

## Chapter 8: Maintenance & Operations

Greenways present both opportunities and challenges for upkeep, day-to-day operations and long-term evaluation as it relates to maintaining a system in a state of good repair. Other public infrastructure such as sewer systems, water systems, roads and parks require a higher degree of specialized attention as regular maintenance is pursued. Greenways can be managed through partnerships with non-governmental entities.

As noted previously in this Plan, there is a great spirit of volunteerism and programs throughout Buncombe County that help promote and encourage use of greenways. This same spirit can also help Buncombe County and municipalities conduct some routine and quick response maintenance procedures. The vision of Connect Buncombe is to establish an entity that can tap volunteer resources to manage certain types of maintenance and operation programs. This is particularly important for a larger geographical areas such as a county where mobilization of resources, most notably people and small equipment, can be difficult for small tasks or in remote areas when a minor maintenance issue needs to be addressed.

Of equal importance are the partnerships through mechanisms such a Memorandum of Understanding (MOU), with non-profits, other municipalities, homeowners associations, and private businesses that can help support maintenance and operation activities.

### Objectives of Maintenance & Operations

Chapter 4: Design Features focuses on elements of the greenway system that promote safety, ensure access for persons of all abilities and help set design and construction standards for the greenway system. Many of the design strategies were developed with a

long-term maintenance perspective that recognizes good design and construction practices, which will defray future maintenance costs.

The primary objectives of maintaining and operating a greenway system should be to:

- ◆ **Preserve Existing Investment:** Greenways are one of many visible public investments that should be viewed as an asset to the County and municipalities in the same manner as the County Courthouse, a City Hall, an amphitheater or a school. A well-maintained asset is fundamental to fiscal stewardship and ensuring usability of that asset over a long period of time. The outlay of resources for the initial construction of trails, pathways, amenities, access points, parking lots, signage and lighting also requires consideration of how these investments will be preserved.
- ◆ **Protect Habitat & Environment:** Greenways and trails by nature are desired in areas that promote or enhance natural environments, even in their most urban settings. The degradation of a greenway or walking trail can adversely impact the quality of the surrounding habitat and environment that it was meant to protect and negatively impact public opinion of the benefits of that trail.
- ◆ **Safeguard Public Safety:** Maintenance involves both the trail infrastructure and the environment around it, both of which can greatly impact the safety and the perception of safety for users. The lush landscape of Western North Carolina leads to fast rates of growth for foli-



*Maintenance of greenways is a critical element of any greenway program. Simple features, such as the movable signs shown above, help inform users of potential conflicts on the trail ahead.*

Photo Credit: Don Kostelec



*The combination of a wet climate, winter freeze/thaw cycles, and tree roots can create significant damage to greenways, causing potential safety hazards for all users.*

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age, which can overtake trails, block safety-related signage, and create an “enclosed” feeling where users may not feel safe. The environment also impacts the trail surface as root heaves create tripping hazards for users while encroachment of trailside grasses and shrubs can degrade the edge of pavement or shorten the effective width of the trail and create user conflicts. Stormwater runoff can compromise the integrity of the trail base and natural surface trails can be washed away during major storms, both creating unexpected conditions for users.

### Considering Context

Trimming foliage on and around greenways, sweeping sediment from the trail, and fixing cracks before they become safety hazards are the greenway equivalent of applying lube to a bicycle chain, putting air in the tires and adjusting brake cables. Delaying action on any or all of them seriously compromises the integrity of the trail and sets forth a cycle of degradation that can quickly result in the need to completely repave or rebuild a trail.

Making the case to funding sources, elected officials and partners on the importance of preventive maintenance can be difficult. Fixing cracks does not warrant a ribbon cutting. Sweeping a trail once a month won’t win any awards. Some volunteers won’t always see it as the best way to spend their time.

But it must be made clear to decision makers that maintenance on a new greenway trail begins soon after it is built and is directly tied to operations. Grass needs to be mowed, the first rainstorm can wash newly settled dirt or gravel over the trail, or a tree may fall and block the trail. Some of these maintenance needs can be planned for while others require

methods of reporting maintenance needs, response policies and clearly defined roles for maintenance participants.

