

APWA Public Works Management Practices

Practice Summary Sheet

Chapter: **27**

Title: **Stormwater and Flood Management**

Practice Number: **27.14**

Name: **Infrastructure Inspection**

Assigned to: **Angel Garcia**

Practice Statement:

An established program provides for inspection of the stormwater infrastructure to ensure compliance with water quality standards. (Also see Chapter 40, Asset Management.)

All facilities are designed, constructed, and maintained in accordance with adopted policies, ordinances and bylaws. Enforcement will ensure the system functions and provides the level of service anticipated in the policy and plans. All installed facilities are maintained and operated in accordance with adopted policies and ordinances.

Agency Compliance:

The City of Salem operates under a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase 1 permit, which requires following best management practices (BMPs) to ensure compliance with water quality standards. As such, all stormwater facilities within city limits are designed, constructed, and maintained in accordance with adopted ordinances and policies per Salem Revised Code.

Stormwater Operations and Maintenance (O&M) staff use Granite NET software for CCTV inspections in their fleet of two trucks dedicated solely to stormwater utility inspections. Granite NET uses a national standard scoring system to rate sanitary sewer and stormwater systems to determine risk and consequence of pipe/structure failure. Based on the rating system, maintenance needs are prioritized objectively based on flooding issues, pipe size, area affected, and customer impact.

Stormwater infrastructure is inspected on a routine basis and include but is not limited to CCTV inspections of pipes, and field crew visual inspections of detention basins, catch basins, water quality manholes, culverts, ditches, and other stormwater appurtenances. All inspection and maintenance work performed on city assets are recorded in the IPS database. CCTV inspection data is gathered in Granite Net and scored based on pipe condition, location, and age. The condition inspection data informs repair and replacement decisions, and project scopes are prepared for either Capital Improvement Project ranking or for project planning at the Operations crew levels.

The City prepares its NPDES MS4 Annual Report to the Oregon Department of Environmental Quality each November, which summarizes stormwater-related activities that were completed through the reporting period to ensure compliance with water quality standards.



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Associated Documents:

MS4 Annual Report

Granite NET TV inspection report

IPS inspection reports for a variety of stormwater assets

IPS work orders for a variety of stormwater assets

 CITY OF <i>Salem</i> AT YOUR SERVICE	Public Works Department
	PROCEDURE
Title:	Cleaning, Inspection, and Repair of Inlets, Manholes, Catch Basins
Document #:	PRO 24.14-A
Approved by:	Mark Bechtel, Public Works Operations Manager
Effective date:	November 8, 2019
See also:	High Water Problem Site Maintenance Handbook – City

Action By:
Action:
O&M Supervisor


1. Creates work order in IPS database and assigns to designated staff.

Hydrovac Operator

2. Receives work order and performs structure cleaning (inlet, catch basin, or manhole) using a hydrovac truck. Alternatively, hand tools can be used to clean inlets and catch basins when a vactor truck is not available.
3. Enters the estimated amount of debris removed into the work order comments and closes work order in IPS.
4. Transports collected debris and deposits it at the City's Waste Processing Facility for dewatering and disposal.
5. Conducts a visual inspection of the inlet, catch basin, or manhole structure, and inputs inspection data into IPS.

Structure Repair Crew

6. Structure Repair Crew Leader reviews completed inspection and opens a repair work order in IPS, if necessary.
7. Crew Leader reviews work order and stages equipment, materials, and supplies at the job site.
8. Crew Leader and Maintenance Operator(s) performs structure repair, following all OSHA rules and city procedures for confined space entry where applicable.
10. Crew leader enters repair information and closes work order in IPS.

 CITY OF <i>Salem</i> AT YOUR SERVICE	Public Works Department PROCEDURE
Title:	Cleaning, Inspection, and Repair of Pipes and Culverts
Document #:	PRO 24.14-B
Approved by:	Mark Becketl, Public Works Operations Manager
Effective date:	November 8, 2019
See also:	High Water Problem Site Maintenance Handbook – City of Salem

Action By:

Action:

O&M Supervisor

1. Creates inspection work order in IPS database and assigns to one of the Stormwater Closed Circuit Television (CCTV) inspection crews.

TV Inspection Operator

2. Receives work order and conducts a CCTV inspection utilizing cameras on robotic transports and the Granite NET inspection management software.
3. Performs CCTV inspection and enters pipe defect codes into Granite NET according to the National Association of Sewer Service Companies (NASSCO) Pipe Assessment Certification Program (PACP).

Project Leader


4. Reviews pipe and culvert CCTV inspection reports in Granite NET and identifies any necessary repair work.
5. Creates a work order in IPS and assigns to repair crew.

