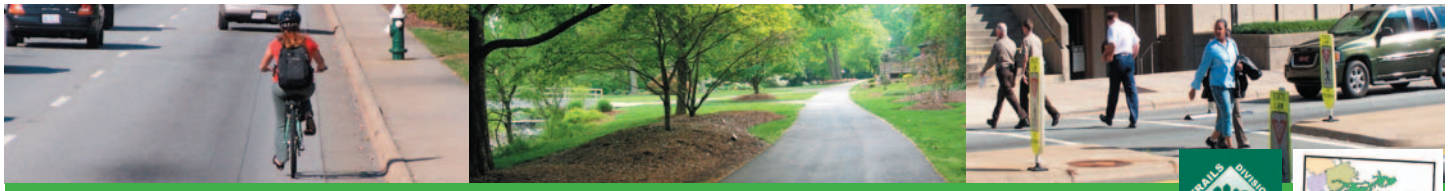


Chapter 6: Operations and Maintenance

6.1 Operations and Maintenance

Operations and maintenance refers to specific day-to-day tasks and programs performed to assure resources and facilities are kept in good usable condition. This begins with sound design, durable components, and a comprehensive management plan. A management plan should be embraced by the entities responsible for maintaining the greenway, bicycle, and pedestrian network, at the beginning of the implementation process. In addition, community groups, residents, business owners, developers and other stakeholders should be engaged in the long term stewardship of the resources preserved and enhanced by this plan as discussed later in this chapter.

6.1.1 Guiding Principles for Effective Operations and Maintenance

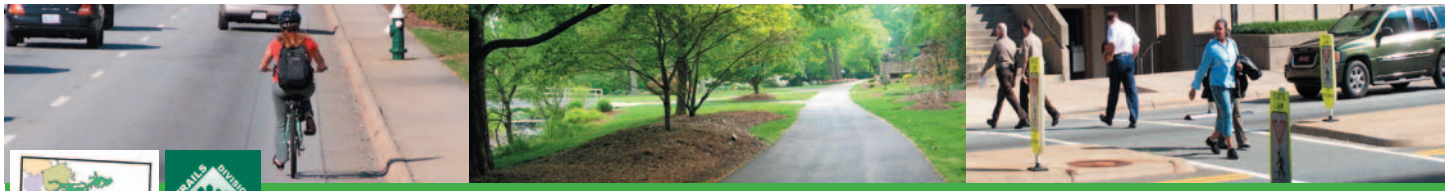
The Greensboro Bicycle, Pedestrian and Greenway system should be viewed and maintained as a public resource. Indeed it will become infrastructure similar to the street system or utility networks, serving the community for generations to come. The following guiding principles will help assure the preservation of a first class system:

- Good maintenance begins with sound planning and design
- Foremost, protect life, property and the environment
- Promote and maintain a quality outdoor recreation and transportation experience
- Develop a management plan that is reviewed and updated annually with tasks, operational policies, standards, and routine and remedial maintenance goals
- Maintain quality control and conduct regular inspections
- Include field crews, police and fire/rescue personnel in both the design review and on-going management process
- Maintain an effective, responsive public feedback system and promote public participation
- Be a good neighbor to adjacent properties
- Operate a cost-effective program with sustainable funding sources

6.1.2 Resource Stewardship and Enhancement

A well-managed bicycle, pedestrian, and greenway system is critical to the long-term success of this Plan. This includes stewardship, the oversight of resources, and operations and maintenance. This includes such activities as monitoring the condition of bicycle, pedestrian, greenway, and ancillary facilities; monitoring the impact of growth on bicycle, pedestrian, and greenway facilities; and long-term application of policies—such as land-use and development measures—in accordance with the objectives of this plan. Stewardship might range from cleaning up litter to assuring that a project does not visually scar the surrounding landscape.

The stewardship process must consider both private sector—such as land subdivision and development—and public sector activities—such as the construction of roads and utilities. In pursuit of this, coordination among agencies at the local, regional, state and federal level is vital to assure that these activities are supportive of the plan and complementary to each other. Long term stewardship also calls for the enduring commitment of agency staff, elected officials and concerned citizens all working together. This suggests the need for a shared community vision and value system centered



on the protection of bicycle, pedestrian, greenway and outdoor recreational resources. This plan and similar plans can help coordinate and guide that action.

6.2 Routine and Remedial Operations

The following task lists describe the general routine and remedial operations responsibilities for all network facilities. To complement this text, Table 6(a) illustrates current operations and provides recommendations for improvement.

6.2.1 Routine Operations Defined

Routine operations refer to the daily activities required to oversee a greenway, bicycle, or pedestrian system.

Task: Systematic risk management assessment

Safety is central to all maintenance operations, and is the single most important trail, bicycle, and pedestrian facility maintenance concern. The City of Greensboro should implement a safety program that includes the following preventative measures.

- Schedule and document inspections to determine the amount of use, location, age, type of construction, and condition of railings, bridges, trail surfaces, signage, etc. Follow-up with the appropriate corrective measures in a timely manner.
- Evaluate and remove all obstacles or objects that could impede facility usage such as debris, rumble strips, etc. and provide solutions such as alternative routing, removal of obstacle, etc.
- Implement a data base management system, a Crime Tracking System, with police for tracking the specific locations and circumstances of all incidents, such as vandalism, and create a safety follow-up task force to address any problems that develop.
- Implement an emergency response protocol working with law enforcement, EMS agencies, and fire department that includes mapping of access points, design of trails and access roads (to accommodate up to 6.5 tons), and an "address system" such as mile markers to identify locations for all off-road greenway facilities. On-road facilities should make use of the existing street names and adjacent property addresses. Where appropriate, 911 emergency phones should be installed in remote areas. Each local emergency response office/unit should have an up-to-date map of all City greenway, bicycle, and pedestrian facilities.

Task: Inter-agency design review

Coordination between and commitment of agencies responsible for trail, bicycle, and pedestrian facilities is crucial to complete the following routine maintenance tasks. In addition to department managers, planners, designers and engineers, police and fire/rescue and field maintenance personnel should be consulted in the design and review process. The creation of a Citizens Advisory Committee and Technical Work Group is recommended to carry out the following tasks.

- Establish a coordinating committee with representatives from each of the participating agencies and stakeholders
- Identify an entity to provide on-going oversight, coordination, and leadership for the overall network
- Review critical public and private sector projects that might impact the greenway, bicycle, and pedestrian projects as they come on line
- Pursue grants and cooperative agreements
- Monitor operations and maintenance and other advocacy functions now and over the years to come.
- Review accident and crime reports and take the necessary up-front actions, on a case by case basis, to assure that greenway, bicycle,

		Greenway Facility Operations		Bicycle Facility Operations		Pedestrian Facility Operations	
		Current Efforts	**Recommendations**	**Current Efforts**	**Recommendations**	**Current Efforts**	**Recommendations**
Routine Operations Activities							
Systematic Risk Management Assessment	Schedule and document inspections	Inspections are conducted as general observations by the attending maintenance crew, while in the field conducting routine tasks	Designated person, such as Trails Director or Assistant Trails Director should conduct formal inspections of all facilities 2 times / year (in the early spring and early fall). Conduct quarterly inspections on facilities with heavier usage.	Inspections are conducted as general observations by the attending maintenance crew, while in the field conducting routine tasks	2 times / year (in the early spring and early fall)	Conducted by Field Operations Department as needed	2 times / year (in the early spring and early fall)
	Evaluate and remove all obstacles or objects that could impede facility usage	As needed	As needed	As needed	As needed	Conducted by Field Operations Department for repair of concrete; Property owners remove obstacles and objects	Develop a regular schedule for Field Operations Department to trim shrubbery and clear debris
	Implement a data base management system	Very up to date GIS data base exists and is managed by the Assistant Trails Director	Continue to maintain data base and keep it up to date	GIS database was developed as a part of this plan	MPO should maintain data base and keep it up to date	Sidewalk database is maintained by GDOT	MPO should maintain data base and keep it up to date
	Implement an emergency response protocol	911 emergency response system already in place, Addresses exist for each trail, Access roadways have been established (Owl's Roost Fire Lanes)	Evaluate emergency response system regularly to ensure timely response	911 Emergency Response System already in place	Continue current protocol	911 Emergency Response System already in place	Continue current protocol
Inter-Departmental Design Review	Identify an entity to provide on-going oversight, coordination, and leadership for the overall network	Currently, Greenway, Bicycle, and Pedestrian Systems are not well integrated	Create an Inter-Departmental Committee	Currently, Greenway, Bicycle, and Pedestrian Systems are not well integrated	Create an Inter-Departmental Committee	Currently, Greenway, Bicycle, and Pedestrian Systems are not well integrated	Create an Inter-Departmental Committee
	Review critical public and private sector projects that might impact the greenway, bicycle, and pedestrian projects as they come on-line	Internal review of projects is done by the Trails Department	Review as part of the Inter-Departmental Coordinating Committee	Internal review is currently done by GDOT	Review as part of the Inter-Departmental Coordinating Committee Review designs for all facilities that allow bicycle usage to eliminate unsafe drainage grates, railroad crossings, etc.	Internal review is currently done by GDOT	Review as part of the Inter-Departmental Coordinating Committee
	Pursue grants and cooperative agreements	Assistant Trails Director-pursues grants. More sources of funding are needed.	Hire another Assistant Trails Director and reassign responsibilities according to Organizational Model	Currently done by GDOT	Make this a responsibility for the future Bicycle Coordinator	Currently done by GDOT	Make this a responsibility for the future Pedestrian Coordinator
	Monitor operations and maintenance and other advocacy functions now and over the years to come	Trails Director-Overall monitoring, but not enough support staff to carry out the needed tasks in a timely manner	Hire staff to support existing greenway system and hire more staff as needed (one crew person for every 16 miles of trails maintained)	Not currently done and no performance measures exist	Make this a responsibility for the future Bicycle Coordinator	Not currently done and no performance measures exist	Make this a responsibility for the future Pedestrian Coordinator
	Review accident and crime reports and take the necessary up-front actions, on a case by case basis	Trails Director-The few serious incidents that have occurred, were recorded and filed. Incidents such as graffiti and dog bites are observed and addressed. Legal action would be taken if needed, but generally is not.	Incidents should be recorded digitally and the information should be shared with the Inter-Departmental Committee	Bicycle crash data is reviewed by GDOT on a regular basis	Continue to review bicycle crash data and expand analysis to the entire MPO	Pedestrian crash data is reviewed by GDOT on a regular basis	Continue to review pedestrian crash data and expand analysis to the entire MPO

