

Technical Memorandum

Date: Wednesday, November 25, 2015
Revised Tuesday, March 08, 2016

Project: Stormwater Master Plan Update

To: City of Cedar Rapids

From: Mike Butterfield/HDR
Teresa Platin/HDR

Subject: TM 2.0 Asset Management

This Technical Memorandum presents an overview of the City of Cedar Rapids' Stormwater Asset Management Program. The intent is to document current practices and identify considerations for future improvements to the program. The Cedar Rapids Public Works Department is in the process of overhauling its entire asset management program; significant operational changes will be implemented in the coming years. Practices and procedures for stormwater asset management are evolving nationwide. This document should be used in conjunction with the Iowa Stormwater Management Manual to determine the best and right practices, procedures, and policies for the City.

TM 2.0 is organized as follows.

- Objective
- Summary
- Current Asset Management Program
 - NPDES Permit
 - Asset Inventory & Tools
 - Condition Assessment
 - Maintenance
 - Asset Management Policies
- Considerations for Asset Management Program
- Attachment A – Iowa NPDES Permit Number 57-15-0-05
- Attachment B – SOPs and Notes for TV Inspection Video Cataloguing
- Attachment C – Best Management Practice for Maintenance of Private Storm Water Facilities
- Attachment D – Best Practices Assessment of the Public Works Department

Objective

The objective of this Technical Memorandum 2.0 Asset Management is to provide an overview of the City's current asset management program for the stormwater system and identify potential changes for consideration.

Summary

Asset Management (AM), as defined by the International Infrastructure Management Manual, Version 4, 2011, is: “The systematic and coordinated activities and practices of an organization to optimally and sustainably deliver on its objectives through the cost-effective lifecycle management of assets”.

The same manual defines Asset Management Plans (AM Plans) as: “Long-term plans (usually 10-20 years or more for infrastructure assets) that outline the asset activities and programs for each service area and resources applied to provide a defined level of service in the most cost effective way.”

The City of Cedar Rapids’ current AM program for the stormwater system includes:

- Asset Inventory
- Condition Assessments
- Maintenance
- Asset Management Policies

The Public Works Department is implementing a variety of improvements to the City’s asset management program. Improvements are anticipated to be consistent with the above organization.

Current Asset Management Program

NPDES Permit

Stormwater system operations and maintenance (O&M) planning is a required element of stormwater management programs under the National Pollutant Discharge Elimination System (NPDES) Program for Phase I Municipal Separate Storm Sewer Systems (MS4s). As detailed in the Iowa Stormwater Management Manual, v3, October 28, 2009, the United States Environmental Protection Agency (EPA) has designated the Iowa Department of Natural Resources (IDNR) as the administrator of the program (402 permit program) for activities in Iowa. Required maintenance generally applies to currently serviceable structures, facilities, and equipment that do not involve expansion or significant adverse hydrologic impact. It covers the typical activities taken to prevent a decline or failure in the structures or systems. Asset Management programs can optimize O&M to satisfy regulations, meet expected levels of service, and reduce costs. The current permit, Iowa NPDES Permit Number 57-15-0-05 issued February 1, 2016, is included with this memo as Attachment A.

Asset Inventory and Tools

The basis of AM is an inventory of physical assets. This includes descriptions, types and number, functional responsibilities, and past, current, and expected future condition and performance. Storage and access to asset management inventory is critical to the success of a program, and inventory tools provide the framework to support data collection, storage,

analysis, and communication. The following inventory tools are used by the City's Public Works Department:

- Geographic Information System/Information Management System - A Geographic Information System (GIS) is a software application and database that contains geospatial information, such as pipelines, roads, zoning, land use, etc. It details relevant information (size, age, material composition, etc.) of assets with a mapping tool to facilitate effective AM, and with regular updates to system inventories, provides a strong foundation upon which to build. GIS is the primary tool used by the City for managing asset information. For Public Works/Stormwater, this is the ArcGIS program (www.arcgis.com).
- Inventory Management System (IMS) – An IMS is a software application that manages electronic information. This warehousing/inventory tool creates an itemized list of current assets such as a catalogue of property, or a detailed list of the stormwater system structures and related elements. It houses information used to track assets, record inspections and issues, effectively use resources, coordinate internal activities, and communicate among City staff and citizens. The City uses ArcGIS (www.arcgis.com) for information management.
- Computerized Maintenance Management Systems (CMMS) – A CMMS is a computer system for measuring, managing and analyzing the maintenance process. CMMSs often include task planning and scheduling, inventory control and management, and labor and material cost accounting. Lucity (www.lucity.com) is the City's current software platform; the City will be transitioning to EnerGov is the software platform for the City's CMMS in 2016 (<https://www.tylertech.com/solutions-products/energov-product-suite>).
- Regulatory Inspections & Condition Assessments – Each regulatory inspection is documented with a report and maintained in the Public Works filing system. For Public Works/Stormwater, the CUES GraniteNet program (www.cuesinc.com) provides the user interface for inspections.

