyclists
- Increased property values
- Decrease in vacant parcels
- Increase in sales volume
- Reductions in annual fuel usage
- Savings in annual fuel costs
- Reduction in carbon dioxide emissions
- Savings in daily and annual healthcare benefits

Percent Changes

The results of the Complete Streets evaluation data collection provide the evaluation team with percent changes for most of the tools. The percent changes indicate, negatively or positively, the change from baseline values to evaluation values. These percent changes, automatically calculated in the *Complete Streets Evaluation Toolkit Spreadsheet,* provide the information needed to determine whether the Complete Streets Evaluation objectives have been met at the corridor and program levels.

Rates

The results of the *Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools* and the *Crash Injury and Mortality Worksheet Tool* can be used to report the changes in rates of bicycle and pedestrian injuries and moralities. While reporting the raw numbers should be done, the baseline and evaluation rates should be reported to accurately reflect decreases, or increases, in injuries and moralities. Including rates in reporting results will troubleshoot any inaccurate representations in the appearance of an increase in injuries and fatalities because of an increase of bicyclists and pedestrians. Rates should be calculated for pedestrian injuries, pedestrian mortalities, bicycle injuries, and bicycle mortalities at baseline and evaluation. The generic formulas for calculating the rates is:

$$\text{Rate} = \frac{\text{Number of injuries or deaths}}{\text{Total number}} \times 1{,}000$$

Reporting on Monetary Benefits

The monetary amount associated with changes made for a Complete Streets project implementation will likely be very important information for Broward Complete Streets stakeholders. Complete Streets projects are an investment for local governments and they will likely want to see what the return is on this investment. Conducting this Complete Streets evaluation will provide you with a number of pieces of information that depict the Complete Streets project level of success in monetary terms, including:

- **Total Business Sales**
  Informs on sales increases, and resulting increased sales taxes, adding both to the local economy and the government.
  Tool: *Economic Vitality Tool*

- **Property Values**
  Increased property values translate to increased city revenues through property taxes and an increase in the property's selling price.
  Tool: *Economic Vitality Tool*

- **Health Care Cost Savings**
  The health benefits associated with walking, bicycling and reduced motor vehicle travel, like improved cardiovascular health and decreased asthma and respiratory conditions associated with carbon dioxide emissions, are well documented. These health benefits are not only great because a community's health is improving, but also because improved health translates to reduced healthcare costs. The *Conserve by Bicycle and Pedestrian Study Benefits Calculator* calculates daily and annual health care cost savings automatically.
  Tool: *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools*

- **Fuel Savings**
  Savings on the cost of fuel from reduced vehicle trips and increased pedestrian, bike and transit travel gives stakeholders an idea of how much money local residents saved following Complete Streets project implementation. The *Conserve by Bicycle and Pedestrian Study Benefits Calculator* calculates daily and annual fuel savings automatically.
  Tool: *Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools*

- **Transit Ridership**
  Increased transit ridership informs both on the magnitude of the change, i.e. more people riding the train, and the economic value of this through increased revenue. By multiplying the number of new trips taken on transit, following Complete Streets project implementation, by the cost per ride, provides you with a single dollar number that can be used for reporting the value of project implementation for transit in that area.
  Tool: *Automatic Passenger Counter Worksheet Tool*

- **Savings from Reduced Crash Injuries and Fatalities**
  Along the same lines as the reduction in health care costs, reducing the number of motor vehicle-related crashes and injuries can provide huge savings in these costs. According to the National Safety Council, in 2012 the average economic cost per death, injury, or crash was $1,410,000 for a death, $78,900 for a nonfatal disabling injury, and $8,900 for property damage crash (including non-disabling injuries).
  Tool: *Crash Injury and Mortality Worksheet Tool*

Using Photos

Photos taken at baseline and evaluation can serve as a way to visually show the changes that have occurred as a result of a Complete Streets project or program implementation. This qualitative information can complement the quantitative data reported to stakeholders and provide an additional method for reporting Complete Streets evaluation results.