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Table 6(a)

Network Routine and Remedial Operations

		Greenway Facility Operations		Bicycle Facility Operations		Pedestrian Facility Operations	
Accurate and Organized Record Keeping	Daily Activities	No accurate log of daily activities-not enough employees to do record keeping	Hire another Assistant Trails Director and reassign responsibilities according to the Organizational model	No accurate log of daily activities-not enough employees to do record keeping	Make this a responsibility for the future Bicycle Coordinator	No accurate log of daily activities-not enough employees to do record keeping	Make this a responsibility for the future Pedestrian Coordinator
	Schedule of Routine and Remedial Maintenance Tasks	No accurate log of routine and remedial maintenance tasks-not enough employees to do record keeping	Regularly schedule maintenance tasks and post schedule to alert users of potential conflicts	No accurate log of routine and remedial maintenance tasks-not enough employees to do record keeping	Regularly schedule maintenance tasks and post schedule to alert users of potential conflicts	No accurate log of routine and remedial maintenance tasks-not enough employees to do record keeping	Regularly schedule maintenance tasks and post schedule to alert users of potential conflicts
	Hazards, Incidents, Safety Issues Observed and Actions Taken	Trails Director-The few serious incidents that have occurred, were recorded and filed away. Incidents such as graffiti are observed and addressed. Legal action would be taken if needed, but generally is not.	Continue to record and file all incidents and share with the Inter-Departmental Committee	Currently, GDOT reviews bike crashes	MPO should offer a maintenance hotline and website to report incidents and provide maintenance requests	Currently, GDOT reviews pedestrian crashes	MPO should offer a maintenance hotline and website to report incidents and provide maintenance requests
	Inspection Reports	No inspection reports are completed. Generally, if repairs need to be made, they are noted by the field crew and repaired or reported to the Trails Director	Complete inspection reports for greenway facilities twice a year	Currently, inspections are conducted as general observations by the Field Operations Department, while in the field conducting routine tasks	Complete inspection reports for greenway facilities twice a year	Currently, inspections are conducted as general observations by the Field Operations Department, while in the field conducting routine tasks	Complete inspection reports for greenway facilities twice a year
	Annual Maintenance Budget, pursuing various funding sources	Trails Director-An annual budget is prepared by the Trails Department to maximize the limited funds available.	Hire another Assistant Trails Director and reassign responsibilities according to the Organizational model. Focus on identifying and investigating alternative funding sources	GDOT works with other City agencies to prepare the annual maintenance budget	The future Bicycle Coordinator should be responsible for the annual maintenance budget including volunteer work, grant applications, and city funds	GDOT works with other City agencies to prepare the annual maintenance budget	The future Pedestrian Coordinator should be responsible for the annual maintenance budget including volunteer work, grant applications, and city funds
	Projected costs for subsequent years	Repairs or replacements are made when absolutely necessary and not by the lifespan estimate of each facility	Continue to maximize the lifespan/usage of each facility, but schedule repair/replacement costs and labor into the budget and work schedule for the estimated time span for each facility	Repairs or replacements are made when absolutely necessary and not by the lifespan estimate of each facility	Continue to maximize the lifespan/usage of each facility, but schedule repair/replacement costs and labor into the budget and work schedule for the estimated time span for each facility	Repairs or replacements are made when absolutely necessary and not by the lifespan estimate of each facility	Continue to maximize the lifespan/usage of each facility, but schedule repair/replacement costs and labor into the budget and work schedule for the estimated time span for each facility
	Internal working data base for existing, planned, and proposed projects	Assistant Trails Director-GIS is utilized to keep up to date records of all trail facilities and to produce maps for users	Update GIS database as new facilities are implemented	GIS database was developed for this plan	Continue to include future plans and programmed facilities in the data base	GIS database was developed for this plan	Continue to include future plans and programmed facilities in the data base and expand the database to include the entire MPO area
Remedial Operations Activities							
Program Development	Update informational and directional signage to integrate greenway, bicycle, and pedestrian systems and to communicate proper usage of all network facilities	Informational signage is in good condition and reflects the current rules and regulations for facility usage; Directional signage to include bicycle and pedestrian systems and nearby trip attractors is needed	Sustain the quality and condition of greenway informational signage; Update directional signage to include bicycle and pedestrian facility connections, trip attractors, etc.	Bicycle Route signage exists in the City of Greensboro but is outdated	Remove and replace signage with new (See Chapter 4)	Some existing pedestrian way finding signs in downtown Greensboro and in college areas	Provide more pedestrian wayfinding signage and coordinate with GTA and bicycle system signage
	Update user maps to reflect any additions or changes to the systems or overall network and also reference the connections between each system	Existing trail maps are great resources. However, reference to the bicycle and pedestrian systems should be included	When maps are updated to reflect new greenway facilities, reference the connections between the overall network	Existing Greensboro bicycle map is outdated	Publish and distribute the new bicycle map that has been created as part of this plan; Have new bicycle coordinator update the bicycle map every 3-5 years	No maps specific to pedestrian, but pedestrians often use the GTA maps	Consider developing maps of walking routes; Assistant Pedestrian Coordinator should coordinate pedestrian maps with bicycle and GTA maps
General Operations	Provide contact information and institute an agency response for facility users to report questions, comments, concerns, or complaints	Trail maps give the Assistant Trails Director as a contact, although many people call the main line or the Courthouse	Hire another Assistant Trails Director and redistribute tasks to provide timely response to questions, comments, etc. from public	MPO staff responds to citizen calls	Have the new Assistant Bicycle Coordinator address concerns raised through the hotline and website	MPO staff responds to citizen calls	Have the new Assistant Pedestrian Coordinator address concerns raised through the hotline and website
	Continue to provide and establish new public education and citizen participation programs for network users	The Trails Department has numerous environmental and educational programs. (See Chapter 5: Program and Policy)	Hire another Assistant Trails Director and redistribute tasks to provide more time for education and outreach	The City of Greensboro has existing educational and environmental programs (See Chapter 5)	Assistant bicycle coordinator should lead these education, enforcement, and encouragement efforts	The City of Greensboro has existing educational and environmental programs (See Chapter 5)	Assistant pedestrian coordinator should lead these education, enforcement, and encouragement efforts
	Pursue development of an easy to use management manual and training program and incorporate it into existing and new maintenance programs and procedures	No formal training for employees is required besides a City of Greensboro employee introduction session	Create a manual for all employees emphasizing their role as representatives of the greenway system and outlining responsibilities for each position	GDOT provides some bicycle facility planning and design training to the staff	Greensboro MPO should provide more training on bicycle issues; Bicycle coordinator should lead the training effort	GDOT provides some pedestrian facility planning and design training to the staff	Greensboro MPO should provide more training on pedestrian issues; Pedestrian coordinator should lead the training effort

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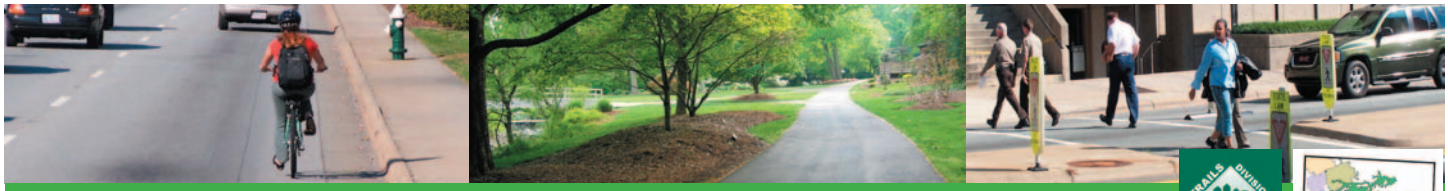
Table 6(a)

Network Routine and Remedial Operations



and pedestrian facilities do not deteriorate due to safety concerns, crime, or from fear of criminal activity

Task: Accurate and Organized Record Keeping

Good record-keeping techniques are essential to a comprehensive operations and maintenance program, particularly when multiple systems are involved. This information can be used to eliminate overlap or gaps in maintenance services provided, identify levels of use, and prioritize management needs.