The City's goal is for all three of these systems – ArcGIS, EnerGov, and CUES GraniteNet – to be integrated. As of the writing of this memo, this is a work in progress as new programs are implemented.

Elements of the Cedar Rapids Stormwater inventory include the following.

- Mapping – ArcGIS is the primary data platform for the stormwater system asset inventory. In the mid 1990s, the City of Cedar Rapids began using the GIS product to document approximate location and limited inventory attributes of its stormwater system by converting the previous mylar mapping into the newer electronic format. There are gaps in the documented information, as early data collection focused on structures and may have inferred pipeline information; staff knowledge was used to supplement map information without extensive surveying. Today, updates for each new Capital

Improvement Project (CIP), development, and site plan that affect the stormwater system are included in the GIS stormwater layer. *(Note, during model development for TM 3.1 Macro Modeling it was determined that roughly 20-30% of the pipe inverts and diameters required for the model were included in the City's existing GIS database.)*

- On-going field reporting – Additional updates to the mapping system are made as staff find missing items through utility locates or field operations.
- Inventory inspection – In 2009, the City initiated a regular inspection program and began using Geographical Positioning System (GPS) tools to more accurately locate elements of the stormwater system. Over 10,000 structures have been inventoried, with the collection of more accurate information enabling the City to improve the overall reliability of its mapping. Figure 1 is an example of Cedar Rapids' annual inspection locations.

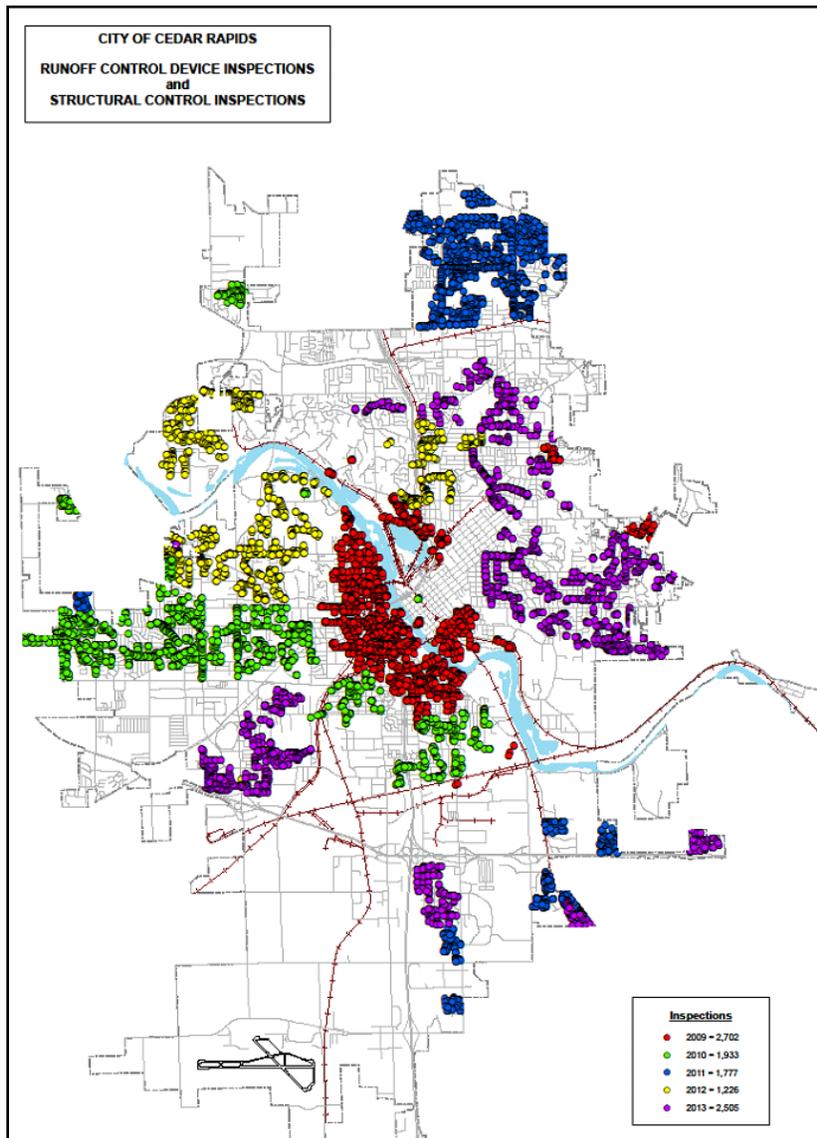


Figure 1 – Cedar Rapids Runoff Control and Structural Control Inspections Locations (2009 – 2013)

