

**THE TWO RIVERS GREENWAY TRAIL MAINTENANCE PLAN
JULY-AUGUST 2019
BINGHAMTON METROPOLITAN TRANSPORTATION STUDY**



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Executive Summary

The Two Rivers Greenway Maintenance Plan makes recommendations for maintenance of the trail sections comprising the Two Rivers Greenway by drawing from best practice studies of other trail systems and an on-site assessment of trail conditions included in the appendix.

The appendix is a report of on-site assessments of the existing Two Rivers Greenway trail segments, explaining the condition of the site, outstanding maintenance needs, and recommendations for specific treatments.

It is intended that on-site trail assessments will be done every two years. Any new trail segments will be added during the next scheduled year for the trail assessments.

Introduction

The Two Rivers Greenway is a system of paved walking and biking trails within the BMTS Urban Area that primarily parallels the corridors of the Susquehanna and Chenango Rivers. The signed, on-road bicycle routes help to provide connections between trail segments that are not contiguous yet. (See map at <http://www.bmtsonline.com/sites/default/files/Maps/BiekRouteMap.pdf>)

An initial on-road bike route system and a riverbank trail system was recommended in a study by Konski Engineers back in the late 1970s but very little was implemented. BMTS had its initial Pedestrian & Bicycle Plan adopted during June 1996. That plan called for a feasibility study for a regional walking & biking trail system. During December 1999, the Binghamton Metropolitan Greenway Study was completed. The study produced regional trail system recommendations for what is now the Two Rivers Greenway.

The Implementation Plan for the Binghamton Metropolitan Greenway Study was completed in 2000. It called for each municipality to build the portions of the trail system that are in their respective jurisdictions. The municipalities would also be responsible to maintain their trails.

The 2012 Two Rivers Greenway Design Guidelines and Signage Plan is the source of the Two Rivers Greenway name, logo, and the trail system sign designs.

A trail signing project to install signs on the existing pieces of the Two Rivers Greenway was completed during 2018.

Within the next three years, feasibility studies and planned construction of more pieces of the Two Rivers Greenway include:

- Route 434 Greenway - Phase 2 (Pennsylvania Avenue at Vestal Avenue to Murray Hill Road)
- Chugnut Trail West Extension (Bridge Street/Vestal Avenue to Grippen Park and beyond to Glendale Park)
- Broome County feasibility study for walking and biking facilities on Vestal Road from Bunn Hill Road to African Road, where the Vestal Rail Trail begins

Why We Need a Trail Maintenance Plan

Regular trail maintenance is an ongoing necessity for several reasons. It invites more people to use a trail. It ensures continued safe use of the trail. And it sends a positive message to local citizens and visitors, boosting the reputation of the local community.¹

From a management perspective, and from a liability standpoint, maintenance plans need to be implemented. All trail managers should have proof that they exercise a reasonable amount of due diligence to ensure that the trails are safe.²

Trail maintenance is often deferred which eventually results in greater expenses for repair, even though maintenance costs are not as high as many perceive them to be. When accounting for volunteers, maintenance costs on average range from \$500 to \$1,000 per trail mile per year depending on the surface.³

Initial construction costs dwarf the costs of routine maintenance and enhancement of existing facilities. Deferring maintenance can dramatically increase maintenance costs and invert that cost balance. Deferral is common since funding for routine maintenance has been comparatively difficult to secure. As trails age without appropriate maintenance, opportunities for substantial cost-savings through early intervention shrink.⁴

¹ Parks and Trails New York and Hudson River Valley Greenway. (2004). *A Guide to Planning Trails in New York State*.

² Rails-to-Trails Conservancy. (2015). *Maintenance Practices and Costs of Rail-Trails*.

³ Rails-to-Trails Conservancy. (2015). *Maintenance Practices and Costs of Rail-Trails*.

⁴ LTAP, Indiana and Development Commission, Ohio River Greenway, "Best Practices in Trail Maintenance" (2014).

Management Parties

The following municipalities are responsible for the maintenance of their respective trails within the Two Rivers Greenway trail system: Broome County, City of Binghamton, Town of Vestal, Village of Endicott, Village of Owego, Village of Port Dickinson.