- Daily activities
- Schedule of routine (and remedial) maintenance tasks
- Hazards, incidents, safety issues observed and action taken
- Inspection reports
- Annual maintenance budget, pursuing various funding sources
- Projected costs for subsequent years (short-term, medium term, and long-term to reflect on project prioritization as shown in Chapter 6: Prioritization of Projects
- Internal working database for existing, planned, or proposed projects for each system - greenway, bicycle, and pedestrian

6.2.2 Remedial Operations Defined

Remedial operations refer to activities required to sustain the quality of the greenway, bicycle, and pedestrian systems.

Task: Program Development

- Update informational signage (rules and regulations) to communicate proper usage of all network facility types
- Update directional signage to integrate greenway, bicycle, and pedestrian systems and as new projects are implemented
- Update user maps to reflect any additions or changes to the systems or overall network and also reference the connections between greenway, bicycle, and pedestrian facilities

Task: General Operations

- Provide contact information and institute an agency response for facility users to report questions, comments, concerns, or complaints regarding the network, and a feedback phone number and Web address
- Continue to provide and establish new public education and citizen participation programs for network users - See Chapter 5: Education, Encouragement, and Enforcement
- Pursue development of an easy to use management manual and training program and incorporate it into existing and new maintenance programs and procedures within the participating agencies

6.3 Routine and Remedial Maintenance

The following task lists describe the general routine and remedial maintenance responsibilities for all network facilities. To complement this text, Tables 6(b) and 6(c) illustrate current maintenance efforts and provide recommendations for improvement.

Table 6(c) below lays out maintenance tasks for facilities such as pedestrian signals, crosswalks, bicycle lanes, and roadway shoulders. These types of pedestrian and bicycle facilities are provided within the roadway right-of-way and should be maintained by either the North Carolina Department of Transportation (NCDOT) or the City of Greensboro. A Greensboro MPO staff member should be designated as the main contact for the maintenance of pedestrian and bicycle facilities in the roadway right-of-way. This staff member should coordinate with the appropriate departments (such as the City of Greensboro Field Operations Program or NCDOT Division Seven Maintenance Program) to

Greenway Facility Types

		Current Efforts	Type I: No Facility Development[1]	Type II: Limited Development[1]	Type III: Multi-use Unpaved Trail[1]	Type IV: Multi-use Paved Trail[1]	Type V: On Road Facilities[1]	Type VI: Water-based Trails/ Natural Stream Corridors[1]	Recommendations
Routine Maintenance Activities									
Facility Maintenance	Sweeping	As Needed	N/A	N/A	Boardwalks and Bridges 2 times / year	2 times / year	Refer to Bicycle and Pedestrian Routine and Remedial Maintenance	N/A	Paved facilities will be swept by machine or spot sweeping of bad areas will be swept by hand or with blowers. Some trails require a combination of methods. Transition areas between unpaved and paved facilities will require extra attention to remove potentially hazardous debris from the paved surfaces.
	Trash Removal	As needed	1-2 times / year	2-4 times / year	6 times / year	6 times / year	Sidepaths 6 times / year or Refer to Bicycle and Pedestrian Routine and Remedial Maintenance	1-2 times / year	This includes removing ground debris. Volunteers should be utilized for this task, such as Adopt-a-trail programs.
Vegetation Management	Tree and Shrub Trimming and Pruning	As Needed	N/A	Spring and Fall and as needed, such as after a storm to maintain 8' high and 6'-8' wide clearance	Spring and Fall and as needed, such as after a storm to maintain 8' high (12' high for equestrian) and 12'-14' wide clearance	Spring and Fall and as needed, such as after a storm to maintain 10' high (12' high for equestrian) and 12'-14' wide clearance	Spring and Fall and as needed, such as after a storm to maintain 10' high and 2'-14' wide clearance (depending on the facility type)	N/A	Tree and shrub trimming and pruning should be performed to the City's specifications and should be scheduled according to species type. This service will be performed for the safety of trail users, to maintain safe use of all facilities, without physical obstacles, such as low hanging tree limbs and visual obstructions, such as limited line of sight.
	Mowing of Vegetation	As Needed	N/A	N/A	30 times / year	30 times / year	30 times / year	N/A	Vegetation along trail corridors should be mowed on a regularly scheduled basis.
	Mulching and Edging	N/A-mulching As Needed-Edging	N/A	once/year or as needed	once / year or as needed	N/A	N/A	N/A	Type II and II Greenways may require mulch in some areas to maintain a useable trail surface. Edging to prevent encroachment of grass. vegetation on trail is also needed.
	Invasive Species Control	As Needed	As needed to reduce the spread of invasive species	once / year and as needed in problem areas	once / year and as needed in problem areas	once / year and as needed in problem areas	As scheduled by Public Works for routine maintenance of adjacent roadway	As needed to reduce the spread of invasive species	Vegetation, weed and pest management plans should be put into place to control invasive species and protect endangered plant and animal species and preserve wetlands, riparian buffers, and other resources of special natural, cultural or urban infrastructure value.
Remedial Maintenance Activities									
Facility Repair or Replacement	Replenish gravel, mulch, or other surface materials	As Needed	N/A	once / year and as needed	once / year and as needed	N/A	N/A	N/A	Loose stone or gravel has a lifespan of approximately 7-10 years and mulch, 1-3 years however water, wind, and excessive use may displace the materials, requiring a yearly assessment and replenishment of the surface
	Repaint/Restrip/Stain	As needed	N/A	N/A	N/A	2-4 years	2-4 years	N/A	
	Replace asphalt or concrete	As needed and when the budget allows	N/A	N/A	N/A	10-12 years	10-12 years	N/A	Concrete has a lifespan of approximately 20 years
	Remove encroaching debris along paved trail/ sidewalk edges	As needed	N/A	As needed	As needed	As needed	Edging-As needed	Edging-As needed	

*All greenway routine and remedial maintenance tasks should be performed by the Park and Recreation Department Trails Division Maintenance Crew unless otherwise noted.

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Table 6(b)

Greenway Routine and Remedial Maintenance

Greenway Facility Types

		Current Efforts	Type I: No Facility Development[1]	Type II: Limited Development[1]	Type III: Multi-use Unpaved Trail[1]	Type IV: Multi-use Paved Trail[1]	Type V: On Road Facilities[1]	Type VI: Water-based Trails/ Natural Stream Corridors[1]	Recommendations
Facility Repair or Replacement	Regrade to prevent or eliminate low spots and drainage issues	As needed	N/A	Only if absolutely necessary	As needed	As needed	Responsibility of Field Operations as part of remedial maintenance of the adjacent roadway	N/A	
	Addition or repair of culverts, bridges, boardwalks, retaining walls, etc. to prevent or eliminate drainage/ erosion issues	As needed and when the budget allows	N/A	N/A	As needed, refer to Table 6(d)	As needed, refer to Table 6(d)	As needed, refer to Table 6(d)	N/A	
	Reroute trail, if necessary, to avoid environmentally sensitive or overused areas , safety issues, or construction projects	Done if necessary, however other alternatives are also explored	N/A	As needed	As needed	As needed	Responsibility of Field Operations with input from GDOT to reroute bicycle and pedestrian facilities if the adjacent roadway is rerouted or closed	N/A	
Seasonal Maintenance	Remove leaf litter	As needed	N/A	N/A	As needed on bridges and boardwalks	As needed	As needed by Trails Division for sidepaths. Refer to Bicycle and Pedestrian Remedial Maintenance for on-road facilities	N/A	Prioritize removal by the most heavily used facilities and geographic location. Limited development trails should be emphasized as natural environments and warnings should be posted that hazardous conditions may exist with the changing seasons.
	Remove snow and ice	As needed	N/A	N/A	As needed on bridges and boardwalks	As needed	As needed by Trails Division for sidepaths. Refer to Bicycle and Pedestrian Remedial Maintenance for on-road facilities	N/A	Prioritize removal by the most heavily used facilities, such as commuter routes, and geographic location. Limited development trails should be emphasized as natural environments and warnings should be posted that hazardous conditions may exist with the changing seasons.
Habitat Enhancement and Control	Plant vegetation, such as trees and shrubs	When the budget allows	Annual-Purchase of plant materials should be part of the annual budget to reintroduce native plant species	As needed to prevent erosion and introduce native plant materials into the landscape	As needed to prevent erosion or as landscape features during the installation of a trail	As needed to prevent erosion or as landscape features during the installation of a trail	Responsibility of Field Operations and as part of the Street tree Enhancement Program	Annual-Purchase of plant materials should be part of the annual budget to reintroduce native plant species	
	Take preventative measures to protect the landscape from the wildlife	As needed	As needed	As needed	As needed	As needed	As needed	As needed	
	Apply herbicide to eliminate any problem areas	As needed	As needed to discourage growth of invasive or problem species, such as poison ivy, kudzu	As needed to discourage growth of invasive or problem species, such as poison ivy, kudzu	As needed to discourage growth of invasive or problem species, such as poison ivy, kudzu	As needed to discourage growth of invasive or problem species, such as poison ivy, kudzu	As needed to discourage growth of invasive or problem species, such as poison ivy, kudzu	As needed to discourage growth of invasive or problem species, such as poison ivy, kudzu	
	Apply herbicide to maintain edges and prevent encroaching vegetation, such as along trails and sidewalks	As needed	N/A	N/A	As needed	As needed	As needed	N/A	

*All greenway routine and remedial maintenance tasks should be performed by the Park and Recreation Department Trails Division Maintenance Crew unless otherwise noted.