Condition Assessment

A condition assessment is conducted to collect information on the condition of assets in a manner that is consistent and easily understood across all the categories of assets. This information is used to develop asset management plans for the maintenance and operation of assets that will achieve sustainable service levels. Condition assessments should occur on a frequency that meets service, business, and reporting needs.

A physical in-field inspection and evaluation is necessary to validate the inventory and monitor the condition of the assets. A documentation system is used to verify the occurrence of inspections, track findings (including attributes and condition issues), and log recommended maintenance actions, if any.

The City uses the National Association of Sewer Service Companies (NASSCO) rating systems and compatible forms to assess results of routine CCTV inspections. The NASSCO rating system provides common nomenclatures and ranking definitions to assist in the proper specification of rehabilitation work. The current standard operating procedure for CCTV inspections is included with this memo as Attachment B.

GraniteNet software from CUES will be the repository for condition assessments; new digital inspection equipment from CUES will be used for assessments.

PUBLICLY OWNED FACILITIES

For the City's publicly owned facilities, the following inspections are currently performed:

- Stormwater Control Basins: These structures protect water quality and provide necessary stormwater detention to decrease creek bank erosion and flooding issues. They are typically highly visible and a sign of the vitality of the City. Any deficiencies are documented with work requests and repaired as crews are available and the weather permits on a prioritized basis. Specific roles and responsibilities within the City's organization include the following:
 - Erosion Control Specialist – Visually inspects each basin annually. Maintains a written inspection of the condition of each basin. Deficiencies are converted in work requests for Maintenance to repair. On a rotating basis of 5 to 10 years, GPS elevations are determined and recorded to track sedimentation levels. Major items are turned over to the Sewer Utility Engineering Manager for development of a CIP.
 - Parks Natural Resources Supervisor – Performs visual reviews of basins after mowing for completion and quality of work along with general site conditions.
 - Mowing crew – Staff report deficiencies and provide information on drainage issues that prevent mowing.
 - Utility Infrastructure Management Specialist in Sewer Maintenance Program maintains a list of and data for City-maintained detention basins and drainage ways within the GIS system. This is the list that is used by field staff to track the inspections and related work.
- Storm outfalls: Every 5 years, an environmental specialist from the Utility Department inspects 18 inch and larger outfalls into creeks and the Cedar River. Deficiencies are reported to Public Works for repairs. A summary of the inspections is submitted to the Stormwater Coordinator for inclusion in the Stormwater Annual Report.
- Flood control equipment: In the spring and after significant flood events, flood control equipment is inspected for damage (visual inspection) and functionality. Equipment that is inspected includes flood pumps, pipe plugs, sewer valves, and Tiger Dams.

- Storm above-ground structures: On a 10-year basis, the Erosion Control Specialist inspects, collects GPS information, and documents deficiencies. From this documentation, work requests are generated and prioritized to facilitate repair and replacement assignments.
- Ongoing inspections: Staff performs assessments as part of their daily duties and report deficiencies from the field. This work includes the following roles and responsibilities.
 - Street sweepers – Report damaged or plugged intakes as they perform their routes. This includes three cycles of the City each season.
 - Street supervisors, sewer supervisors, water meter readers, and sewer personnel – Perform inspections of the City on rainy days and react to citizen feedback regarding deficiencies.
 - Street supervisors – Perform intense street inspections on a 3- to 4-year basis to identify deficiencies and enter them into Lucity (the City’s GIS linked data management system) for tracking and generation of work orders.

PRIVATELY OWNED FACILITIES

The City has developed a guide titled “Best Management Practice for Maintenance of Private Storm Water Facilities” (City of Cedar Rapids, Iowa, Public Works Department, March 2008) to provide owners of non-City facilities with guidance on care, inspection, and maintenance of their facilities. A copy of the guide is included in Attachment D.

Privately owned facilities are typically either the original property developer or the subsequent homeowner association. Inspections of privately owned sites/facilities include the following.