This maintenance plan is intended to (1) recommend specific maintenance treatments and (2) suggest ways of collaboration with municipalities.

Overview of Two Rivers Greenway

Total Mileage of Existing Trails: 13.52 miles

Name	Location	Material	Municipality	County	Length in Miles
Owego Riverwalk	Owego	Cement	Town of Owego	Tioga	0.25
Vestal Rail Trail Phase 1	Main Street to African Road	Asphalt	Town of Vestal	Broome	2.09
Vestal Rail Trail Phase 2	Castle Gardens to Main Street	Asphalt	Town of Vestal	Broome	1.82
Route 434 Greenway Phase 1	South Washington Street Bridge to Vestal Avenue at Pennsylvania Avenue	Cement and Asphalt Loop	City of Binghamton	Broome	0.40
South Washington Street Bridge	South Washington St. at Conklin Ave to Confluence Park/Washington St. at North Shore Dr.	Asphalt Approaches, Cement Bridge Deck and Wood Walkways	City of Binghamton	Broome	0.13
Confluence Park	South Washington St. Bridge to North End of Chenango River Promenade Tunnel	Asphalt	City of Binghamton	Broome	0.13
Chenango River Promenade	Confluence Park to Court Street (Includes Upper Trail Portion)	Asphalt Cement and Brick	City of Binghamton	Broome	0.39
Chenango River Promenade	Susquehanna St. to Court St. Bridge (Lower Trail Portion)	Asphalt	City of Binghamton	Broome	0.22

Court St. Bridge Underpass	Path under the bridge to north side stairway.	Cement	City of Binghamton	Broome	0.10
Martin Luther King Jr. Promenade	Court St. to East Clinton Street	Cement	City of Binghamton	Broome	0.28
Chenango Riverwalk	East Clinton Street to Eldredge Street	Asphalt	City of Binghamton	Broome	0.70
Chenango Riverwalk	Eldredge Street to Cheri Lindsey Park	Asphalt	City of Binghamton	Broome	0.90
Chenango Riverwalk Connector Trail	Cheri Lindsey Park to Chenango Street to Bevier Street	Cement sidewalk and roadway improvements	City of Binghamton	Broome	0.41
Otsiningo Park to North Otsiningo Park	Bevier Street Spur to Otsiningo South Trails to Howell Drive	Asphalt	City of Binghamton	Broome	3.60
Port Dickinson Community Park Trail Loop	Chenango Street to West Service Street	Asphalt	Village of Port Dickinson	Broome	0.75
Chugnut Trail	River Terrace to Riverview Drive	Asphalt	Village of Endicott	Broome	0.75
Front Street Trail	Prospect St. to Bevier St.	Asphalt	Town of Dickinson	Broome	0.60

Planned Greenway Projects:

- Segments in Design: 5.70 miles

Name	Location	Material	Municipality	County	Length in Miles
Route 434 Greenway Phase 2	Vestal Avenue at Pennsylvania Avenue to Murray Hill Rd.	Asphalt	City of Binghamton / Town of Vestal	Broome	2.50
Chugnut Trail West Extension 1	Chugnut Trail to Grippen Park	Asphalt	Village of Endicott / Town of Union	Broome	1.40

Chugnut Trail West Extension 2	Grippen Park to Glendale Park	Asphalt	Village of Endicott / Town of Union	Broome	1.80
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The proposed segments for the entire Two Rivers Greenway are available in the Binghamton Metropolitan Greenway Study, which can be downloaded at <http://www.bmtsonline.com/node/41>.

Trail Infrastructure

In general, municipalities do not have inventories of trail conditions or trail amenities. They do, however, maintain what is installed and repair worn and damaged infrastructure when notified of such needs.

Maintenance Through Partnership

Though maintenance of the trail system is the responsibility of the local municipalities, case studies show numerous municipalities with successful maintenance plans have partnered with active volunteer groups or “friends of” organizations to assume responsibility for routine trail maintenance.