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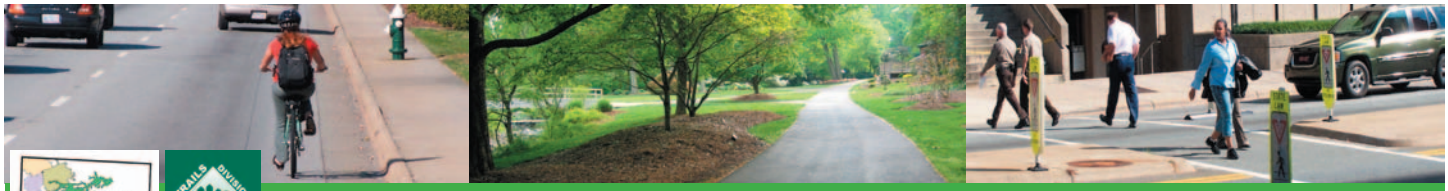
Table 6(b)

Greenway Routine and Remedial Maintenance



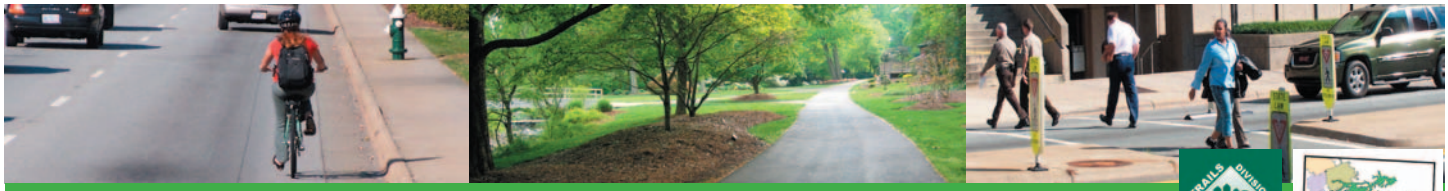
conduct maintenance activities in the field. Funding for an ongoing maintenance program should be included in the County's operating budget or Capital Improvements Program.

Note that the schedule is intended to provide general guidance for routine and remedial maintenance activities. The frequency of pedestrian and bicycle facility maintenance within the roadway right-of-way will vary. Maintenance needs will depend upon many factors, including pavement surface type, the use of paint or thermoplastic for markings, and traffic volumes. The City of Greensboro and NCDOT should make immediate repairs to any pedestrian and bicycle facilities that are damaged or have hazardous conditions. The Greensboro MPO staff member in charge of maintenance should set up a free maintenance hotline for people to provide information about spot maintenance needs in the urban area.

Maintenance of Pedestrian and Bicycle Facilities Within Roadway Rights-of-Way
City of Greensboro & North Carolina DOT

Task	Frequency	Comments
Regular inspection	2 times per year	Includes all on-road bikeways, identify needed repairs of pavement signs, markings, etc
Shoulder and bike lane sweeping	2 times per year	All roadways with bicycle facilities
Shoulder and bike lane repairs	As needed	Repair of road surface, including potholes, cracks, or other problems on bicycle facilities
Median island and curb extension repairs	As needed	Repair of curb and gutters, removal of debris
Shoulder and bike lane resurfacing	During regular roadway repaving	Ensure that pavement width is maintained or increased during repaving projects
Debris removal from shoulders	As needed	Remove debris from roadway shoulders and bike lanes such as limbs, silt, and broken glass
Snow and ice removal	As needed	Plow snow off of roadway shoulders and bike lanes, and require property owners to shovel sidewalks
Pedestrian signals	As needed	Replace burned out or broken pedestrian signal heads; adjust pedestrian signal timing to accommodate MUTCD standard pedestrian walking speed
Signs and markings	As needed	Repair or replace pedestrian and bicycle warning signs, bicycle route signs, crosswalk markings, bicycle lane markings, and any other similar facilities identified during inspections
Vegetation control	During regular roadway maintenance	Mow grass and trim limbs and shrubs 2 feet back from sidewalk edge
Litter removal	6 times per year	Could be done with volunteers

Table 6(c). Maintenance schedule for on-road pedestrian and bicycle facilities.



6.3.1 Routine Maintenance Defined

Routine maintenance refers to the day-to-day regimen of litter pick-up, trash and debris removal, weed and dust control, trail sweeping, sign replacement, tree and shrub trimming, and other regularly scheduled activities. Routine maintenance also includes minor repairs and replacements such as fixing cracks and potholes or repairing a broken hand railing.

The following tasks should be performed on a regular basis to keep all network facilities in good, useable condition. Maintenance tasks should be conducted more frequently for greenway, bike, and pedestrian facilities where use is the most concentrated. Currently, the trails division of the Park and Recreation Department is researching the use of their popular trails with trail counters. Methods such as pedestrian and bicycle counts, sketch plan analysis methods for estimating pedestrian and bicycle demand, public survey results, and public meeting comments, such as the results found in Appendix B, can be used to determine which resources are the most heavily used and may require the most maintenance attention. The frequency of required maintenance tasks should be established as new facilities are implemented and should be reviewed and updated annually to reflect any changes in usage, safety issues, etc.

Task: Facility Maintenance

Basic housekeeping of greenway, bicycle, and pedestrian facilities will ensure that the network is clean and functional and will also improve the life of each facility.

- Sweeping
- Trash removal

Task: Vegetation Management

To maintain a high quality network, regular attention should be given to the surrounding landscape, both natural and man-made. This not only improves the aesthetic quality of the network but also improves the users' sense of safety, as well.

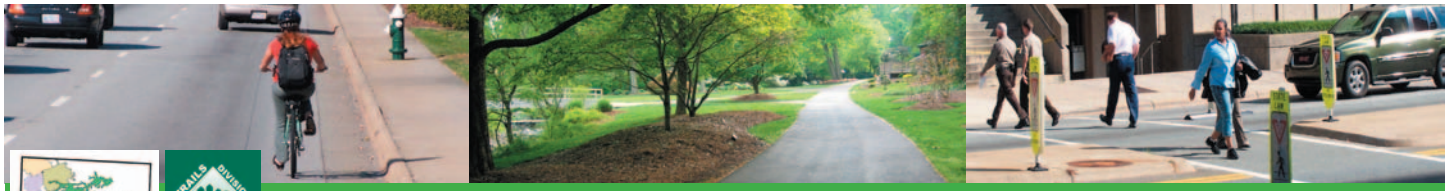
- Tree and shrub trimming and pruning
- Mowing of vegetation
- Mulching and edging
- Invasive species control

Figure 6(a). Vegetation management and aesthetic improvements can be carried out by volunteers in a variety of locations, here along a roadway.

6.3.2 Remedial Maintenance Defined

Remedial Maintenance refers to correcting significant defects in the network, as well as repairing, replacing or restoring major components that have been destroyed, damaged, or significantly deteriorated from normal usage and old age. Some items ("minor repairs") may occur on a five to ten year cycle such as repainting, seal coating asphalt pavement or replacing signage. Major reconstruction items will occur over a longer period or after an event such as a flood. Examples of major reconstruction remedial maintenance include stabilization of a severely eroded hillside, repaving a trail surface or a street used for biking, or replacing a footbridge. Remedial maintenance should be part of a long-term capital improvement plan.

The following tasks should be performed on an as needed basis to keep network facilities in good,



useable condition. Table 6(d) depicts the average life of each facility type, as well as general ancillary facilities, with normal wear and tear. The repair or replacement of existing facilities should be reflected in a projected budget for future maintenance costs.

Longevity of Facilities	
Mulch	2-3 years
Granular stone	7-10 years
Asphalt	7-15 years
Concrete	20 + years
Boardwalk	20 + years
Bridge/Underpass/ Tunnel	100 + years

Table 6(d). Approximate longevity of facility types and materials.

Task: Facility Repair or Replacement

All facilities will require repair or replacement at one time or another. The time between observation and repair/replacement will depend on whether the needed repair is deemed a hazard, to what degree the needed repair will affect the safety of the user, and whether the needed repair can be performed by an in-house maintenance crew or if it is so extensive that the needed repair must be done by outside entities or replaced completely. Some repairs are minor, such as repainting or resurfacing bicycle lanes and can be done in conjunction with other capital projects, such as repaving the adjacent street.