- Private basins/stormwater facilities:
 - Frequency: Inspections are conducted every five (5) years by the Stormwater Coordinator or Erosion Control Specialists in response to feedback of non-functionality.
 - Items inspected include the following:
 - Sitting water: Water that sits for more than 72 hours can breed mosquitoes. This is a public health issue and must be fixed.
 - Mowing: Per City Code and State Code, the areas must be free of noxious weeds and non-purposely planted trees. The maximum height of vegetation in an active drainage way is 12 inches, unless planted in natural flowers or undergoing stabilization techniques for grade/erosion issues.
 - Structures: The inlet and outlet must be free of debris and capable of permitting flow per their design. They must also be covered as necessary to prevent fall dangers caused by open pits.

- Sediment build-up: Basins need to be capable of managing their design capacity. To support this, Public Works established and maintains a database of the basin design capacities.
- Records: A brief inspection report will be kept to track the status of inspections. Tracking will be performed in GIS for data management and accountability purposes. Regardless of the findings (deficiencies or not), a letter is sent to the owner to document that the inspection was performed and reiterate suggested practices for upkeep.
- Deficiencies: When an inspection shows that a deficiency has been found, the owner(s) will be informed by letter of the concern. The City will work with owner(s) to fix deficiencies; however, it is ultimately, the owner(s) responsibility. If not fixed, the work will be performed by the City or contracted, with the cost assessed back to the owner(s).
 - If minor deficiencies are found, the City will issue a letter to the owner identifying repairs to be made within the next 5-year period.
 - If major deficiencies are found, the City will issue the owner a Notice to Comply, after which the owner has 30 days to respond with a schedule and plan for remediation. A licensed professional engineer needs to certify the basin capacity. Remediation actions typically are required within 60 days; however considerations are made for construction season. Non-responsiveness by the owner will trigger violations per Chapter 72 of the Municipal Code.

Maintenance

Maintenance is the work of keeping something in proper condition; it can be reactionary or preventive/routine. The preventive and routine items come from historical failures/feedback or are based on an engineered analysis for expected failure recurrence.

For stormwater, the factors that drive maintenance in the City include:

- Debris – manmade or natural (vegetation/snow)
- Vegetation growth – above and below ground
- Erosion by-products
- Material failures

Reactive maintenance comes from feedback reports. They can come from the public or be developed within the City. Based on the average of FY 12-FY14, there are approximately 620 requests/year. These feedback reports are responded to as described in the previous section.

Routine stormwater system maintenance in the City includes:

- Leaf pick up: Utilities/Solids Waste handles leaf pick-up using leaf vacuum trucks.
- Removal of sediment from lines and root cutting: Cleaning and root cutting occur during televising. Follow-up actions for additional root cutting are taken depending on the location and severity of roots in lines.

- Ditching: Maintenance is performed for roadway ditches by Street Maintenance; if debris impacts storm sewer assets then Sewer Maintenance will perform further work. City forces do not clear private property drainage ways unless public assets are being negatively affected.
- Drainageway clearance: The City's practice is to clear debris from drainageways as needed to prevent structural or roadway flooding. The areas are mostly in easements where general maintenance is a private property responsibility. The City's practice is to remove downed trees and other vegetation debris on municipal property in the winter as staff is available.
- Snow removal from intakes: Snow and ice buildup on intakes can result in street flooding. Based on historical feedback locations, Sewer staff clear intakes prior to major warm-ups on a schedule determined by staff availability. Intake clearing becomes critical if the warming includes rain.
- Public basin maintenance: Public basins are municipal properties that require maintenance to uphold design performance. To comply with the Health Nuisance ordinance, basins are mowed as needed to keep vegetation height less than 24 inches. Minor sedimentation and woody vegetation is removed by sewer maintenance staff. Larger reconstruction is performed by a CIP.

Asset Management Policies

LEVEL OF SERVICE

Level of service (LOS) defines what is to be performed and the level of effort/quality necessary. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost (IPWEA, 2006). Level of service varies by service provider, and should be determined in response to regulatory, safety, community, council, and fiscal responsibility. Developing the LOS for a system is a key part of developing an asset management program, and it is specific to the user needs and expectations. For example, the LOS for flood mitigation on a remote rural road might differ from that of a highly trafficked road in a heavily urbanized area. LOS expectations inform standards such as the required frequency of inspections, the response time after a citizen complaint, and acceptable condition of aging pipe systems.

