

CITY OF MADISON - ENGINEERING DIVISION
STANDARD OPERATING PROCEDURE



GREENWAY INSPECTION AND MAINTENANCE

Revision Date: December 3, 2020

A. BACKGROUND

The City of Madison uses the term “greenway” to define open stormwater conveyance systems throughout the city. These properties are not just vital to stormwater management, but are also critical in providing habitat, ecological corridors, and recreation opportunities throughout the city. .

The City of Madison’s (City’s) greenway network consists of both publicly and privately maintained greenways. All greenways owned and/or operated by the City of Madison will be inspected and maintained in accordance with this Standard Operating Procedure (SOP).

Private greenways will be inspected and maintained in accordance with individual maintenance agreements between the City and the land owner, if applicable.

B. INSPECTION

1. Overview

The intent of greenway inspections is to determine if the facility is in good condition and operating appropriately. City-maintained facilities shall be inspected on a five (5)-year cycle, by qualified personnel, or more frequently if needed. Inspection personnel will be trained by pond and greenway staff.

2. Records Review

- i. GIS Records: Prior to field inspections, the inspector should familiarize themselves with the existing data for each greenway, including ownership and maintenance responsibility. This review should also include reviewing the Engineering Features Layer, as well as the public and private storm sewer records. If there are questions about what may be encountered in the field, pond and greenway staff should be consulted.
- ii. Previous Inspections: The inspector should familiarize themselves with the previous inspections for each location, in order to develop a baseline for what the site looked like during the previous inspection, if possible. This will be important information in determining if the site is actively degrading.
- iii. As-Builts: If as-builts area available, the inspector should review them to better understand the site and the assets to be inspected. As-builts are an effective way to understand the functionality of a greenway. If available, determine is the intent of the greenway design is to convey water as rapidly as possible, or to detain flows for flood attenuation. If possible, the inspector should familiarize themselves with greenway inlet and outlet infrastructure, including secondary and private pipes that may drain to the greenway. If there are questions about what may be encountered in the field, pond and greenway staff should be consulted.

3. Records Locations

Record Type	Record Location
Previous Inspections	M:\PlanVault\Greenways
CityWorks Records	To Be Determined
Engineering Features Layer	To Be Determined
Greenway Node Layer	Madmaps.DATA_ADM.Pond_Greenway
Greenway Node Folders	M:\PlanVault\Greenways
Asset Rating Guidance Sheets	M:\PlanVault\Greenways\Inspections Forms
Storm Sewer Records	Madmaps.DATA_ADM.Storm
Project Folders	M:\DESIGN\Projects or M:\DESIGN\SEWER\DGN
As-Builts	M:\PlanVault\ConstructionProjects

4. Key Personnel

Name	Notifications	Title
Madeline Dumas	Vegetation Issues, Maintenance Issues	Greenway Vegetation Coordinator
Greg Fries	Major Issues	Deputy City Engineer
Phil Gaebler		Water Resources Engineer
Joanna O'Brien	Survey Requests, Misc Issues, Repairs Needed	Engineer
Daniel Olivares	Encroachments	Engineer
Janet Schmidt	Major Issues, Repairs	Principal Engineer – Stormwater Utility
Ryan Schmidt	CityWorks Maintenance Requests, Misc Issues	Operations Supervisor

5. Site Inspections

Provided doing so does not endanger the inspector, the entire greenway parcel should be systematically walked to identify any deficiencies and to assess the overall condition of the site. At no time should the inspector enter storm structures. Although assets will be inspected and rated individually, the inspector should assess the greenway parcel as a whole. If the greenway, in its entirety, is in a highly deteriorated state, this should be brought to the attention of design engineers and the Stormwater Utility Principal Engineer.