- Replenish gravel, mulch, or other materials
- Repaint/restrip/stain
- Repave/seal
- Replace asphalt or concrete
- Remove encroaching debris along paved trail/ sidewalk edges
- Regrade to prevent or eliminate low spots and drainage issues
- Add culverts, bridges, boardwalks, retaining walls, etc. to prevent or eliminate drainage/ erosion issues
- Reroute trail, if necessary, to avoid environmentally sensitive or overused areas and any safety issues

Task: Seasonal Maintenance

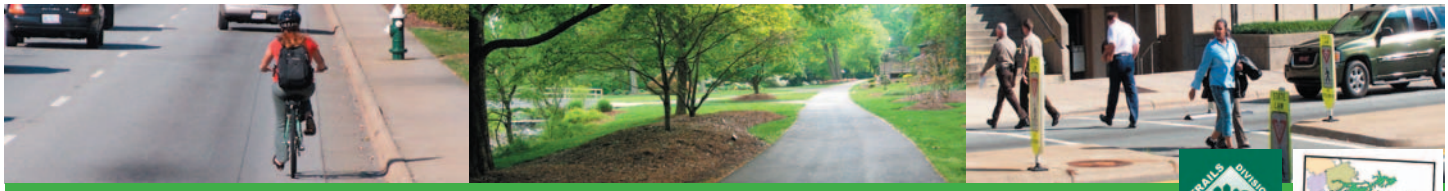
Seasonal tasks should be performed as needed. When conditions cannot be improved to provide for safe use, the facility should be closed to prevent the risk of injury to facility users. Designated maintenance crews will remove leaf debris, snow, and ice, etc. from all network facilities as soon as possible. Leaf debris is potentially hazardous when wet and special attention should be given to facilities with heavier usage. Ice control and removal of ice build-up is a continual factor because of the freeze-thaw cycle. Ice control is most important on grade changes and curves. Ice can be removed or gravel/ice melt applied. After the ice is gone, leftover gravel should be swept as soon as possible.

- Remove leaf litter from network facilities, via raking, blowing, mulching, etc. as needed to sustain the safe usability of all network facilities and prevent any storm water drainage and/or erosion issues
- Remove snow and ice from network facilities, via shoveling, picking, salt, sand, etc. as soon as possible after storm

Task: Habitat Enhancement and Control

Habitat enhancement and control can improve aesthetics, help prevent erosion, and provide for wildlife habitat. Habitat control involves mitigation of damage caused by wildlife.

- Plant vegetation, such as trees and shrubs
- Take preventative measures to protect landscape features from wildlife, such as installing fencing around sensitive or newly planted plant materials
- Apply herbicide to eliminate any problem plant species, such as poison ivy or kudzu, etc.
- Apply herbicide to maintain facility edges and



prevent encroaching vegetation, such as along trails and sidewalks

- Deter interaction between facility users and facility inhabitants, such as feeding the wildlife, etc.

6.4 Administration and Jurisdictional Responsibilities

6.4.1 Operation Responsibilities by Department

City of Greensboro Parks and Recreation Department

Duties for the Park and Recreation Department and Trail Division within the Department would include carrying out the recommendations from this Plan, applying for funding, and overseeing all greenway facilities. Staff should also conduct tasks such as updating and publishing new maps, creating and updating GIS layers of all greenway facilities, proposing future alternative routes, and working with adjacent communities/counties to coordinate linkages. The Parks and Recreation Trails and Greenway Director and/or staff should also play a role in education and encouragement programs.

Greensboro MPO (Greensboro Department of Transportation (GDOT) Planning Division)

Representatives from the Greensboro MPO should take on the responsibilities of "Pedestrian Coordinator" and "Bicycle Coordinator." These duties would include carrying out recommendations from this Plan, applying for funding, overseeing planning, design, and construction of the pedestrian and bicycle systems, and coordinating with local and regional jurisdictions and NCDOT. These coordinators should work with other MPO staff to conduct tasks such as updating and publishing new local bicycle maps, creating and updating GIS layers of all bicycle facilities, coordinating education, enforcement, and encouragement programs, monitoring the use and safety of pedestrian and bicycle facilities, proposing future alternative routes, and working with adjacent communities and regional organizations to coordinate pedestrian and bikeway linkages.

Field Operations Department / City Engineering and Inspections/GDOT

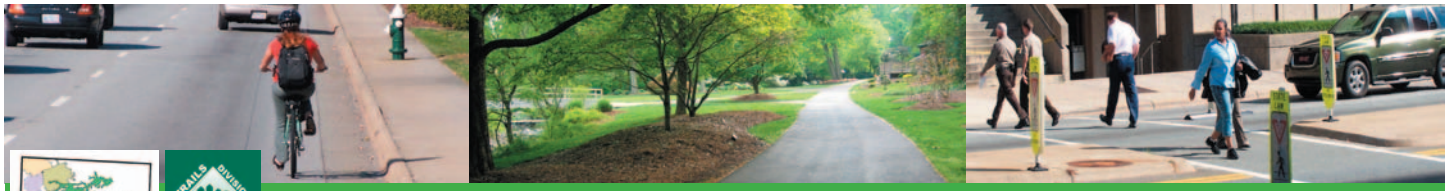
The Field Operations Director should oversee the construction and maintenance of all trail, bicycle, and pedestrian facilities. The Field Operations section devoted to Streets should also be devoted to future recommendations for the bicycle and pedestrian networks, discussed earlier in this plan. One member of the Field Operations Department should handle facility development and construction (including posting bicycle route signs) among his/her other responsibilities.

North Carolina Department of Transportation (NCDOT)

NCDOT Division Seven should maintain all pedestrian and bicycle facilities within the roadway rights-of-way that are owned by the state (with the exception of sidewalks on local streets). This includes paved shoulders, bicycle lanes, crosswalks, pedestrian signals, and sidewalks on main roadways. The Greensboro MPO should work with NCDOT to develop a schedule for routine maintenance and a means of identifying locations for spot maintenance improvements.

Police Department

All local police officers should be educated about North Carolina's bicycle and pedestrian laws to promote positive interactions between bicyclists, pedestrians, and motorists. The Guide to North Carolina Bicycle and Pedestrian Laws, written by the NCDOT Division of Bicycle and Pedestrian Transportation, should be distributed to local law enforcement. Specific laws in the State of North Carolina include wearing a helmet under the age of 16, having an adequate light if riding



after dark, riding on the right side of the road, and proper signaling when turning. Police officers should become more proactive in educating the public and enforcing laws when they are broken.

Figure 6(b). Local citizens cleaning along roadway at Barber Park. Volunteers can contribute in numerous ways, relieving the burden on City agencies.

Volunteers

Services from volunteers, student labor, and seniors, or donations of material and equipment may be provided in-kind, to offset construction and maintenance costs. Formalized maintenance agreements, such as adopt-a-trail/greenway or adopt-a-highway can be used to provide a regulated service agreement with volunteers. Other efforts and projects can be coordinated as needed with senior class projects, scout projects, interested organizations, clubs or a neighborhood's community service to provide for the basic needs of the proposed networks. Advantages of utilizing volunteers include reduced or donated planning and construction costs, community pride and personal connections to the City's greenway, bicycle, and pedestrian networks. Greensboro has been utilizing volunteer efforts to assist in the maintenance of greenway facilities. However, because annual obligations are not enforced, volunteer services are not being used to their greatest advantage. Specific tasks should be outlined in an agreement between the Trails Division and the volunteer party. A review of this agreement should be done as needed to maximize this important resource.

6.4.2 Maintenance Responsibilities by Facility Type

Maintenance responsibility will be with the Parks and Recreation and Field Operations departments depending on the type of facility to be maintained. A number of other jurisdictions and entities, homeowner associations, and business groups will also have roles in maintaining specific facilities in the pedestrian, bicycle, and greenway networks. It will be helpful to create a citizen's group that could ultimately play an important role in coordinating and advocacy (See stewardship discussion, Section 6.1.2). A recommended maintenance schedule is included in Tables 6(b) and 6(c) for each system.

Type I Greenway Facilities and other Resource Conservation Areas

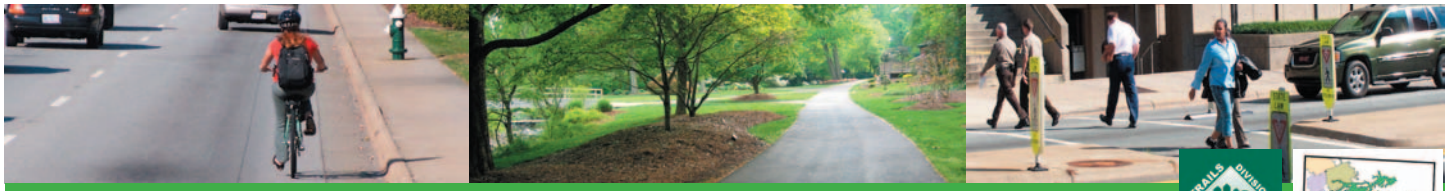
These spaces would be maintained by Field Operations or Leisure Services crews or by homeowner associations where appropriate, for dedicated areas added into the system by new development.