References

Broward Metropolitan Planning Organization (MPO). (2012). *Broward Complete Streets Guidelines.* Retrieved from http://www.browardmpo.org/services/complete-streets/guidelines.

Broward Metropolitan Planning Organization (MPO). (2013). *Commitment 2040: Goals, Objectives, and Measures*. Ft. Lauderdale, FL: Broward Metropolitan Planning Organizations. Retrieved from http://www.browardmpo.org/.

Broward Metropolitan Planning Organization (MPO). (n.d.). *Complete Streets*. Retrieved November 21, 2014 from http://www.browardmpo.org/projects-studies/complete-streets.

Centers for Disease Control and Prevention (CDC). (2008). *Introduction to process evaluation in tobacco use prevention and control*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. Retrieved from http://www.cdc.gov/tobacco/tobacco_control_programs/surveillance_evaluation/process_evaluation/pdfs/tobaccousemanual_updated04182008.pdf.

Centers for Disease Control and Prevention (CDC). (2011). *Developing an Effective Evaluation Plan*. Atlanta, Georgia: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; Division of Nutrition, Physical Activity, and Obesity. Retrieved from http://www.cdc.gov/obesity/downloads/cdc-evaluation-workbook-508.pdf.

Crash Modification Factors Clearinghouse. (n.d.). *About CMFs.* Retrieved October 10, 2014 from http://www.cmfclearinghouse.org/about.cfm.

Dill, J. (2004, January). Measuring network connectivity for bicycling and walking. In *83rd Annual Meeting of the Transportation Research Board, Washington, DC.*

Florida Department of Transportation (FDOT). (2009, October). *Conserve by Bicycling and Walking Phase II Report.* Retrieved October 22, 2014 from http://www.dot.state.fl.us/safety/4-Reports/Bike-Ped-Reports.shtm.

Litman, T. (2005). *Roadway connectivity: Creating more connected roadway and pathway networks*. Retrieved from http://www.vtpi.org/tdm/tdm116.htm.

Smart Growth America. (n.d.). *Benefits of Complete Streets.* Retrieved October 23, 2014 from http://www.smartgrowthamerica.org/complete-streets/complete-streets-fundamentals/benefits-of-complete-streets/.

Smart Growth America. (n.d.). *What are Complete Streets?.* Retrieved October 23, 2014 from http://www.smartgrowthamerica.org/complete-streets/complete-streets-fundamentals/complete-streets-faq.

U.S. Environmental Protection Agency (EPA). (2015, March 10). *National Stormwater Calculator.* Retrieved from http://www2.epa.gov/water-research/national-stormwater-calculator.

Appendices

Appendix A
Additional Resources

Broward Complete Streets Guidelines: available for download, at:
http://urbanhs.com/initiatives/completestreets/browardcompletestreets/

CDC's *Developing an Effective Evaluation Plan*:
http://www.cdc.gov/obesity/downloads/cdc-evaluation-workbook-508.pdf

Crash Modification Factors (CMF) Clearinghouse:
http://www.cmfclearinghouse.org/

Federal Highway Administration (FHWA) Highway Safety Manual:
http://safety.fhwa.dot.gov/hsm/

Safety Analyst, Interactive Highway Safety Design Model (IHSDM):
http://www.fhwa.dot.gov/research/tfhrc/projects/safety/comprehensive/ihsdm/

The *Benefits Calculator User Guide* can be accessed online, at:
http://www.dot.state.fl.us/safety/4-Reports/Bike-Ped/CBBPhase%202%20final%20report_appendices.pdf

Appendix B

Broward Long Range Transportation Plan 2040 Goals and Complete Streets Goals and Corridor and Program Level Objectives