Pipe Repair Crew

6. Pipe Repair Crew Leader reviews work order and stages equipment, materials, and supplies at the job site.
7. Pipe Repair Crew Leader ensures that erosion prevention and sediment control best management practices are installed and functioning properly.
8. Pipe Repair Crew Leader and Maintenance Operators perform excavation to remove existing structure. All excavation material is transported to a designated construction waste disposal site.
9. Crew installs new pipe and appurtenances and backfills the repair.
10. Removes all erosion prevention and sediment control best

management practices from the job site.

11. Pipe Repair Crew Leader enters repair information into the work order that includes new pipe type, size, and length, then closes the work order in IPS.
12. Pipe Repair Crew Leader records dimensions of asphalt/concrete cuts that need to be patched and sends a work request to the Streets department for replacement/repair.

 <p>CITY OF <i>Salem</i> AT YOUR SERVICE</p>	Public Works Department
	PROCEDURE
Title:	Inspection and Cleaning of Road Side Ditches During Dry Weather
Document #:	27.15-A
Approved by:	Mark Bechtel, Public Works Operations Division Manager
Effective date:	December 5, 2019
See also:	

Action By:

Action:

O & M Supervisor

1. Assigns ditch inspections during scheduled roadside mowing operations during dry weather. Sediment removal from ditches occurs only during dry weather.

Mower Operator


2. While mowing the ditch, the Mower Operator completes a visual inspection of the ditch to determine if sediment removal is necessary and relays that information to the Project Leader for a scheduled cleaning (removal of sediment from the ditch).

Stormwater Project leader

3. Schedules cleaning and assigns to the Cleaning Operations Crew.

Cleaning Operations Crew

4. Maintenance Operator II and Maintenance Operator I receive cleaning assignment from Stormwater Project Leader.
5. Maintenance Operators evaluate the job site to determine if flaggers are necessary. If flaggers are necessary, the Maintenance Operator II contacts the flagging vendor and schedules the flaggers to assist at the job site.
6. Crew removes sediment using excavation equipment.
7. The removed sediment is loaded into a dump truck and transported to private tree farms and used to fill low areas for future tree plantings.
7. Straw waddles are placed in the ditch for erosion control.
8. The Maintenance Operator II creates a cleaning work order in IPS and includes the footage of ditch cleaned and the quantity of sediment removed for each ditch segment.

	Public Works Department
	PROCEDURE
Title:	Inspection, Maintenance, and Repair of Green Stormwater Infrastructure Facilities
Document #:	PRO 27.15-B
Approved by:	Mark Bechtel, Public Works Operations Division Manager
Effective date:	December 5, 2019
See also:	City of Salem Public Works Administrative Rule Chapter 109 Division 011 Operations and Maintenance of Stormwater Facilities

Action By:

Action:

Customer Service Request for Inspection and Maintenance:

Supervisor

1. Supervisor reviews Service Request from Dispatch and either:
1) contacts the customer directly to gather additional information; or 2) assigns Service Request to Program Coordinator to address.

Program Coordinator

2. Receives printed Service Request from Supervisor and conducts a site inspection that includes taking photos and documenting concerns. If necessary, Program Coordinator will meet with customer to gather further information.
3. Program Coordinator creates a work order in IPS and assigns work to field staff.

Field Staff

4. Field staff perform cleaning/maintenance/repair of facility and take photos of the completed work.
5. If field staff performs any excavation work, all excavation material is transported to a designated construction waste disposal site.
6. Field staff document cleaning/maintenance/repair notes and before/after photos in IPS work order and closes it out.

Program Coordinator

7. Once the work order in IPS is closed, the Program Coordinator records the job site notes and the completed work order number onto the printed Service Request and returns to supervisor.

Supervisor

8. Supervisor reviews notes, inputs the notes into the original IPS

Service Request, links the Service Request and Work Order, and resolves the Service Request.


Scheduled Inspection and Maintenance:

Program Coordinator

1. The Program Coordinator creates and maintains a maintenance schedule of all vegetated stormwater facilities. These facilities are categorized separately into large facilities that are maintained by an Oregon Department of Corrections (DOC) inmate crew, and smaller facilities maintained by City field staff. The Program Coordinator assigns work daily for the DOC inmates and field staff.

Field Staff

2. Field staff inspects facility and takes photos before conducting any maintenance work.
3. Vegetation, inlets/outlets, and medium in facilities are maintained per Salem's Administrative Rule. Field staff are required to: 1) take photos once work is complete, 2) record notes on a weekly crew sheet, and 3) complete an electronic inspection form using a GIS application.
3. Field staff open and close work orders at the end of the day, complete with before and after photos in addition to any comments pertaining to the work.
4. If the piped components of a Green Stormwater Infrastructure facility needs repair and is beyond the capability of knowledgeable field staff, a repair work order is created for the Operations and Maintenance staff to perform.
5. Field staff provide a weekly summary of the work completed to the Program Coordinator, which is then included in a monthly report to the Supervisor.