Type II, III, and IV Greenway Facilities

The City Parks and Recreation and Field Operations Departments will be key agencies in the maintenance of facilities along roads, utility corridors, and stream corridors. The Parks and Recreation Department, or where appropriate, homeowners associations, should maintain the off-street trail and greenway system.

Bicycle Facilities (Type V Greenway Facilities)

This system should be maintained by GDOT and



the Field Operations Departments, NCDOT, and patrolled by the City Police Department and Guilford County Sheriff's Office. A key to continued success will be the establishment and acceptance of bicycle facility operations and maintenance guidelines and proper training of both supervisory and field personnel regarding on-road bicycle facility upkeep. There should also be interagency coordination and user feedback protocols that assure timely response to citizen complaints and suggestions, including a website and toll-free hotline for pedestrian and bicycle maintenance requests. Bicycle route signs and bicycle racks should also be maintained by GDOT and NCDOT, depending on the types and locations of facilities.

Pedestrian Facilities (Type V Greenway Facilities)

Within the City of Greensboro, major sidewalk repairs are made by the City. Yet, there is a significant backlog of sidewalk maintenance needs. Routine sidewalk maintenance is to be performed by the adjacent property owners and tenants, as prescribed by city ordinances. This may include individual owners, business and resident associations and special districts, as applicable. In suburban and rural areas outside the City, sidewalks on main roadways should be maintained by NCDOT and sidewalks on residential streets should be maintained by property owners.

Trailheads and Feature Areas

These areas are to be maintained by the Field Operations and Parks and Recreation Department or the respective homeowners associations if appropriate.

Other Ancillary Facilities

Special furnishings and amenities such as benches and signage will be the responsibility of the appropriate jurisdictional entity such as the Field Operations and Parks and Recreation Departments.

6.4.3 Administrative and Jurisdictional Recommendations

Actions to implement the following administrative and jurisdictional recommendations are described for each system below.

Overall Network

To sustain the relationship between the Parks and Recreation and GDOT/MPO, a committee should be formed to integrate facilities, provide programs and distribute information, investigate alternative funding options, develop performance measures, and share information, such as GIS data. Communications with and involvement from stakeholders and citizens should be continued throughout the implementation of this Plan.

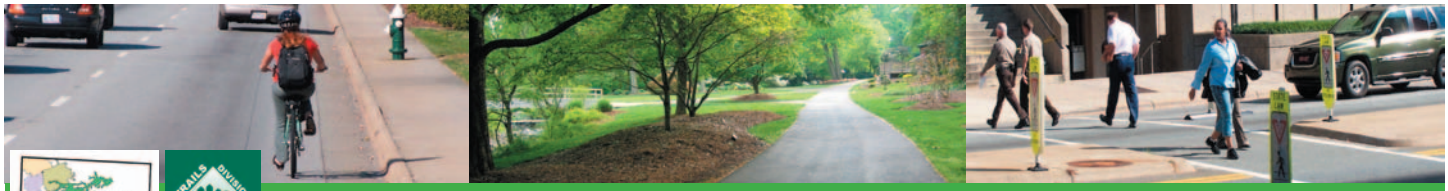
Action: Create an interdepartmental committee

- To oversee the implementation of this plan
- Provide oversight, coordination, and leadership for the overall network
- Sustain communication between departments/agencies to avoid overlap or gaps in the operation, maintenance tasks, or implementation of the network

Greenway

Currently, the Park and Recreation Department's Trails Division is responsible for the majority of greenway operations and maintenance. However, funding is extremely limited. Only 35% of the already limited operations and maintenance budget goes directly to routine and remedial maintenance costs. In order to increase the revenue generated for operations and maintenance of greenway facilities, the following actions are recommended.

Action: Develop a non-profit group or coalition for greenways.



The following is a list of the duties associated with the Friends of the Little Tennessee River Greenway in Macon County, NC. *Friends of the Greenway (FROGs) assist Macon County in the management and development of the Little Tennessee River Greenway in a number of ways:*

- *Serve the public through the acquisition, restoration, protection, and enhancement of the natural resources.*
- *Integrate public recreational, historical, and cultural facilities with compatible commercial interest adjoining the Greenway.*
- *Develop an informational center and educational materials to enhance awareness of environmental and historical value of the Greenway.*
- *Assist local government in funding through grants, donations, leasing of concessions, and special events.*
- *Maintain a board and committees that fairly represent a diversity of interests in the community*

The City of Greensboro should work to establish a "Friends of the Greenways" organization that can help to advocate for and promote the full development of the community-wide greenway system. Friends groups can help to raise awareness and funds for greenway facility development and operation. The mission of these groups can be very simple, for example, the Friends of the Grand Forks Greenway has the following mission:

"The Friends of the Greenway is a volunteer community grass-roots effort to support the development of the Red River and Red Lake River corridors that exist between the Army Corps of Engineers Flood Protection Project within the cities of Grand Forks, ND and East Grand Forks, MN."

The Greensboro Friends of the Greenways could be a subset of the Friends of the Parks organization. In this manner, the two Friends organizations would coordinate activities and mutually support each other's mission. It must, however, be clearly understood that both Friends organizations should operate on equal footing. In other words, the Friends of the Greenways would not be subservient to Friends of the Parks. Support and backing for Parks is not more important than support and backing for Greenways. So it will be up to the City and the Friends organization to work out the logistics so that equal opportunity is afforded both groups.

Typically, Friends of the Greenway will assist the City with promoting and advocating for the Greenway System. They can sponsor events that raise funds for the system. They can host community forums and meetings that increase awareness. They can sponsor events, such as hikes and races, which encourage residents of the community to use the greenways more often. Many Friends organizations operate under a non-profit, 501c3 status so that they can receive contributions from individuals and private sector groups.

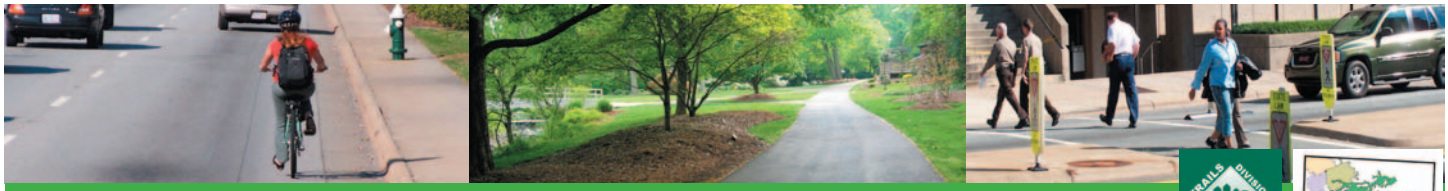
Action: Organization of Greenway O&M

This organizational structure is currently under review at the City of Greensboro Parks and Recreation.

Action: Hire and train new greenway maintenance crew personnel

- To maintain greenway facilities as described in Table 6(b), Greenway Routine and Remedial Maintenance Tasks

The Trails Division currently has two full-time employees and one part-time employee to maintain 47.2 miles of trail. Maintenance responsibilities



include mowing, weed eating, repair of storm damage, blowing trails, removing leaves, installing drainage, pesticide application (with license), etc. The only task not handled by the maintenance crew personnel is paving or repaving trail surfaces. Mowing and any other required maintenance is provided to each existing trail every 2-3 weeks. To improve maintenance standards for greenway facilities and predict future maintenance needs, the consultant recommends a maintenance crew person for every 16 miles of trail in need of maintenance. Currently, another full time maintenance crew person should be hired for the existing trail system. As additional mileage is added to the system, staff should be added in part time or full time positions to accommodate greater maintenance needs.

Figure 6(c). Signage is an ancillary facility that requires maintenance.

Bicycle

Action: Continue to work with other local and regional jurisdictions and NCDOT to develop and maintain bikeways.

The Greensboro MPO should designate a full-time Bicycle Coordinator, as mentioned below. This coordinator would be responsible for the development of the bicycle system, which will require coordination with many other agencies and jurisdictions.

Action: Create an Assistant Bicycle Coordinator Position.

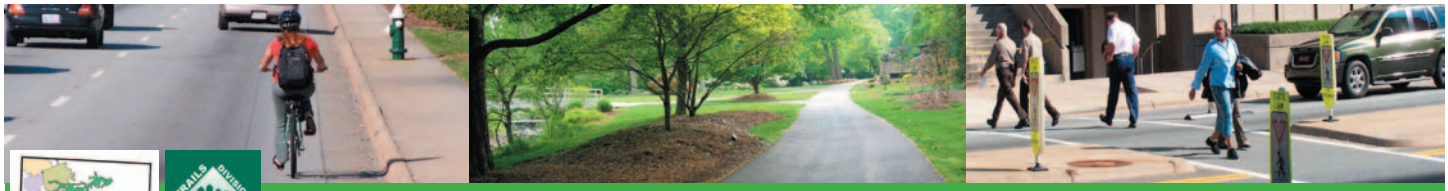
Because of the growing need to develop the on-road bicycle system and supporting education, enforcement, and encouragement programs, the Bicycle Coordinator should also have an assistant. The general responsibilities of the Bicycle Coordinator and Assistant Bicycle Coordinator are listed below.