Currently, the "service response" or LOS as listed on the City's intranet related to stormwater includes:

- Flash Flooding Reports: Dependent upon the number of calls, in general, it is same-day service. After hours, minor issues are grouped together and completed in consecutive order. Unless the request specifically states that there is a house-flooding issue, crews do not necessarily respond immediately. Standing water on a street during heavy rain is expected. Standing water after storms is an issue.
- Drainage ditches and 'natural' creeks: These are considered natural drainage easements and are established to allow natural creeks to meander (flow). Inspection is

generally done within one work day and then work is prioritized with a response that can take multiple years.

- The services provided for stormwater system inventory, assessment, and their levels of service include:
 - Utility location – Compliance with Iowa Code Chapter 480.
 - CCTV – Televising of lines prior to CIPs, investigation of reported problems.
 - Construction – Maintenance performs minor repair of structures and line, larger repairs are contracted via Engineering or the CIP process.
 - Cleaning – Maintenance performs removal of obstructions and reactive maintenance. Routine maintenance is performed based on lines that have historical sedimentation or root issues (less than 2 miles of lines). In the warming periods following heavy snow, staff removes snow from intakes and cul-de-sacs (this includes over 50 locations).
 - Flood mitigation – Staff deploy flood water containment devices including sandbags, tiger dams, and Hesco boxes. Staff also deploy and operate a fleet of nearly 50 trash pumps that range in size from 2 to 12 inch diameters.
 - Feedback response – The responses generally occur on the same day but are grouped to minimize regular and overtime. During normal working hours, responses are within a 1 to 2 hour period for minor precipitation events. In off-hour periods, responses are within a 2 hour period if deemed necessary by the standby supervisor. Routine investigations of reports are conducted in 1 to 2 days. After-hours calls are responded to by phone and depending on the information, staff is either called in on overtime or the response is held for regular work.
 - Drainage ways – Staff remove obstructions to minimize flooding of structures. This includes removal of debris and sediment. Minor bank stabilization near streets is performed by Public Works Street or Sewer staffs as necessary.
 - Detention basins – Sewer staff remove debris, minor sedimentation and vegetation growth. Mowing is performed by Street staff. Large construction or modification work is done through CIPs.
 - Ditching – Prior to staffing reductions in 2000, street crews performed ditching on a 5- to 10-year basis. Maintenance staff perform now perform ditching solely on a reactive basis to mitigate street flooding.

- Easement maintenance – Maintenance staff perform only work that is necessary to allow access to structures, prevent damage to a portion of the infrastructure or in emergency response, to mitigate a cause of flooding to a structure or street.

MAINTENANCE PRIORITIES

Sewer Maintenance uses priority levels to assist in the allocation of limited resources.

- Priority 1: Acute public safety hazard OR a nonfunctional asset requiring immediate actions
- Priority 2: Acute public safety hazard mitigated with temporary controls OR an asset with significantly reduced functionality requiring action to resolve within a week or other more expedited timeline.
- Priority 3: Minor public safety hazard easily mitigated with few controls OR an asset with a minor defect requiring action within the construction season.
- Priority 4: No public safety hazard OR no impact on asset functionality that will have actions taken as workload allows

The table below summarizes the priority levels and response timelines.

Table 1 – Maintenance Priorities & Response Timelines			
Priority Group	Public Safety	Asset Functionality	Timeline for Response
1	High	Nonfunctional	Immediate
2	High / Controlled	Significant Reduction	Workweek
3	Low / Controlled	Minor Reduction	Season
4	None	None	As Allowed

For larger or more significant issues, specifically Priority 1 items, the approach for an immediate response is to improve the issue to a Priority 2 – reduce the public safety hazard and restore some functionality. From there, a determination is made as to whether the issue can be fully remedied by City staff or if it is best to solicit a contractor that is better equipped given the conditions surrounding the issue at-hand.

BUSINESS RISK EXPOSURE

Business Risk Exposure (BRE) is the quantified potential for loss that might occur as a result of a certain activity. A risk analysis ranks risk by assessing the likelihood or probability of an event occurring multiplied by the severity of occurrence; the analysis considers issues such as liability, property loss or damage, and product demand shifts. A BRE analysis is a systematic look at risk to prioritize maintenance and CIP activities based the BRE analysis.

One example of the importance of analyzing BRE is demonstrated in the City’s use of FEMA mapping and a rating system described below to mitigate flood risks and reduce the cost of insurance. The FEMA maps show areas that may be at risk for a 1% and 0.2% frequency flood events. While the maps delineate areas that are likely to be impacted, they do not predict the value or cost of events.