- i. Site Access: Sites should not be accessed through private property. Site access should be through adjacent right-of-way, adjacent Stormwater Utility parcels, or from public easements.
- ii. Site Photos: The photographic log should provide enough detail to inform staff, who have not visited the site, of the current conditions. This means the inspector should provide a thorough photographic record of the inspection, including photos of all mapped and unmapped features, photos that provide a general understanding of overall site layout and conditions, photos detailing any identified deficiencies, as well as photos of features in good condition.
- iii. Verify Mapped Features: During the site inspection, the accuracy of mapped facilities should be reviewed and updated as necessary. The inspector should familiarize themselves with the mapped records for the site, and bring a copy of these records to the field. Errors or unmapped features should be noted. Information necessary to make revisions to unmapped, or incorrectly mapped features should be collected to aid in records revisions, or to allow surveyors to locate the feature. All correctly mapped features should be noted.
- iv. Inspect All Channel Features: All mapped and unmapped assets and features within the channel should be inspected while on site. A list of common greenway assets is included here, but other features may be present, and should also be thoroughly inspected.
 - a. Inlet Structures (pipes and structures that bring water into the greenway): Inspect inlet structures for clogs, missing grates, missing lids, cracks, general condition of connected pipes, etc. Verify the inlet structure matches City records. If not, the inspector should take photos and measurements of the structure so that an accurate record can be created. If necessary note the structure requires survey.
 - a. If inlet pipes from private property are flowing during dry check for any odor or oily sheen. If present contact public health for testing .
 - b. Outlet Structures (pipes and structures that discharge water from the greenway): Inspect outlet structures for clogs, missing grates, missing lids, cracks, general condition of connected pipes, etc. Verify the inlet structure matches City records. If not, the inspector should take photos

and measurements of the structure so that an accurate record can be created. If necessary note the structure requires survey.

- c. Energy Dissipaters (riprap, concrete, or other): Riprap, or stone stabilization, should be inspected for stone durability, appropriate coverage, stone migration, and erosion around the riprap. If it appears the energy dissipation is insufficient, by the evidence of erosion around the structure, this should be noted.
 - d. Channel Banks and Bed: The channel beds and banks may be stabilized with a variety of materials: stone, concrete, manufactured products, vegetation, etc. If a defined stabilization method has been used, the inspector should verify this is appropriately mapped, and inspect the stabilization technique for condition, durability, effectiveness, etc. If a stabilization method is not clear, inspect the channel banks for general stabilization or signs of erosion. If erosion is evident, it should be noted and measured to the extent practicable. The inspector should also determine if erosion is jeopardizing any features, including trees, large embankments, adjacent roads, structures, private property, or utilities. Cunettes, or channels stabilized with concrete, should be inspected condition of the concrete, lifting of cunette sections, and erosion at the concrete/earth interface.
 - e. Grade Control Structures: Grade control structures may consist of concrete or metal weirs, gabion baskets, stone weirs, earthen weirs, etc. Inspectors should observe the general condition of the structure to determine overall durability. Observations may include concrete spalling or cracking, sheet metal deflection or bending, gabion basket collapse, piping or erosion in earthen structures, etc. The inspector should also look for evidence of bypass around the grade control structure, or any other evidence of failure. If significant sediment has accumulated upstream of the structure, it should be noted.
 - f. Retaining Walls: Retaining walls can stabilize a variety of features in greenways, including channel banks, paths, structures, and embankment overflows. Retaining walls are typically field stone, sheet metal, wood, or block. Retaining walls should be inspected for settling, cracking, erosion, sloughing, and piping of soil behind the wall.
- v. Floodplain and Overbank Area: Some greenways have a shelf(s) designed to function as floodplain. Items to note are significant erosion, evidence of secondary channels, or impedances to flow.
 - vi. Inspect Vegetative Cover: It is important to inspect the greenway for the appropriateness of the vegetation. Vegetation can play a vital role for channel banks, channel beds, floodplains, and upland areas. Vegetation stands throughout the City's greenways can vary significantly, from fully wooded to open prairie or grass. The inspector should note if the vegetation is consistent with mapped records. In instances where recent projects have included restoration efforts, the inspector should work with the Greenway Vegetation Coordinator and Engineering Landscape Architect to assess the vegetation quality. The inspector should note if woody vegetation is creeping into access routes, inlet structures, outlet structures, or is inhibiting other access or maintenance. Alternatively, trees and shrubs that have been intentionally planted should be inspected for obvious signs of damage, rot, or other issues.
 - vii. Access Roads: If reinforced access roads, or access paths are noted in the as-builts or plan sheets, the inspector should walk these to determine if they are in good condition. Items to note include, condition of road surface, presence of ruts, encroachment of vegetation, or any other factors that may limit access to the site.