LRTP 2040 Goals	Complete Streets Evaluation Goals	Corridor Level Objectives	Program Level Objectives
Move People **Strengthen Communities**	1. Equitable Mobility	1.1 Increase the incidence of bicycling and walking	1.1 Increase the incidence of bicycling and walking
		1.2 Increase the number of transit users	1.2 Increase the number of transit users
		1.3 Provide facilities for bicyclists and pedestrians that improves the roadway environment for all users	1.3 Provide facilities for bicyclists and pedestrians that improves the roadway environment for all users
			1.4 Decrease the volume of vehicle trips and traffic
			1.5 Increase connectivity for all modes
Strengthen Communities	2. Safety	2.1 Decrease crash injury and mortality rates for bicyclists and pedestrians by X% at X months post baseline.	2.1 Decrease crash injury and mortality rates for bicyclists and pedestrians by X% at X months post baseline.
		2.2 Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post baseline.	2.2 Implement safe design countermeasures to calm traffic and reduce crashes by X% at X months post baseline.
Move People **Strengthen Communities**	3. Health and Sustainability	3.1 Decrease crash injury and mortality rates for bicyclists and pedestrians	3.1 Decrease crash injury and mortality rates for bicycli2sts and pedestrians
		3.2 Implement safe design countermeasures to calm traffic and reduce crashes	3.2 Implement safe design countermeasures to calm traffic and reduce crashes
		3.3 Reduce vehicle emissions and fuel consumption through increased bicycle/pedestrian activity2.	3.3 Reduce vehicle emissions and fuel consumption through increased bicycle/pedestrian activity
		3.4 Increase physical activity	3.4 Increase physical activity
		3.5 Incorporate natural design elements throughout the corridor	3.5 Incorporate natural design elements throughout the corridor
		3.6 Proportion increase in community support and satisfaction	3.6 Proportion increase in community support and satisfaction
			3.7 Decrease chronic conditions
Create Jobs **Strengthen Communities**	4. Economic Vitality	4.1 Increase property values and business sales along the corridor	4.1 Increase property values and business sales along the corridor
		4.2 Reduce the number of vacant parcels along the corridor	4.2 Reduce the number of vacant parcels along the corridor
		4.3 Reduce Healthcare Costs	4.3 Reduce Healthcare Costs

Appendix C

Corridor Level Evaluation Tools Checklist

Goal 1: **Balanced Mobility**		
1.	Pedestrian and Bicyclist Counts Field Data Colletion and Worksheet Tools	☐
2.	Automatic Passenger Counter Worksheet Tool	☐
3.	Multimodal Facility Coverage Worksheet Tool	☐
4.	MMLOS Worksheet Tools	☐
Goal 2: **Safety**		
1.	Crash Injury and Mortality Worksheet Tool	☐
2.	Vehicle Speeds Worksheet Tool	☐
3.	Crash Modification Factors (CMF) Inventory Worksheet Tool	☐
Goal 3: **Health and Sustainability**		
1.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐
2.	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools	☐
3.	Tree Canopy Field Data Collection Tool	☐
4.	National Stormwater Calculator Field Data Collection and Worksheet Tools	☐
5.	Complete Streets User Satisfaction Survey and Worksheet Tools	☐
Goal 4: **Economic Vitality**		
1.	Property Values Element	☐
2.	Sales Volume Element	☐
3.	Vacant Parcels Element	☐
4.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐

Appendix D

Program Level Evaluation Tools Checklist

Goal 1: **Balanced Mobility**		
1.	MMLOS Worksheet Tools	☐
2.	Automatic Passenger Counter Worksheet Tool	☐
3.	Multimodal Facility Coverage Worksheet Tool	☐
4.	Connectivity Worksheet Tool	☐
Goal 2: **Safety**		
1.	Crash Injury and Mortality Worksheet Tool	☐
2.	Vehicle Speeds Worksheet Tool	☐
3.	Crash Modification Factors (CMF) Inventory Worksheet Tool	☐
Goal 3: **Health and Sustainability**		
1.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐
2.	Pedestrian and Bicyclist Counts Field Data Collection and Worksheet Tools	☐
3.	Tree Canopy Field Data Collection and Worksheet Tool	☐
4.	National Stormwater Calculator Field Data Collection and Worksheet Tools	☐
5.	Complete Streets User Satisfaction Survey and Worksheet Tools	☐
Goal 4: **Economic Vitality**		
1.	Property Values Element	☐
2.	Sales Volume Element	☐
3.	Vacant Parcels Element	☐
4.	Conserve by Bicycle and Pedestrian Study Benefits Worksheet Tools	☐