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood damage to insurable property;
2. Strengthen and support the insurance aspects of the NFIP; and
3. Encourage a comprehensive approach to floodplain management.

Cedar Rapids participates in the CRS to reduce the cost of insurance and to better understand how it can mitigate risks associated with flooding. The City's rating is 6 (10 being the lowest rating – no discount; 1 being the highest rating – 50% discount) which lowers the cost by 20% for a special flood hazard area. The City does not provide mapping showing the value of areas that are at risk. The preferred flood management system is to protect an estimated \$500 million in property and structures. A more complete assessment of BRE can help target approaches to improve the City's CRS rating.

CAPITAL IMPROVEMENT PROCESS

Cedar Rapids uses a 5-year window for financial planning that lists CIP projects. Generally, CIPs are either rehabilitation/reconstruction of the existing system or expansion/growth to meet future needs. Existing system items are added based on response to changes (reactionary from a failure or because of a separate CIP such as a street related improvement), Council inputs, growth, and development. Approximately \$48 million of capital needs have been identified. The FY 2017 CIP Technical Memorandum presented a process for prioritizing projects, ranked the projects based on priority and readiness, and developed a CIP plan for the next 5 years.

FINANCIAL PLANNING

Financial Planning is an ongoing process to help the City make sensible decisions about budgets that can help to achieve their long term Council goals and objectives (Institute of Financial Planners). Asset managers incorporate full life-cycle costing into financial planning to achieve cost-effective asset management planning and operation. Financial reporting reflects full life-cycle costing and includes the implications of meeting, or failing to meet, the funding requirements indicated by full life-cycle costing.

Each year, in August and September, the City formulates a 5-year financial plan. It includes estimates of operations, capital improvement projects, and inflation.

Fiscal budgets are developed through the fall and finalized in the winter with approval on or before March 15th of each year. This includes a 5-year CIP budget and funding source plan. Storm Sewer User Fees generate approximately \$2.5 million, of which approximately \$2 million is planned for CIP projects in FY 2017.

Considerations for Asset Management Program

The following recommendations are made for the City’s consideration to enhance the City’s stormwater management program:

- In the near term, use relevant operations and maintenance standards from the Iowa Stormwater Management Manual (v3, October 28, 2009; Iowa Department of Natural Resources; <http://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manual>). A selection of typical maintenance activities from the manual are compiled in Table 2 as an example to be evaluated by the City, adjusted to fit Cedar Rapids desired LOS, and developed into policy (either through adoption of state standards or creation of a stand-alone document). Refer to the Iowa Stormwater Management Manual for detailed explanations of the activities listed in Table 2.

Stormwater Feature & Maintenance Activity	Activity*
Detention Facilities (Dry/Wet)	<ul style="list-style-type: none"> • Remove sediment accumulation • Remove debris from inlet and outlet structures • Maintain side slopes and shoreline vegetation • Inspect for clogging • Remove sediment from forebay/chamber
Bioretention Systems	<ul style="list-style-type: none"> • Perform routine landscape maintenance – remove undesirable and dead vegetation • Replenish mulch layer • Remove accumulated sediment in pretreatment areas
Bioswales	<ul style="list-style-type: none"> • Perform routine landscape maintenance; maintain grass height of approximately 4 to 6 inches • Inspect annually for erosion problems; remove accumulated trash and debris • Remove sediment from forebay and channel (if necessary)
Sand Filters	<ul style="list-style-type: none"> • Inspect for clogging – rake first inch of sand • Remove sediment from forebay/chamber • Replace sand filter media as needed
Permeable (Concrete, Asphalt, Pavers) Pavement	<ul style="list-style-type: none"> • Sweep/vacuum one to two times/year • Avoid/“prevent” application of sand in winter
Green Roof Systems	<ul style="list-style-type: none"> • Weed • Provide supplemental irrigation • Verify plant coverage and maintain soil fertility • Keep drains clean

*Refer to the Iowa Stormwater Management Manual for more detailed explanations

- Continue O&M and inspection practices in compliance with the Cedar Rapids Municipal Separate Storm Sewer System (MS4) Iowa NPDES Permit Number 57-15-0-05 issued February 14 2011.
- Continue to implement recommendations for the Sewer Operations Division pertinent to stormwater management in the document “Operations Review of the Public Works

Department, City of Cedar Rapids, Iowa” (Matrix Consulting Group, October 2014). Several examples are listed below.