**Importance of Design.** Even when the economy was in better shape the financial needs of public agencies were not being met with existing resources. This inevitably led to investment decisions on greenways in many communities that looked at the cost of the project while making tradeoffs in design to reflect revenues. This is a part of doing business and building a greenway system; however, the design and construction of greenways is a critical facet of protecting the asset well into the future.

The many trails that have been converted from former railroad beds typically fare better in terms of life cycle maintenance costs because the original railroad bed was built with a deep base of aggregate materials below the tracks to promote efficient drainage and limit encroachment from roots and foliage. Rails-to-trails also have some type of gravel shoulder extruding beyond the width of the pavement that protects the integrity of the trail surface.

As addressed in Chapter 4: Design Features, the base of the trail is fundamental to maintaining its long-term viability, as it was with railroads and as it is with other road building techniques. Asphalt is a material that performs best when its pliability is maximized. Asphalt can withstand freeze and thaw cycles better than concrete. It is also cheaper to build than concrete and easier to replace or repair. The pliability of asphalt is best preserved through weight transfer, which roadways gets from heavy traffic volumes and large vehicles—neither of which are functions that greenways serve or promote.

The design features related to base and materials, as

well as some type of shoulder treatment are intended to bolster the strength of the asphalt and offset the negative effects that come with a lack of weight loads on the pavement. Over the life of the greenway this reduces maintenance costs and lessens the need to completely repave or overlay the trail as frequently.

**Different Settings.** There was strong support among Buncombe County citizens for greenways and trails in natural settings to be built with natural surfaces, such as crushed gravel (gravel fines), mulch, or dirt. There are several maintenance advantages that come with natural surface trails, most notably replacement costs and less influence of tree roots on the trail surface. Runners prefer them to paved trails. There are also several challenges, such as erosion, encroachment of trailside vegetation, muddy or poorly-draining sites and concerns over user conflicts and accessibility in high use areas.

Communities that want to protect or enhance a rural feel, promote equestrian use or simply prefer a more natural feeling with their trails should be made aware of the potential challenges that come with being able to maintain those trails, particularly in remote settings. This does not and should not mean that a default position should be to pave the trail. Rather, a different set of expectations should be established for how the County, municipalities and other partners can address maintenance needs.

In some settings, stream and river buffer requirements may require a natural surface trail. More reliance may need to be placed on volunteers to inspect the trails, report major problems and conduct maintenance activities than with trails in more urban or transitional settings.

**Access & Detours.** It can be frustrating for greenway users to come upon trail maintenance that restricts their use of the trail or does not have a suitable alternative route. Identifying and assigning detour routes are difficult with greenway trails, particularly in rural areas where on-street bike routes or sidewalk alternatives do not exist.

Luckily, most pedestrians can walk around a maintenance impediment and bicyclists may be able to walk their bike around a temporary obstacle. Individuals with mobility impairments are not as fortunate and attempts should be made to erect advance warnings for all users so they can choose whether or not to use that trail during the time of maintenance activities. Users can also be alerted via text messages, social media and web site announcements.

**Materials, Supplies & Equipment.** Relying upon a diverse set of partners and agencies to properly maintain greenways requires consideration of access to materials and supplies needed for maintenance, as well as reliability of equipment. Labor may be easy to come by but continued support from volunteers and partners is best sustained by consistent access to the supplies needed to perform various maintenance duties. A County staff person or a contracted service is also needed to coordinate and manage volunteer efforts.

For many regular maintenance activities, Buncombe County may be able to keep enough inventory on-hand to address most needs. However, equipment such as small earthmovers, mowers and large trimming equipment may be used sporadically and may already be owned by cities or other departments within the County. Finding a way to achieve economies of scale in the purchase and maintenance of such equipment will help maximize efficiency and



*Where possible, detour routes should be designated and signed during construction or maintenance activities.*

Photo Credit: Don Kostelec

allow resources to be focused on greenway system expansion, encouragement programs or other maintenance activities.