 CITY OF <i>Salem</i> AT YOUR SERVICE	Public Works Department PROCEDURE
Title:	Inspection, Maintenance, and Repair of Mechanical Treatment Facilities
Document #:	PRO 27.15-C
Approved by:	Mark Bechtel, Public Works Operations Division Manager
Effective date:	December 5, 2019
See also:	

Action By:

Action:

Program Coordinator

1. Program Coordinator coordinates with Operations & Maintenance Field Supervisor and Project Leader to schedule a time that works for a joint inspection/cleaning of a mechanical facility.
2. Once a time is determined, the Program Coordinator informs Stormwater Quality field staff of date/time and ensures that necessary equipment for Stormwater Quality staff is ready for confined space entry, and replacement cartridges or filters have been ordered.
3. Program Coordinator gathers the manufacturer's specifications and all necessary manuals and technical specifications so that they are available for discussion at the joint field visit.

SW Quality Field Staff

4. On the scheduled cleaning day, Stormwater Quality field staff meet with Operations and Maintenance field staff on site, and assist with traffic control and setting up confined space equipment. Prior to leaving Shops, field staff will perform safety calibration checks on the gas detector used for confined space entry and take it to use on the job site.
5. Field staff will follow all OSHA and City of Salem confined space rules and procedures for performing a confined space entry, as well as follow all ODOT/NHTSA standards for traffic control and flagging.
6. Stormwater Quality field staff will conduct a confined space entry and perform an inspection of the treatment facility. They will also work with Operations and Maintenance field staff to replace the cartridges/filters and vacuum sediment and debris from the facility.

7. If field staff perform any work that removes sediment and debris from the facility, all material is transported to a designated construction waste disposal site.
8. Once the entry and maintenance work are complete, Stormwater Quality field staff will complete the GIS inspection report, and Operations and Maintenance field staff will complete a work order in IPS.
9. Confined space entry paperwork is submitted to the Stormwater Quality Supervisor for signature and proper document retention.
10. If used cartridges are to be returned to the manufacturer, then field staff will clean/prepare them for shipment, and notify the manufacturer of the planned shipment date.
11. Program Coordinator will note the completion of the work and adjust the maintenance schedule, if necessary, to reflect the change in maintenance frequency needed of that particular facility.

Program Coordinator

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Practice Summary Sheet

Chapter: **27**

Title: **Stormwater and Flood Management**

Practice Number: **27.16**

Name: **Private Owner Operations & Maintenance**

Assigned to: **Angel Garcia**

Practice Statement:

An ordinance defines the operations, maintenance and inspection requirements for private conveyance, stormwater storage, and BMP facilities.

Privately owned facilities are an important element of the total community stormwater management system. To protect property and facilities, operations and/or maintenance guidelines for inspection of permanent private facilities are reviewed in the same manner as public facilities.

Agency Compliance:

Salem Revised Code Chapter 70 (Utilities) and Chapter 71 (Stormwater) are ordinances that define the operations, maintenance, and inspection requirements for public and private conveyance, stormwater storage, and stormwater treatment facilities (Best Management Practices). The following list of ordinances ensures that private stormwater facilities are constructed, operated, inspected, and maintained in the same manner as public facilities.

- Sec. 70.072. – Approval of plans.
- Sec. 70.074. – Construction to conform to standards.
- Sec. 70.076. – Inspection and approval of construction.
- Sec. 70.100. – Private stormwater, wastewater, and water systems.
- Sec. 70.117. – Operation, maintenance, and inspection of private facilities.
- Sec. 70.120. – Inspections.
- Sec. 71.065. – Requirements for all property.
- Sec. 71.085. – Requirements for single-family residential projects.
- Sec. 71.087. – Requirements for City projects.
- Sec. 71.090. – Requirements for large projects.
- Sec. 71.095. – Flow control facilities.
- Sec. 71.100. – Treatment facilities.

The City's stormwater ordinances are implemented and enforced through the City's permitting and plans review process, construction inspection sign-off program, private stormwater facility maintenance agreements, and routine field inspections. *Administrative Rule* Chapter 109 Division 011 – Operations and Maintenance of Stormwater Facilities, provides public and private facility owners with operations and maintenance guidelines for stormwater facility inspections.



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Associated Documents:

[Salem Revised Code of Ordinances – Chapter 70. – Utilities](#)

[Salem Revised Code of Ordinances – Chapter 71. – Stormwater](#)

[Administrative Rule Chapter 109 Division 011 – Operations and Maintenance of Stormwater Facilities](#)