Case Studies

Numerous case studies illustrate the effectiveness of volunteer and “friends of” groups who take part in regular maintenance of trails. “Friends of” groups are a low-cost method of regular maintenance. Because “friends of” groups frequently monitor their trails, they increase the general awareness of problems with the site, and they foster greater community investment in the site.⁵

Albany County Helderberg-Hudson Rail Trail: For the Albany County Helderberg-Hudson Rail Trail, Friends of the Rail Trail (FORT) developed a program of Rail Trail Ambassadors – Over 50

⁵ Capital District Trails Plan. (2019). *Trail Management Best Practices: Case Studies in Creating Successful Community Trails*.

local volunteers, directed by a coordinator, help to monitor the trail and provide weekly reports on trail conditions and issues.⁶

Farmington Canal Heritage Trail: Each municipality along the Farmington Canal Heritage Trail is responsible for their own section of trail. The Farmington Valley Trails Council (FVTC) serves as a clearinghouse for best practices and public works departments plow trailheads. The FVTC also maintains bathrooms, repaves the trails and seeks grant funding. Volunteer groups organized by the FVTC and ‘friends of’ groups help patrol the trails, sponsor clean-up days and perform landscaping along the trails.⁷

Zim Smith Trail: Saratoga County budgets approximately \$3,500 for the upkeep of its Zim Smith Trail. It also devotes one full-time County Department of Public Works (DPW) employee. While the trail is a county initiative, support from town supervisors and local DPWs is vital to the trail’s success. Most municipalities have taken responsibility for the maintenance of trailheads.⁸

Minuteman Bikeway Trail: The Massachusetts Bay Transportation Authority: Minuteman Bikeway Trail is divided into segments which are individually managed and maintained by the respective municipalities it passes through. Overall, trail maintenance is provided through a mixture of volunteer efforts and the local Department of Public Works (DPW) offices, which is an arrangement that has evolved over time.⁹

Receiving Feedback

Currently users of the Two Rivers Greenway trails are encouraged to call the Parks & Recreation Department or the Public Works Department of the local municipality that owns the trail to address problems they encounter such as deteriorated pavement. This plan recommends that local municipalities provide contact information including a phone number, email address, or website URL for an online form for trail users to share photos and descriptions of hazardous areas in need of maintenance with the appropriate municipal officials. This can be accomplished with signage on the trails, as well as through municipal and trail websites.

⁶ Capital District Trails Plan. (2019). *Trail Management Best Practices: Case Studies in Creating Successful Community Trails*.

⁷ Capital District Trails Plan. (2019). *Trail Management Best Practices: Case Studies in Creating Successful Community Trails*.

⁸ Capital District Trails Plan. (2019). *Trail Management Best Practices: Case Studies in Creating Successful Community Trails*.

⁹ Capital District Trails Plan. (2019). *Trail Management Best Practices: Case Studies in Creating Successful Community Trails*.

In Albany, Friends of the Rail Trail members acted as Helderberg-Hudson Rail Trail ambassadors, regularly patrolling the areas to promote a safe and welcoming environment and to report spots on the trail in need of maintenance.¹⁰ The trail ambassador system improves the municipality's abilities to identify and rectify problems.

Best Practices in Maintenance

The [Guide to Planning Trails in New York State](#) by Parks and Trails New York and Hudson River Valley Greenway, lists the following activities under regular trail maintenance:

- mowing
- pruning vegetation
- picking up litter
- inspecting and repairing all trail structures
- maintenance of any amenities added to a trail, such as trash cans, toilets, kiosks, and map dispensers

Additional Activities Include

- snow removal

Pavement Treatments

Surface and crack treatments for pavement work best when viewed as preventive maintenance that are part of a preservation strategy, as opposed to temporary fixes that are part of a reactive maintenance strategy.

A fog seal is an application of diluted emulsion (typically at a rate of 1:1) to enrich the pavement surface and delay raveling and oxidation. A fog seal is considered a temporary treatment.¹¹

Fog sealing and crack fillings are recommended treatments for pavement when it is in good or fair condition because it prevents further deterioration. Regular application of these preventive maintenance tools is proven to be more cost effective than delayed repair when the pavement is in poor condition.¹²

¹⁰ Capital District Trails Plan. (2019). *Trail Management Best Practices: Case Studies in Creating Successful Community Trails*.