**Planning for Maintenance.** Maintenance must be standard practice. As the greenway system grows it will become increasingly important to define maintenance roles for the many entities involved. This means setting aside specific funding amounts in the County's annual budget, examining maintenance and life-cycle costs in the specific design of trail segments, understanding maintenance expectations when new developments construct a public use trail, and incorporating a maintenance element into future corridor planning.

**Using Technology.** Communication between greenway users and those in charge of maintenance is greatly enhanced by the use of established and emerging technologies. Social media outlets will allow the County and its partners to report maintenance activities that can disrupt travel or recreational plans for greenway users. Interpretive GIS software can also be used. Cities and counties are developing mobile phone applications that allow citizens to report maintenance problems such as potholes, street light outages, and clogged storm drains. A similar effort could be conceived for reporting on greenway maintenance issues.

### Maintenance & Operations Participants

The maintenance efforts of the Buncombe County greenway system will have many partners playing a role including the County's Parks, Greenways & Recreation Services Department, the Greenway Commission, Connect Buncombe, other County departments, municipal public works and transpor-

tation departments, North Carolina DOT, and community service organizations.

Exhibit 8-1 characterizes various maintenance activities by typology and the most likely responsible party for conducting the activity. The typologies identified are:

- ◆ **Spot or Incident Maintenance** activities are unplanned and occur in response to a particular reported problem, event or incident. In most greenway settings these will be the resulting impacts or damage from storms, floods or snowstorms.
- ◆ **Regular Maintenance** consists of programmed or continuous activities that occur at logical intervals based on the characteristics of the greenway. Trail inspection, trimming, sweeping, and clean-up activities are examples of regular maintenance activities.
- ◆ **Long-Term Maintenance** requires major planning and budgeting for what are oftentimes very specific projects such as major pavement repair, re-building, erecting new signage or replacing major structures such as bridges or culverts.

Exhibit 8-2 illustrates a sample maintenance schedule that considers these typologies and the type of maintenance activities.



Exhibit 8-1: Partners & Potential Responsibilities in Maintenance Activities

Types of Maintenance & Operations Activities	Parks, Greenway & Recreation Services, Municipal Parks Departments, Contractors	Connect Buncombe Volunteers, Other Contract Organizations	Facilities Maintenance, Municipal Public Works, Transportation Departments, Contractors
<p><b>Spot / Incident:</b> Occurs as necessary or warranted.</p>	<ul style="list-style-type: none"> <li>• Citizen Response</li> <li>• Low Water Crossing / Warning Signs</li> <li>• Major Debris Removal</li> <li>• Securing Temporary Signage</li> <li>• Identify Detours</li> <li>• Information Dissemination</li> <li>• Special Events Policies &amp; Permitting</li> <li>• Lighting Replacement</li> </ul>	<ul style="list-style-type: none"> <li>• Citizen Response</li> <li>• Spot Improvement &amp; Incident Reporting</li> <li>• Water New Vegetation</li> <li>• Minor Debris Removal</li> <li>• Placing Temporary Signage</li> <li>• Information Dissemination</li> <li>• Special Event Monitoring / Support</li> </ul>	<ul style="list-style-type: none"> <li>• Asphalt Spot Patches</li> <li>• Major Debris Removal</li> <li>• Graffiti Control</li> <li>• Parking Lot Repair</li> <li>• Major Debris Removal</li> </ul>
<p><b>Regular:</b> Programmed or continuous at logical intervals based on features and their needs.</p>	<ul style="list-style-type: none"> <li>• Scheduling Major Maintenance Tasks</li> <li>• Trail Edge / Path Weed Treatment</li> <li>• Major Mowing &amp; Trimming</li> <li>• Trash Disposal</li> <li>• Plant &amp; Trim Trees</li> <li>• Stock, Clean Amenities</li> <li>• Rotary/Machine Sweeping</li> <li>• Bollards / Bollard Locks</li> <li>• Sign Replacement</li> <li>• Mapping</li> <li>• Volunteer Training</li> <li>• Accident &amp; Incident Tracking</li> <li>• Pest Management</li> </ul>	<ul style="list-style-type: none"> <li>• Trail Inspection &amp; Condition Surveys</li> <li>• Scheduling Minor Maintenance Tasks</li> <li>• Minor Mowing &amp; Trimming</li> <li>• Removing noxious weeds</li> <li>• Trail Shoulder / Borrow Ditch Clean-up</li> <li>• Trash Collection</li> <li>• Planting Shrubs, Grasses &amp; Flowers; Mulch Planting Beds</li> <li>• Locking / Securing Trailheads &amp; Access Points</li> <li>• Hand Tool Sweeping</li> <li>• Volunteer Training Support</li> <li>• Accident &amp; Incident Monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Asphalt Crack Sealing / Seal &amp; Cover</li> <li>• Shoulder Protection &amp; Maintenance</li> <li>• Large Scale Vegetation Removal</li> <li>• Dust Management</li> <li>• On-Street Sidewalk &amp; Connecting Route Maintenance</li> </ul>
<p><b>Long-Term:</b> Requires major planning, budgeting and coordination for anticipated investments or major initiatives.</p>	<ul style="list-style-type: none"> <li>• Fence &amp; Structure Paint / Maintenance</li> <li>• Trail Location Signage / Wayfinding</li> <li>• Major Amenities Procurement &amp; Replacement</li> <li>• Habitat / Environmental Maintenance &amp; Control</li> <li>• Secure Funding</li> </ul>	<ul style="list-style-type: none"> <li>• Benches &amp; Table Paint / Maintenance</li> <li>• Support / Pursue Funding</li> </ul>	<ul style="list-style-type: none"> <li>• Asphalt Seal &amp; Cover / Overlay</li> <li>• Centerline Striping / Crosswalk Markings</li> <li>• Street Location Signage &amp; Lighting</li> <li>• Bridge inspections &amp; Maintenance</li> <li>• Fencing &amp; Railing</li> <li>• Drainage / Borrow Ditches, Culverts</li> </ul>