Bicycle Coordinator

- Overall implementation of on-road bicycle recommendations in this Plan
- Future on-road bikeway planning
- Roadway design and construction project review
- Interagency and jurisdiction coordination
- Grant applications
- Public outreach
- Staff training on bicycle issues
- Reporting to the transportation director

Assistant Bicycle Coordinator

- Reviewing and addressing public feedback
- Monitoring on-road bicycle system performance (safety, usage, amount of facilities provided)
- Coordinating education, enforcement, and encouragement programs
- Monitoring the demand for and installing new bicycle racks
- Replacing bicycle route signs and



continually evaluating bicycle routes
- Oversight of on-road bicycle facility maintenance

Pedestrian

Action: Continue to work with other local and regional jurisdictions and NCDOT to develop and maintain pedestrian facilities.

The Greensboro MPO should designate a full-time Pedestrian Coordinator, as mentioned below. This coordinator would be responsible for the development of the sidewalks and pedestrian crossing facilities, which will require coordination with many other agencies and jurisdictions.

Action: Create an Assistant Pedestrian Coordinator Position.

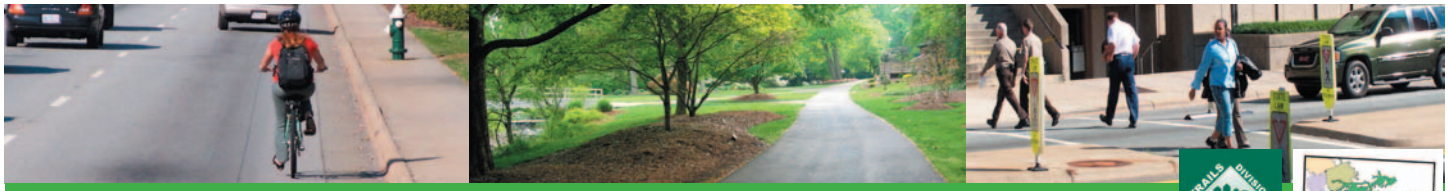
The significant amount of pedestrian facility and program needs will require additional staff to address adequately. Therefore, the Pedestrian Coordinator should also have an assistant. The general responsibilities of the Pedestrian Coordinator and Assistant Pedestrian Coordinator are listed below.

Pedestrian Coordinator
- Overall implementation of pedestrian recommendations in this Plan
- Future pedestrian facility planning
- Roadway design and construction project review
- Interagency and jurisdiction coordination
- Grant applications
- Public outreach
- Staff training on pedestrian issues
- Reporting to the transportation director

Assistant Pedestrian Coordinator
- Reviewing and addressing public feedback
- Monitoring the performance of sidewalk and pedestrian crossing facilities (safety, usage, amount of facilities provided)
- Coordinating education, enforcement, and encouragement programs
- Oversight of pedestrian facility maintenance

6.5 Cost of the Operations and Maintenance Program

Annual operations and maintenance costs vary, depending upon the facility to be maintained, level of use, location, and standard of maintenance. Operations and maintenance budgets should take into account routine and remedial maintenance over the life cycle of the improvements and on-going administrative costs for the operations and maintenance program. Table 6(e) provides an overview of approximate costs for basic bicycle, pedestrian and greenway trail operations and maintenance services. The estimates include field labor, materials, equipment and administrative costs. Table 6(f) provides a sample of comparable programs in other metropolitan areas that may be helpful in gauging the costs associated with a large-scale greenway, bicycle, and pedestrian system.



Annual Maintenance Costs		
Description/Activity	Frequency	Costs
Drainage Maintenance	4x/year	$750
Sweeping/Blowing Trails	20x/year	$1500
Pick Up & Trash Removal	20x/year	$1500
Weed Control	10x/year	$1250
Mowing - 3 foot safe zone	20x/year	$1800
Minor Repairs	Annual	$750
Maintenance and Supplies	Annual	$500
Equipment fuel and repairs	Annual	$1000
Total Maintenance - One Mile		$9050

Table 6(e). Approximate annual costs per mile of facility.

Comparable Programs			
Entity	Facilities Mix	Acreage	Annual Budget
Jefferson County Open Space Program, Golden, Colorado	Mostly natural open space with all-terrain trails, trailheads and minimal amenities. (450,000 residents in jurisdiction with 2 million visitors to open space.)	51,000	$6 million (from 1/2 cent sales tax)
South Suburban Parks and Recreation District, Littleton, Colorado	Mix of parks, paved and non-paved trails (111 miles), open space. Metro Denver (160,000 residents in District)	3,200	$5 million (property tax)
City of Albuquerque Open Space Program	Mostly natural open space (mountains, arroyos and river bottomlands with all-terrain trails, trailheads and minimal amenities (450,000 residents in city). Includes administration, resource management, law enforcement and visitor services.	28,000	$3.5 million (1/4 cent gross receipts tax)

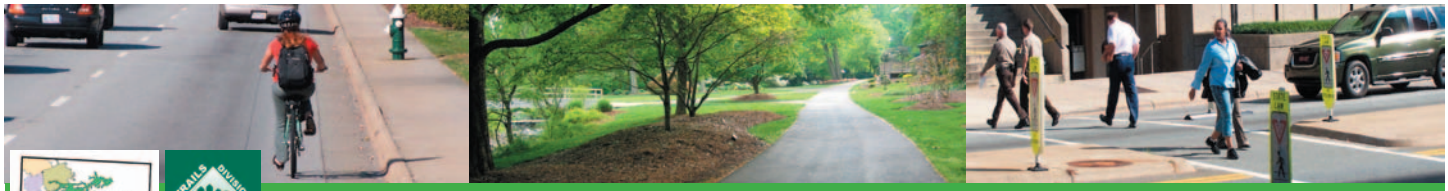
Table 6(f). Comparable programs and associated budgets.

6.5.1 Routine Operations and Maintenance Costs

While actual costs will vary depending upon a number of factors, such as future availability of water and labor rates, the estimates can provide a general idea of potential operations and maintenance obligations. Following are typical annual costs for key components:

Natural and Buffer Areas

Maintenance of greenway corridors costs between $75 and $200 per acre, per year, depending on the level of use and disturbance. The Jefferson County



Open Space Program offers a comparable situation, managing 51,000 acres of passive facilities at a cost of $118 per acre annually. Two million visitors use the facilities in the Metro Denver area each year.

Drainage channels

With minimal landscaping and including debris pick up, weed control, and minor repairs, a drainage channel may cost about $2,500 per mile, annually. It is assumed that the City Field Operations Department and homeowner associations would participate in this effort.

Landscaped greenspace (Approximately 100 foot wide corridor)

Landscaped greenspaces are assumed to be semi-developed park spaces and cost $37,000 per mile, per year to maintain. Maintenance includes addressing items such as: weed control; litter and graffiti management, erosion control, irrigation, plant grooming, and law enforcement.

Type II and III Greenway Facilities (All-Terrain Trails)

Annual maintenance costs range from nominal to $2,000 per mile/year depending on usage and level of development. East Bay Regional Park District has estimated $1,000 per mile/year. Volunteers may absorb all or part of this function.

Type IV Greenway Facilities (Multi-Use Off-road Trails)

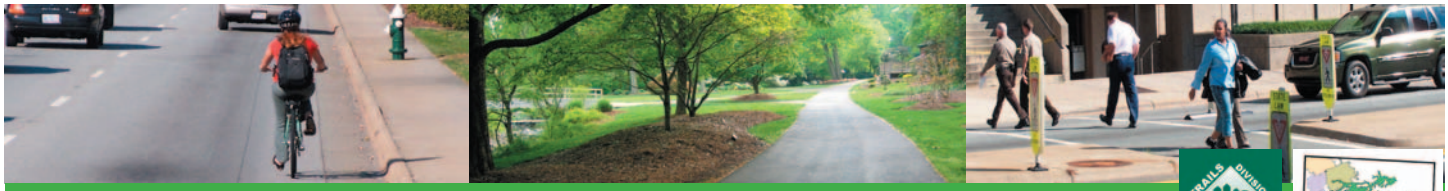
Crew sizes tend to range from 0.5 to 5 full time employees (FTE's) per 10 miles of off-street trail. Annual routine maintenance costs may range from less than $3,000 to over $7,000 per mile. Routine cleanup and monitoring of facility conditions should be handled by volunteers and maintenance crews.

Bicycle Facilities

It is assumed that the current City of Greensboro street maintenance crew and NCDOT Maintenance Division will be able to maintain the on-roadway bicycle facility system. Some provision should be made however for fifteen regular inspections per year, to include minor repair or replacement of signs, vegetation grooming and other items that an inspector could remedy in the field. Additional attention should be paid to any potholes or other pavement damage. Some additional sweeping will be required where bicycle lanes and wider shoulders are provided along roads.