Appendix E

Pedestrian and Bicyclist Counts Field Data Collection Tool

Data Collection Guidelines

The Complete Streets *Pedestrian and Bicyclist Counts Field Data Collection Tool* gathers information on the volume of pedestrians and bicyclists along a Complete Street corridor. This data can be used to report the numerical change in volume before and after project implementation.

The survey data is collected at a location (i.e. at an intersection, on the east side of a street) along the Complete Streets project corridor and from which the data will be collected. For two hours, the data collector will count adult and children pedestrians and bicyclists crossing this point, in 15-minute intervals. For each pedestrian or bicyclist, mark one tally in the corresponding box. A handheld tally counter can help keep track of counting. Be sure to change rows every 15-minutes and record the hour before you begin counting in the hour column. Count bicyclists on the street and the sidewalk, and be sure to count the number of people on a bicycle, not the number of bicycles. Pedestrians include all people not on bicycles, i.e. people in wheelchairs, on skates, on scooters, etc.

Complete all of the fields on this form. Sometimes pedestrian and bicycle traffic volume will be heavy or someone may try to speak with you. Do your best to not lose count. Also, if volume is too heavy to track the adult and children pedestrians and bicyclists, switch to just counting pedestrians and bicyclists.

Materials Needed

- Pedestrian and Bicyclist Counting Form
- Pen
- Handheld Tally Counter if available
- Sunscreen
- Hat
- Sunglasses
- Timer

This tool is adapted from: Federal Highway Administration (FHWA), National Bicycle and Pedestrian Documentation Project (NBPD), Bike Walk Twin Cities – Transit for Livable Communities (BWTC / TLC), and the Minneapolis Department of Public Works (MDPW).

Data Collection Instrument

Data Collector's Name:				**Data Collector's Organization/ Agency:**			
Data Collector's Email:				**Data Collector's Telephone:**			
Date:	_____/_____/_____						
Day of the Week *(circle one)*:	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Type of Count *(circle one)*:			Pedestrian	Bicyclist	Both		
Count Start Time:			AM/ PM	**Count End Time:**			AM/ PM
Complete Streets Corridor:							
Street or Intersection:							
City:							
Notes:							

Time		Bicyclists					Pedestrians							
							Unassisted				Assisted (skaters, wheelchairs, etc.)			
		Male		Female			Male		Female		Male		Female	
Hour	Minutes	Adult	Child	Adult	Child		Adult	Child	Adult	Child	Adult	Child	Adult	Child
	:00-:15													
	:15-:30													
	:30-:45													
	:45-:00													
Hour 1 Subtotal														
	:00-:15													
	:15-:30													
	:30-:45													
	:45-:00													
Hour 2 Subtotal														
Hour 1 + Hour 2 Total														

Appendix F

Tree Canopy Field Data Collection Tool

Canopy Cover at Edge of Pavement (CCEP) is a standard measurement of street tree canopy coverage that measures the percentage of shading that street trees provide for streets. This evaluation tool is a simple ground survey that can be conducted on foot by one data collector, with few materials needed.

Data Collection Guidelines

The ground survey is conducted by walking along the edge of the pavement and recording direct tree canopy shade at evenly spaced points, for example every three steps, along the route. A yard stick, lightweight pole, or similar tool will help to better determine the accuracy of tree canopy directly overhead providing shade. These tools will allow the evaluator to sight a point directly overhead and project a line vertically from the edge of pavement upward towards the canopy to increase the accuracy of the evaluation.