¹¹ Ann M. Johnson, P.E. *Best Practices Handbook on Asphalt Pavement Maintenance*. (2000).

¹² Minnesota Department of Transportation. (2009). *Preventive Maintenance for Recreational Trails*. Chapter 3 Best Practices.

Given that pavement degradation commences from the time of construction, due to the environmental factors of solar radiation, oxygen and water, it is recommended that fog seals be applied at the time of construction in order to best preserve the pavement at its' peak condition. Applying fog seals at the time of construction can be done with construction funds for the project.¹³

The Ohio River Greenway Plan recommends the application of porous pavement which can be applied on top of existing pavement. Furthermore, it states that porous pavement is more resilient to weather deterioration, it allows ice and snow to melt more quickly than traditional pavement, and the cost difference from traditional pavement is negligible.¹⁴ However, it is important to note that routine maintenance for porous pavements includes bi-annual vacuuming to remove accumulations of dirt and debris, annual vacuuming and fine gravel replacement, and weekly to monthly sweeping or blowing.

The Ohio River Greenway Plan provides the following cost estimates for pavement treatments:

Fix Type	Cost (\$ Per Mile)	Added Life ESL	Cost per Year of Added Life
Crack Seal	\$4,000	1 year	\$4,000
Seal Coat & CS	\$20,000	4-9 years	\$5,000
Overlay	\$100,000	8-12 years	\$12,500
Crush & Shape	\$150,000	14 years	\$10,700
Reconstruction	\$300,000	15 years	\$20,000

The FHWA provides the following checklists for the application of pavement treatments:

Title	Website
Crack Seal Application	http://www.fhwa.dot.gov/pavement/preservation/ppcl01.cfm
Chip Seal Application	http://www.fhwa.dot.gov/pavement/preservation/ppcl02.cfm
Fog Seal Application	http://www.fhwa.dot.gov/pavement/preservation/ppcl04.pdf
Thin Hot Mix Application	http://www.fhwa.dot.gov/pavement/preservation/ppcl03.pdf
Slurry Seal Application	http://www.fhwa.dot.gov/pavement/preservation/ppcl13.cfm

¹³ Minnesota Department of Transportation. (2009). *Preventive Maintenance for Recreational Trails*.

¹⁴ LTAP, Indiana and Development Commission, Ohio River Greenway, "Best Practices in Trail Maintenance" (2014). and Stuart Macdonald. (2011). "Porous Asphalt Shows Advantages For Trail Surfacing."

Recommended Approaches to Maintenance

[A Guide for Maintaining Pedestrian Facilities for Enhanced Safety](#)¹⁵ defines three types of maintenance: routine maintenance, corrective maintenance, and preventative maintenance.

1. **Routine Maintenance**: “Routine Maintenance consists of day-to-day activities that are scheduled by maintenance personnel to maintain and preserve the condition of facilities at a satisfactory level of service. This definition encompasses short term and some long-term maintenance.”¹⁶
2. **Corrective Maintenance**: “Includes activities that are performed in response to the development of a deficiency or deficiencies that negatively impact the safe, efficient operations of the facility and future integrity of the pavement section. Corrective maintenance activities are generally reactive, not proactive, and performed to restore a pavement to an acceptable level of service due to unforeseen conditions.”¹⁷
3. **Preventative Maintenance**: “Preventive maintenance is typically applied to pavements in good condition having significant remaining service life” Preventative maintenance treatments for sidewalks include mud-jacking, joint sealing, grinding and horizontal cracking. Preventative maintenance treatments for asphalt include chip sealing and slurry treatments.¹⁸

Three pavement preservation criteria to help decide what treatment to use are:¹⁹

- The Right Road—The road section must have some distress but must also be “good enough” for pavement preservation to be fully successful.
- The Right Time—Expected life curves and section history should be examined to ensure a successful fix.
- The Right Fix—Existing distress and section type will dictate which treatment(s) are appropriate.

¹⁵A *Guide to Planning Trails in New York State*. (2004). p. 60.

¹⁶ A *Guide to Planning Trails in New York State*. (2004). p. 60.

¹⁷ A *Guide to Planning Trails in New York State*. (2004). p. 60.