Pedestrian Facilities

In the City of Greensboro, NCDOT requires property owners or Homeowner Associations (HOAs) to maintain sidewalks. Sidewalks on local and collector streets are assumed to be maintained by property owners and homeowner associations, while sidewalks on arterial streets should be maintained by the Department of Field Operations. Crosswalks, pedestrian signals, curb ramps, median crossing islands, and other pedestrian facilities should be maintained by GDOT or NCDOT, depending on right-of-way ownership. The City of Greensboro has agreed to maintain sidewalks in some places where they have been required by development regulations. It is recommended that NCDOT maintain all sidewalks on NCDOT rights of way. Maintaining these pedestrian facilities is an important part of maintaining the complete right of way for all users. NCDOT should maintain sidewalks and pedestrian crossing facilities on major roadways in areas outside of the City of Greensboro. Cracks, surface defects, tree root damage, and other problems should be identified on a regular basis and fixed to ensure that sidewalks remain accessible to all types of pedestrians.



6.5.2 Remedial Operations and Maintenance Costs

(These tables are included in the annual routine maintenance costs.)

Type II and III Greenway Facilities
(Off-road non-paved-all-terrain trails)

For purposes of this study, remedial work on non-paved trails will be assumed to be negligible, since volunteers may accomplish much of this work. There may be some administrative costs associated with this.

Type IV Greenway Facilities
(Off-road paved trails)

A 10-to-12-year life is assumed for asphalt and crushed fine trails after which an overlay may be required. A complete resurfacing after 20-25 years is anticipated. Concrete is assumed to last twice as long. Bridges, tunnels, retaining walls and other heavy infrastructure are assumed to have a 100-year life or longer.

On-road Bicycle Facilities

Remedial work for on-road bicycle facilities includes asphalt repaving (5' on either side of the street for a two-way bike route, total 10' width) along with curb and gutter, sewer-grate and manhole repair. Pothole and crack repair are considered routine. Pavement markings, such as bicycle lane lines, bicycle stencil markings, and edgelines should be re-installed when other roadway pavement markings are improved. Since this work is done as part of the current street maintenance regime the cost is assumed to be covered.

Pedestrian Facilities

Sidewalks should be constructed with concrete, which requires replacement in 50 to 75 years. A rough cost estimate for a linear mile of concrete sidewalk is $400,000, including the base material, concrete, and construction work. This does not include the design and Right-of-Way (ROW)/easement purchases.

6.6 Funding the Operations and Maintenance Program

Identifying funding sources, creating funding sources and sustaining reliable funding over the long term is critical to the overall success of operations and maintenance and, ultimately, the success and growth of the Greensboro Bicycle, Pedestrian and Greenway Network. Several types of funding sources can be identified and a combination of these might offer the best solutions. The following are potential sources for operations and maintenance. Appendix D identifies funding sources for project design and implementation.

Budget Allocations to Current Agency Programs

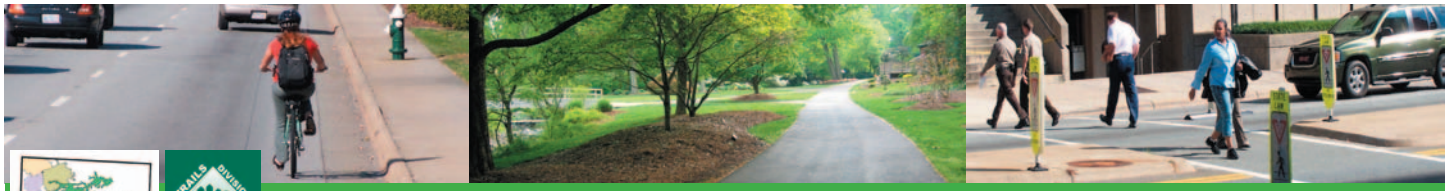
These are funds coming directly from existing agency and department programs as part of annual budget contributions. Typically this is the base revenue source for operations and management.

Multi-Objective Partnerships

Most trails serve multiple public and private benefits including access for floodway and ditch upkeep, utility access, street maintenance, and enhancement of adjacent private properties. This may pose a number of opportunities for task sharing and cost sharing among the various beneficiaries, particularly with respect to storm drainage management along river, creek, and wetland corridors.

In-Kind Services

In-kind services involve people, such as volunteers, youth and student labor, and seniors to provide routine maintenance practices to network facilities. In-kind services may also include donations of material and equipment. Another consideration is the adopt-a-trail program, which works with service clubs, scouts, school groups, businesses and others. Adopt-a-trail



programs should include credit signage and written agreements with the adopting group.

Trust Fund

Working in partnership with the Friends of the Greenway, the City of Greensboro may be able to establish a Greenway Trust Fund. This Trust Fund would be a dedicated source of funding that supports the operation and management of portions of the greenway system. The Friends of the Greenways would work with a private financial institution to set up an investment account or work with a local foundation to establish an endowment. Contributions to the fund would be solicited from greenway advocates, businesses, civic groups, and other foundations. The goal would be to establish a capital account that would earn interest and use the interest monies to support greenway maintenance and operations. Special events could be held whose sole purpose is to raise capital money for the Trust Fund. A trust fund can also be used in the acquisition of high-priority properties that may be lost if not acquired by private sector initiative.

The following is an example of the Mountains-to-Sound Greenway Legacy Fund in Washington.

The Mountains to Sound Greenway Legacy Fund is an endowment fund managed by The Seattle Foundation. Its purpose is the protection of the Mountains to Sound Greenway, for the public good, in perpetuity. It will be used to support restoration, enhancement, education and advocacy programs of the Mountains to Sound Greenway Trust. Currently we have a goal of raising $1 million for the Greenway Legacy Fund by July 2006. This will kick off a multi-year endowment fund campaign with a goal to raise $5 million.

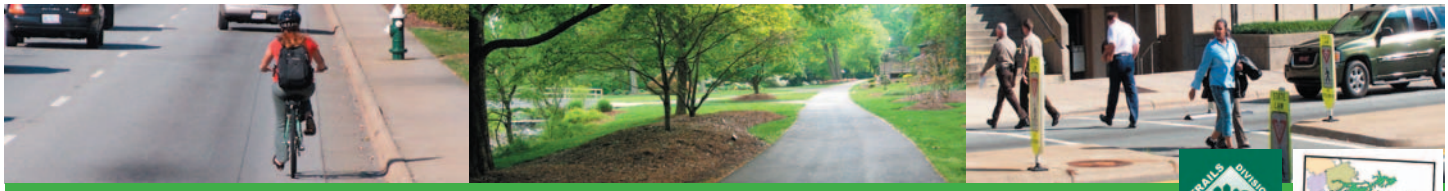
Revenue from Programming

The City of Greensboro should also work with the Friends of the Greenway to capture and direct fees and revenues that are derived from greenway events and activities into an account that can be dedicated to operating and managing the greenway system. Revenues could be used to support the Greenway Trust Fund. As defined in Chapter 5, there are numerous opportunities to program greenway lands and facilities for activities that can generate revenues. The City of Greensboro should work actively, and in partnership with a Friends of the Greenway organization, to define events that can occur throughout the calendar year, and determine which of these events has the capability of generating revenues that support operations and management of the greenway. Grand Forks, North Dakota has demonstrated that a properly operated greenway can generate upwards of $250,000 in direct revenues annually for use in off setting the cost of operations and maintenance costs.

Working with the Community Foundation of Greater Greensboro

Throughout the United States, more and more community foundations are becoming interested and involved with the development of greenway systems. Greenways are excellent community-based pursuits and normally match up well with the mission of community foundations. Action Greensboro, Inc. is a partner in The Community Foundation of Greater Greensboro, and has been one of the principal partners in the preparation of this Plan. So the link between greenways and the local community foundation has already been established.

Other community foundations throughout the nation have taken on the task of greenway development as a major initiative. For example, the Community Foundation for Southeastern Michigan took a lead role in developing the Southeast Michigan Regional Greenway Plan. The foundation raised more than $25 million for the greenway system, provided technical assistance to partners, awarded financial grants to



build projects and established an endowment for maintenance and operation.

6.7 Other Operations and Maintenance Resources

6.7.1 Conflict Reduction

- Plan, design, and manage to reduce conflicts among users, with adjacent properties including: reckless and unsafe behavior; incompatible uses; trespassing; disturbances and adverse environmental impacts
- Recognize the different goals of different users, such as equestrians and bicyclists, and separate where feasible
- Provide user education through signage, patrol, volunteers, brochures, and media
- Provide adequate trail mileage and bicycle, pedestrian, and greenway acreage to accommodate user populations
- Solicit input from user groups by providing contact information to report problems and responding promptly and effectively to complaints, concerns, or suggestions
- Monitor, document, and log problem areas and address problems through design and management
- Promote trail etiquette
- Educate bicyclists and hikers on how to pass horses using subdued voice cues rather than bells, horns, or sudden loud noise that might startle a horse
- Avoid excessive regulatory signage
- Employ temporary closure of facilities when conditions dictate or for resource recovery
- Maintain facilities as specified in this chapter
- Distribute or publish a maintenance schedule
- Respond to illegal or disturbing activity quickly