- Televising Storm Pipes – Reinforce metric of televising 5 to 10% of the storm sewer system each year. This is a best management practice and is in keeping with the 2014 Public Works Performance Review.
- Inventory – Inverts for pipe diameters of 24 inches or greater should to be measured following a prescribed protocol by Pipeline Assessment & Certification Program (PACP) trained field staff. Pipe diameters should be verified by professional surveyors and the undocumented locations entered into GIS.
- Financial Plan – The future cost of levee maintenance and recapitalization should be addressed. This may cost over \$250,000 for routine maintenance upon completion of the construction. Starting 10 to 20 years after construction, the replacement of pumps and reconstruction of major elements may cost \$1-3 million/year.
- Maintenance Levels (detention pond sediment) – The City should consider an annual basin maintenance contract for removal of sediment.
- Business Risk Exposure – To highlight the risk exposure of significant businesses and areas of residential properties, maps showing potential structure loss costs should be developed. Current FEMA mapping show the areas but not the dollar value of structures in them. Further, conduct a broader BRE analysis that looks at potential risks other than flooding. This would assist in prioritization of projects based on cost benefit analysis and a visual tool for the City Council and residents if rate increases are recommended.

An assessment of best practices was completed prior to the full Operations Review being completed. An excerpt of the Best Practices Assessment that includes the Asset Management, Maintenance Management, and Sanitary and Storm Sewer Collection section of the report is included as Attachment C.

- O&M – Conduct benchmarking of other utilities to refine existing O&M standards in use for Cedar Rapids. A few other utilities have created very specific guidance tied to Estimated Expected Live (EEL) and LOS*. Possible sources include:
 - City of Grand Rapids Michigan Stormwater Asset Management and Capital Improvement Plan (May 2013, Updated January 27, 2014)
 - California Stormwater BMP Handbook, January 2003

**It is not recommended that these standards be used directly for Cedar Rapids, as geography, climate, land use, financial priorities, city size, and other factors affect values for a particular location.*

- Capital Improvement – While recognizing the conscious decision by the City to use a 5-year window for CIP financial planning due to the volatility inherent in longer projections, 5 years is generally not adequate for projects that cost millions or even tens of millions of dollars. A longer term listing is needed for these types of items. The Master Plan should be used as that platform to look longer term; it should be a living document with periodic updates. Alternately, the City may consider a strategic business planning process that looks at near-term expenditures with a greater confidence level, yet still plans for sustainability of the system by preparing for 20- to 100-years of systematic repairs, replacements, and new infrastructure investments. This plan would also be revisited periodically, but would allow Public Works/Stormwater to present a strategic, defensible, and transparent funding plan to Council. See the next recommendation for the foundation of such a plan.
- Stormwater Asset Management Program (incorporates O&M and Capital recommendations above) – Over the next 10 to 15 years, complete and standardize the stormwater system inventory, provide system-wide condition assessments (through a combination of field assessment and desktop extrapolation), calculate BRE values, adjust thresholds and define mitigation actions that fit the City's desired LOS. Define O&M standards and CIP plans around these City specific analyses to develop near- and long-term action plans and financial budgets.



Attachment A – Iowa NPDES Permit Number 57-15-0-05



STATE OF IOWA

TERRY E. BRANSTAD, GOVERNOR
KIM REYNOLDS, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
CHUCK GIPP, DIRECTOR

CERTIFIED MAIL

January 21, 2016

Jen Winter
Public Works Director
City of Cedar Rapids
500 15th Ave. SW
Cedar Rapids, IA 52404

RE: Final MS4 Permit 57-15-0-05

Dear Ms. Winter:

Please find enclosed the final National Pollutant Discharge Elimination System (NPDES) permit for the discharge of storm water from your facility.

If you have any questions or comments concerning this matter, please contact me at 515-725-8417 or joe.griffin@dnr.iowa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Joe Griffin".

Joe Griffin
NPDES Section
Environmental Protection Division

Enclosure

cc: Field Office 1

RECEIVED

JAN 25 2016

CITY OF CEDAR RAPIDS
PUBLIC WORKS DEPT.