Materials Needed

- Tree Canopy Ground Survey sheet
- Pen
- Yard stick
- Sunscreen
- Hat
- Sunglasses

Calculating Results

The CCEP is calculated using the following formula:

% CCEP = 100 x (points with canopy cover/total number of points)

Recording Results

Record data from the *Tree Canopy Field Data Collection Tool* in the *Tree Canopy Worksheet Tool* located in the *Complete Streets Evaluation Toolkit Spreadsheet*. Each time a Tree Canopy Ground Survey is conducted for a Complete Streets project, record the data on the same project's *Complete Streets Evaluation Toolkit Spreadsheet* to automatically calculate, track and evaluate periodic CCEP measurements for a Complete Streets corridor.

This tool is adapted from: *Swiecki, T. J., Bernhardt, E. A. Guidelines for Developing and Evaluating Tree Ordinances. Phytosphere Research, Vacaville, CA. http://phytosphere.com/treeord/index.htm. Accessed: (May 24, 2014)*

Tree Canopy Survey Data Collection Information

Complete Streets Corridor:	**Date:** _____ / _____ / _____
Location: Street or intersection (nearest address if relevant)	**Day:** *(circle)* Sunday Monday Tuesday Wednesday Thursday Friday Saturday
City or Town	**Count duration, in hours:**
Count recorder name(s):	**Count start time:** *(circle)* AM / PM
Counter Telephone and Email	**Name of agency / organization managing count:**

Fill in the following information on the data collection:

Staring Point:	
End Point:	
Interval Distance:	
Street Distance:	

NB/WB ***(circle one)***

(Street name):

NB/WB ***(circle one)*** ***(Street name):***

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(Street name): **SB/EB** ***(circle one)***

SB/EB ***(circle one)***

(Street name)

Notes:

Appendix G

National Stormwater Calculator Field Data Collection Tool

Land Cover

Enter the percentage of the site's area covered by each type of non-impervious surface. The remaining areas are considered to be directly connected impervious surfaces (roofs, sidewalks, streets, parking lots, etc.) that drain directly off-site. Disconnecting some of this area, to run onto lawns for example, is an LID option appearing on the next page.

Choose a land cover distribution that reflects the stage of development being analyzed, such as pre-development, current development or future development. Total runoff volume is highly dependent upon the amount of impervious area, and less dependent upon how the non-impervious area is divided between the different land cover categories.

Non-impervious land cover type will affect the amount of rainfall captured on vegetation or in natural depressions. It also determines surface roughness. Rougher surfaces slow down overland flow allowing more opportunity for infiltration.

% Forest	
% Meadow	
% Land	
% Desert	
% Impervious	

Disconnection Capture Area

The Capture Ratio is the ratio of the pervious area receiving the runoff (such as a lawn area) to the impervious area that generates the runoff.

For example, if 5,000 square feet of roof area is directed onto 3,000 square feet of lawn area then the Capture Ratio would be 3,000 / 5,000 or equal to 60%.

% Capture Ratio:	

Rain Harvesting

Rain harvesting systems collect runoff from rooftops and convey it to a cistern tank where it can be used for non-potable water uses and on-site infiltration.

The harvesting system is assumed to consist of a given number of fixed-sized cisterns per 1000 square feet of rooftop area captured.
The water from each cistern is withdrawn at a constant rate and is assumed to be consumed or infiltrated entirely on-site.

Cistern Size (gallons):	
Emptying Rate (gallons/ day):	
Number per 1,000 Sq Ft:	

Rain Gardens

Rain Gardens are shallow depressions filled with an engineered soil mix that supports vegetative growth. They are usually used on individual home lots to capture roof runoff.

Typical soil depths range from 6 to 18 inches.

The Capture Ratio is the ratio of the rain garden's area to the impervious area that drains onto it.

Ponding Height (inches):	
Soil Media Thickness (inches):	
Soil Media Conductivity (inches/hour):	
% Capture Ratio:	

Green Roofs

Green Roofs (also known as Vegetated Roofs) are bio-retention systems placed on roof surfaces that capture and temporarily store rainwater in a soil growing-medium. They consist of a layered system of roofing designed to support plant growth and retain water for plant uptake, while preventing ponding on the roof surface.