- viii. **Overflow Locations:** Greenways should have a defined overflow location. These are typically low-points on street crossings at the greenway intersection, but could also be adjacent swales, etc. If possible, defined overflows should be identified, noted, and inspected for stability, the any impedance to flow, etc.
- ix. **Verify Key Elevation Data:** During the records review and field inspection, the inspector should note what elevation information has been verified by as-built or survey data, what can be accurately measured in the field, and what items may need to be surveyed to provide the most accurate records. Key elevation data for greenways should be noted for inlet structures, outlet structures, any weirs, overflows, etc. If settlement has potentially caused the water flow path to change, this should be brought to the immediate attention of a supervisor.
- x. **Encroachments:** While on site, or during the records review, the inspector should note any encroachments onto City property. This may be small items, such as debris or gardens, or more significant features, such as fences, structures, surfaces, etc. Any potential encroachments should be noted and brought to the attention of a supervisor for further action.
- xi. **Sediment Accumulation:** General conditions of sediment accumulation within the channel or floodplain should be noted, especially if sedimentation is causing channel migration. Location of the most significant sediment piles should be noted for removal.

6. Recording Data

All assets should be given a numerical value that represents overall condition. The numerical value should be based on the Asset Rating Guidance Sheets, and should also take into account the condition of the asset from previous inspections. The numerical rating should be entered into CityWorks.

- i. **Photos:** Photos should be recorded in CityWorks. If CityWorks is unavailable, the photos name should contain the date and a unique identifier. If CityWorks is unavailable, photos should be transferred into the Greenway Node Folder.
- ii. **Notes:** Notes should be recorded in CityWorks. If CityWorks is unavailable, print copies of the CityWorks inspection sheets and bring them to the field to be filled out manually. Information should be entered into CityWorks at a later date, and scanned and placed in the Greenway Node Folder.

7. Reporting Findings

The majority of inspection findings can be recorded in CityWorks without follow-up. However, there are instances where additional actions are required.

- i. **Clogged Inlets or Outlets:** A work order should be submitted through CityWorks to remove the accumulated material.
- ii. **Unmapped or Incorrectly Mapped Assets:** A clear description of mapping changes should be sent to either greenway mapping personnel or storm sewer mapping personnel. If survey is necessary to accurately identify, this shall be combined with “vi. Missing Survey Data” and sent to be survey staff.
- iii. **Loss or Failure of Riprap:** For riprap failure at inlets and outlets, a work order should be submitted through CityWorks to replace the stone. For riprap failure on a channel-wide scale, pond and greenway staff should be notified.
- iv. **Concrete Structure Damage:** If significant, or worsening, cracks, spalling, breaks, etc. are noted in concrete structures, it should be brought to the attention of pond and greenway staff.

- v. Disconnected Pipes and Missing Grates: A work order should be submitted through CityWorks.
- vi. Missing Survey Data: Where additional survey data is needed, the inspector should notify pond and greenway staff. This information will be compiled and submitted to survey staff when schedules permit.
- vii. Encroachments: Encroachments should be brought to the attention of the staff listed in Section 4.
- viii. Significant Determination: If any part of the greenway, or an individual asset has significantly deteriorated since the previous inspection, it should be brought to the immediate attention of pond and greenway staff.
- ix. Additional Items: If any other items appear to be out of order, they should be brought to the attention of pond and greenway staff.

8. Data Analysis

Following the inspection of each greenway, the data will be reviewed to determine if additional actions are necessary.

- i. Vegetation Maintenance: The Greenway Vegetation Coordinator will determine if the current vegetation management is still appropriate for the site. If modifications need to be made, they will do so.
- ii. Overall Inspection: The inspector and pond and greenway staff will review the inspection information and determine if this site has deteriorated significantly, or if the site is in need of significant action. If so, the site will be added to a future projects list to be included for reconstruction funding in a future budget cycle.

C. MAINTENANCE

1. Vegetation Maintenance:

Vegetation maintenance is coordinated by the Greenway Vegetation Coordinator and Operations staff. Maintenance schedules are determined by the individual site, type of vegetation, presence of invasive species, and seasonal weather conditions. Vegetation maintenance operations include mowing, brushing, invasive species removal, prescribed burns, and tree clearing. If site specific needs are identified, the Greenway Vegetation Coordinator and Operations staff develop individual maintenance plans.

2. Work Orders

Specific problems identified in the field should be repaired by placing a work order in CityWorks. These include missing grates, missing lids, minor erosion issues, specific vegetation issues, etc. Inspectors, or anyone performing site visits, can submit work orders via CityWorks. Large, or system-wide issues, should be brought to the attention of pond and greenway staff.

3. Significant Deficiencies

Significant deficiencies that are identified and cannot be handled by a work order will be included in larger repair projects. These may be managed by City Operations staff, or managed as a Public Works Contract.

APPENDIX A: GREENWAY INVENTORY

APPENDIX B: INSPECTION FORMS

APPENDIX C: ASSET RATING GUIDANCE SHEET