¹⁸ A *Guide to Planning Trails in New York State*. (2004). p. 60.

¹⁹ Ann M. Johnson, P.E. *Best Practices Handbook on Asphalt Pavement Maintenance*. (2000).

Elements to be considered when undertaking a preventive maintenance project include:²⁰

- Providing enough staff to maintain trail closures
- Ensuring adequate clearance for construction vehicles
- Minimizing public disruption by providing early notifications
- Coordinating treatments with garbage pickup days, school let out times, community events and residential parking needs.
- If the trail is used as a commuter route, detours should be clearly trail blazed for the users.

Before a maintenance project starts municipalities should make a complete inventory of trail markings and signage and arrange for temporary signage until markings can be replaced after the treatment has cured.

Walking and biking trails serve a wide range of structural demands in addition to cyclists and pedestrians. Trail design and construction need to account for maintenance vehicles and equipment to ensure the existing trail structure is not damaged by over loading it or breaking off the trail edges. Municipalities should also note what the optimum weather conditions are for applying a given pavement treatment.²¹

Current Ongoing Maintenance

For most responsible municipalities general maintenance such as mowing, and trimming occur on a regular schedule. Corrective maintenance occurs on an as needed basis. No preventive maintenance plans are currently in place.

Funding

Most funding for maintenance comes from the local parks and/or public works department budgets.

If a fog seal or other preventive maintenance treatment is applied at the time of construction, funds from the original grant or construction budgets can be utilized.²²

Case studies show that an annual trail maintenance day for volunteers can strengthen community bonds, attachment to the trail, and promote significant trail improvements.

²⁰ Minnesota Department of Transportation. (2009). *Preventive Maintenance for Recreational Trails*.

²¹ Minnesota Department of Transportation. (2009). *Preventive Maintenance for Recreational Trails*.

²² Minnesota Department of Transportation. (2009). *Preventive Maintenance for Recreational Trails*.

One benefit of having volunteer or “friends of” groups take on maintenance responsibilities is that they are eligible to apply for funds for which the local government agencies are ineligible.

Further References

For more detailed information on pavement treatments for maintenance see [Best Practices for Bicycle Trail Pavement Construction and Maintenance in Illinois](#). Appendix-D addresses trail maintenance issues including joint faulting, lack of trail drainage, thermal cracking, edge cracking, and tree root infiltration.

New asphalt patches were used to address tree root infiltration and edge cracking. Pavement cracking was also addressed by crack sealing in other cases.

The report recommended the following schedule for regular trail maintenance:

Maintenance Task	First Maintenance Application (years)	Subsequent Maintenance Applications (years)
Check drainage components for proper function	1	1
Identify and complete crack sealing	2	6
Identify and complete patching	2	6
Perform seal coating	4	4

The order that maintenance activities take place is important. For example, completing patch work prior to crack sealing will allow for sealant to be installed around the patches. Likewise, completing both patching and crack sealing prior to seal coating will provide the best level of pavement preservation. The time lines shown for the maintenance tasks are recommendations. Several real-world factors, such as construction materials, construction technique, trail usage, and environmental conditions, may dictate completion of these tasks more or less frequently than outlined.

When prescribing specific preventive or corrective maintenance solutions refer to the [FHWA Guide for Maintaining Pedestrian Facilities](#).

For the recommended frequency of common maintenance practices refer to Appendix 2 of [“Ensuring the Future of Your Trail – A Survey of 100 Rails-Trails.”](#)

- Most maintenance practices such as pavement treatments are performed on an as needed basis
- Regular maintenance like emptying garbage cans and clearing paths of trash occur weekly or where resources are low some areas reorganize monthly volunteer clean up days
- Non-critical repairs and inspections occur annually

For deciding what pavement treatment to use refer to [Preventative Maintenance for Recreational Trails, \(Minnesota Transportation Department\)](#) Appendix-Chapter 2.

- Fog sealing is a light application of an asphalt base product that is applied to seal the surface of the pavement to fill voids, small cracks and reduce aging.
- CRS-2pd should be considered a product for more aged, pocked, porous and cracked trail pavements.

RESOURCES

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