The thickness used for the growing medium typically ranges from 3 to 6 inches.

Soil Media Thickness (inches):	
Soil Media Conductivity (inches/hour):	

Street Planters

Street Planters consist of concrete boxes filled with an engineered soil that supports vegetative growth. Beneath the soil is a gravel bed that provides additional storage.

The walls of a planter extend 3 to 12 inches above the soil bed to allow for ponding within the unit. The thickness of the soil growing-medium ranges from 6 to 24 inches, while gravel beds are 6 to 18 inches in depth.
The planter's Capture Ratio is the ratio of its area to the impervious area whose runoff it captures.

Ponding Height (inches):	
Soil Media Thickness (inches):	
Soil Media Conductivity (inches/hour):	
Gravel Bed Thickness (inches):	
% Capture Ratio:	

Infiltration Basins

Infiltration basins are shallow depressions filled with grass or other natural vegetation that capture runoff from adjoining areas and allow it to infiltrate the soil.

The calculator assumes that the infiltration rate from the basin is the same as that of site's native soil.

The basin's Capture Ratio is the area of the basin relative to the impervious area whose runoff it captures.

Basin Depth (inches):	
% Capture Ratio:	

Permeable Pavement

Continuous Permeable Pavement systems are excavated areas filled with gravel and paved over with a porous concrete or asphalt mix.

Modular Block systems are similar except that permeable block pavers are used instead.

Normally, all rainfall will immediately pass through the pavement into the gravel storage layer below it where it can infiltrate at natural rates into the site's native soil.

Pavement layers are usually 4 to 6 inches in height while the gravel storage layer is typically 6 to 18 inches high.

The Capture Ratio is the percent of the treated area (street or parking lot) that is replaced with permeable pavement.

Pavement Thickness (inches):	
Gravel Layer Thickness (inches):	
% Capture Ratio:	

Once all of the above data has been collected, input this information into the *National Stormwater Calculator Worksheet Tool* in the *Complete Streets Evaluation Toolkit Spreadsheet.*

Appendix H

Complete Streets User Satisfaction Survey Tool

The following survey was adapted from the East Portland Active Transportation Survey.

Data Collection Guidelines

The following survey takes inventory of participants' mode share and user satisfaction. A simple way to allow people to access the survey and to receive an automatic descriptive survey analysis is to make available on SurveyMonkey, or a similar free online survey website, for easier access for participants. SurveyMonkey will automatically gather and analyze data that can easily be extracted for results reporting.

It may be tricky to access people living and working in the Complete Streets project area. Contact local businesses and organizations in the project area to help promote the survey on their social media accounts. Enlist partner organizations in the Complete Streets project area to help promote and recruit survey participants. Additionally, promote the survey on the Broward MPO website and through local government social media. Consider offering an incentive for survey participants, like a free pedometer or other tool that could help promote active modes of transportation.

Once all of the surveys have been collected, input the results into the *Complete Streets User Satisfaction Worksheet Tool* in the *Complete Streets Evaluation Toolkit Spreadsheet.*

Survey Instrument

The following survey gathers information for the Broward County Metropolitan Planning Organization (Broward MPO) on the types of transportation you use to get around, your opinions on transportation, and changes in transportation you would like to see in your area. Your information will help the Broward MPO plan streets that meet the transportation needs of all Broward County residents.