Exhibit 8-2: Sample Maintenance Schedule

Tasks	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<b>Basic Maintenance</b>												
Inspection & conditions survey												
Graffiti removal	As needed throughout the year											
Hand tool sweeping												
Major mowing & trimming												
Machine Sweeping												
Planting shrubs, grasses & flowers												
Plant, trim trees												
Shoulder / borrow ditch clean-up	As needed or annually											
Trail edge, shoulder, gravel path weed control												
Trash collection & disposal												
Water new vegetation												
Weed control & pest management												
<b>Substantial Maintenance</b>												
Asphalt patching	As needed, fall and spring											
Asphalt crack sealing												
Painting	As needed year around; Every 10 years for major structures & amenities											
Overlay	Once every 20 years											
Shoulder / borrow ditch protection & maintenance												

## Facility Inventory

A critical component of any maintenance plan is to know the condition and location of various items such as signs, benches, and markers. The trail condition record of activity is also helpful in planning future maintenance and monitoring schedule requirements.

Buncombe County has been working to develop a set of master GIS files showing the location of various amenities, which creates an ideal depository for the inventory of various elements of the greenway and trails system. Before greenway system development begins in earnest, Buncombe County should organize a database for signs, amenities, bridges, culverts, and pavement condition to assist in the annual maintenance review.

The database can be updated as maintenance tasks are complete, used to project budgetary needs, and inform volunteers of what types of activities are short-term needs. The database can also be used to assess performance of the greenway system and provide feedback for planning, design and construction of new trails. Emerging smartphone, GPS and GIS technologies offer an efficient means toward developing such an inventory and volunteers can be used to conduct certain functions of the inventory.

This facilities inventory should include:

- ◆ **Design characteristics**, such as length, width, pavement type, and year constructed;
- ◆ **Surface condition**, including pavement condition, date of last inspection and photo at last inspection;
- ◆ **Usage by mode and characteristics**, such as pedestrians, bicyclists, equestrians, etc.;

- ◆ **Sign inventory**, including type of sign, location, trail location, and date installed;
- ◆ **Amenities and their location**, such as benches, bicycle racks, trail markers and piers; and
- ◆ **Bridge and culvert database**, including location, date of last inspection and condition.



*Volunteer patrols can also take note of conditions and users on greenways and trails to be used in a facilities inventory.*

Photo Credit: Don Kostelec

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