1. Approximately how many times per week do you take a trip by each of the following transportation modes?

	None	1-3 times	4-6 times	7-10 times	More than 10 times
A. Car					
B. Bus					
C. Walk					
D. Bike					

2. Below are statements about your neighborhood with which you may or may not agree. Please check the answer that best applies to you and your neighborhood:

	Strongly disagree	**Somewhat disagree**	**Neutral**	**Somewhat agree**	**Strongly agree**
A. There are many places to go within easy walking distance (10-15 minutes) of my home.					
B. The crime rate in my neighborhood makes it unsafe to go on walks.					
C. It is easy to walk (10-15 minutes) to a bus stop from my home.					
D. I feel safe from traffic while walking along side streets or local streets in my neighborhood.					
E. I feel safe from traffic while walking along busy streets (arterials) in my neighborhood.					
F. I feel safe riding a bike on side streets (local streets) in my neighborhood					
G. I feel safe riding a bike on busy streets (arterials) in my neighborhood.					

3. How difficult would it be for you to use the following types of transportation for day-to-day, non-work trips from your current home, such as running errands?

	Very difficult	Difficult	Somewhat Difficult	Somewhat Easy	Easy	Very easy
A. Car						
B. Bus						
C. Walk						
D. Bike						

4. Listed below are a few activities that you may often do. Assume that you are at your home and decide to do one of the following activities. Which type of transportation would you use?

	Car	Bus	Walk	Bike
A. Visiting a friend				
B. Routine grocery shopping				
C. Eating in a restaurant				
D. Going to a coffee shop				
E. Running errands (bank, dry cleaners, post Office, etc.)				
F. Last minute grocery trip to buy basic grocery items you've just run out of, like bread or milk				

5a. On a typical weekday, what type of transportation would you most likely use to get to work or school? Check all that apply:

Car, truck or motorcycle	
Bus	
Walk	
Bicycle	
Not applicable, I do not work or go to school	

5b. If you took the bus, how did you get to the bus stop or transit station? Check one:

Car, truck or motorcycle	
Walk	
Bicycle	

6. How often do you walk from your home to each of the following places?

	Never Less than 1 time per month	**1 to 3 times per month**	**About 1 time per week**	**2 to 4 times per w eek**	**5 or more times per week**
A. Work or school					
B. A service provider (bank, post office, barber, dentist)					
C. A restaurant, bar or coffee shop					
D. A store					
E. The home of a friend or family member					
F. Taking someone else to school or daycare					

7. How satisfied are you with facilities for pedestrians (i.e. shade, benches, adequate sidewalk space, smooth sidewalk surfaces) in your neighborhood?

Very satisfied	
Somewhat satisfied	
Neutral	
Somewhat unsatisfied	
Not satisfied	

8. To what extent would any of the following make it more likely that you would choose to walk to get around in your neighborhood?

	Not at all likely	A little bit more likely	Somewhat more likely	Much more likely
A. More sidewalks on busy streets				
B. More sidewalks on neighborhood streets				
C. Slower vehicle traffic				
D. More destinations within walking distance				
E. More marked crosswalks across busy streets				
F. Better lighting				
G. Organized walking groups				
H. A map from the city showing safe routes for walking to popular destinations				

9. How often do you ride a bike from your home to each of the following places?

	Never Less than 1 time per month	1 to 3 times per month	About 1 time per week	2 to 4 time s per week	5 or more times per week
A. Work or school					
B. A service provider (bank, post office, barber, dentist)					
C. A restaurant, bar or coffee shop					
D. A store					
E. The home of a friend or family member					
F. Taking someone else to school or daycare					

10. How satisfied are you with the bike facilities (bike lanes, shared lanes, bike parking) in your neighborhood?

Very satisfied	
Somewhat satisfied	
Neutral	
Somewhat unsatisfied	
Not satisfied	
I do not ever ride my bike	

11. To what extent would any of the following make it more likely that you would ride a bike to get around?

	Not at all more likely	A little bit more likely	Somewhat more likely	Much more likely
A. More bike lanes on busy streets				
B. Neighborhood streets that give bicycles and pedestrians priority				
C. On street bike paths separated from car traffic by parked cars or a curb				
D. Off -street paths				
E. Slower vehicle traffic				
F. More destinations in my neighborhood				
G. Better lighting				
H. Classes where I can learn safe biking skills and basic maintenance				
I. A city map showing safe bike routes				

12. If you ride the Broward County Transit bus, how reliable do you find the bus system?

A. Very reliable, always on time	
B. Somewhat reliable, mostly on time	
C. Not very reliable, frequently off schedule	
D. Unreliable, never on time	
E. I do not ride the bus	

13. Overall, how satisfied are you with your bus transit service, including bus reliability, cleanliness and cost?

Very satisfied	
Somewhat satisfied	
Neutral	
Somewhat unsatisfied	
Not satisfied	
I do not ever ride the bus	

14. On a scale of 1 to 5 (with 5 being the most important), how important do you think each of the following should be prioritized by the Broward Metropolitan Planning Organization?

Please mark one:	**1** **Not important**	**2**	**3**	**4**	**5** **Veryimportant**
A. Building sidewalks on busy streets (arterials)					
B. Building sidewalks that improve access to bus stops and transit stations					
C. Installing signals or other improvements to make crossing busy streets safer					
D. Retrofitting neighborhood streets to give bicycles and pedestrians priority					
E. Traffic and speeds					
F. Making wider bike lanes on busy streets (arterials)					
G. Maintaining streets and fixing potholes					
H. Creating new bike lanes on busy streets (arterials)					
I. Improving signal timing					
J. Building new trails/multi -us separated from traffic					

15. What is your gender?

Female	
Male	

16. What age group do you fall in?

18-25 years	
26-35 years	
36-45 years	
46-55 years	
56-65 years	
Over 65 years	

17. What is your ethnicity or race? (check all that apply)

A. African American	
B. Native American	
C. Pacific Islander	
D. Hispanic	
E. White	
F. Asian	
G. Other	

18. Do you currently have a physical condition that seriously limits or prevents you from doing any of the following?

	Yes	No
A. Driving a vehicle		
B. Walking outside the home		
C. Riding a bicycle		
D. Using regularly scheduled buses		

19. Do you own a car?

Yes	
No	

Thank you for taking this survey!

Appendix I

MMLOS Adjustment Factors

The following six adjustment factors were identified by Kimley-Horn and Associates, Inc., in a national scan of Alternative LOS Methodologies.

Six Broward County Adjustment Factors Choices

1. Pedestrian Connectivity	2. Pedestrian Features	3. Urban Form Features	4. Urban Form Features	5. Urban Form Features	6. Urban Form Features
Distance between crossings	Presence and Quality of Pedestrian Features	Building Setbacks	Spacing Between Buildings	Physical Barriers between Sidewalk and Building	Location of Off-Street Parking
300' or less	High	Close	Close	None	Rear
301' to 400'	Moderate	Mixed	Mixed	Some	Side
401' to 500'	Low	Far	Far	Many	Front
501' to 600'	Pedestrian Features				
Over 600'					

1. **Pedestrian Connectivity Adjustment Factor**: Distance between intersections or mid-block crossings

300’ or less	5
301’ to 400’	4
401’ to 500’	3
501’ to 600’	2
Over 600’	0

2. Pedestrian Features: Presence and quality of pedestrian features (food sidewalk condition; lack of obstacles; ADA compliance; shade trees; street furniture)

High quality	5
Moderate quality	3
Low quality	2
Poor quality or no features	0

3. – 6. Urban Form Features:

Characteristics	Rating		
	Good	Fair	Poor
3. Building setbacks	Close (<30')	Mixed	Far (≥ 30')
4. Spacing Between Buildings	Close (<30')	Mixed	Far (≥ 30')
5. Physical Barriers between Sidewalk and Building	None	Some	Many
6. Location of Off-Street Parking	Rear	Side	Front

Urban Form Rating	Bicycle/Pedestrian Adjustment Factor	Transit Adjustment Factor[1]
Good	0.80	1.2
Fair	0.95	0.95
Poor	1.2	0.80

[1]The transit adjustment factor has an inverse relationship to the bicycle and pedestrian adjustment factor due to the inverse scoring scale used in ARTPLAN.