IOWA DEPARTMENT OF NATURAL RESOURCES

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

PERMITTEE

City of Cedar Rapids
1201 6th St. SW
Cedar Rapids, Iowa 52404

IDENTITY AND LOCATION OF FACILITY

City of Cedar Rapids

IOWA NPDES PERMIT NUMBER: 57-15-0-05

RECEIVING WATERCOURSES

Cedar River, Otter Creek, Hoosier Creek,
Indian Creek, Prairie Creek, Morgan Creek
and other, undesignated streams

DATE OF ISSUANCE: February 1, 2016

DATE OF EXPIRATION: January 31, 2021

YOU ARE REQUIRED TO FILE

FOR RENEWAL OF THIS PERMIT BY: August 4, 2020

EPA NUMBER – IA0075566

This permit is issued pursuant to the authority of section 402(b) of the Clean Water Act (33 U.S.C. 1342(b)), Iowa Code section 455B.174, and rule 567--64.13, Iowa Administrative Code. You are authorized to operate the disposal system and to discharge the pollutants specified in this permit in accordance with the monitoring requirements and other terms set forth in this permit.

You may appeal any conditions of this permit by filing written notice of appeal and request for administrative hearing with the director of this department within 30 days of receipt of this permit.

Any existing, unexpired Iowa operation permit or Iowa NPDES permit previously issued by the department for the facility identified above is revoked by the issuance of this Iowa NPDES operation permit.

FOR THE DEPARTMENT OF NATURAL RESOURCES

By 

Joe Griffin
NPDES Section
Environmental Protection Division

PART I. DISCHARGES AUTHORIZED UNDER THIS PERMIT

A. Permit Area

This permit covers all areas within the boundaries of the City of Cedar Rapids totaling approximately 63 square miles which is drained by the city's Municipal Separate Storm Sewer System (MS4) and any other areas added while this permit is in effect.

B. Authorized Discharges

This permit authorizes all existing or new storm water point source discharges to waters of the State from the MS4. This permit also authorizes the discharge of storm water commingled with flows contributed by process wastewater, non-process wastewater, or storm water associated with industrial activity provided such discharges are authorized under separate NPDES permits, as required by law. This permit does not authorize discharges to the MS4.

C. Limitations on Coverage

The following discharges are not authorized or regulated by this permit:

Storm water discharges that are mixed with non-storm water and storm water associated with industrial activity except where such discharges are:

1. in compliance with a separate NPDES permit; or
2. identified by and in compliance with Part IV. of this permit.

PART II. STORM WATER POLLUTION PREVENTION & MANAGEMENT

The permittee shall implement the Best Management Practices (BMPs), measurable goals, implementation dates and frequencies described in the following sections:

A. Public Education and Outreach on Storm Water Impacts

The permittee shall continue implementing a public education and outreach program about the impacts of storm water discharges and measures which the residents of the permittee can implement to reduce pollutants in storm water runoff that includes the following:

1. **General Storm Water Education Materials** – An informational brochure shall be made available to all residents, businesses and other target audiences served by the MS4. As new residents and businesses are served by the MS4 they shall also receive the brochures. The brochure shall present information regarding storm water impacts on water quality and measures residents can implement to reduce water quality degradation from storm water. The brochure shall be updated as appropriate.

The brochure shall continue to be made available to all residents and business and distributed to new residents and businesses for the duration of the permit.
2. **Website** – The permittee's website shall contain information regarding storm water impacts on water quality, measures residents can implement to reduce pollutants in storm water, regulations, current local topics and links to other relevant websites. A form to be downloaded for reporting storm water complaints shall be provided on the website. The website shall be updated as appropriate.

The website information shall be maintained by the permittee for the duration of the permit.

3. Privately Owned Storm Water Structural Controls - Educational materials shall continue to be made available to landowners which outline proper maintenance procedures for privately owned structural controls.

The educational materials shall be made available by the permittee for the duration of the permit.

B. Public Involvement and Participation

The permittee shall implement a public involvement and participation program that includes the following:

1. Storm Water Pollution Hotline – The permittee shall maintain a 24-hour storm water pollution hotline to be used by the public to report storm water pollution or other problems. The hotline is to be advertised to the public and continually on the permittee’s website and maintained for the duration of the permit.
2. Storm Water Advisory Commission – The permittee shall organize and hold public meetings with an informal storm water stakeholders group to receive public input, hold public hearings and work with volunteer groups, as appropriate. Representatives of environmental groups, developers, builders’ associations, businessmen, city personnel and residents at large shall be allowed to participate, if interested. The meetings shall be held at least once each calendar year and as needed for the duration of the permit.

The stakeholders group shall continue to meet at least once each calendar year for the duration of the permit.

3. Public Notice Requirements - When implementing a public involvement and participation program, the permittee must comply with all state and local public notice requirements.

C. Illicit Discharges

The permittee shall continue implementing and enforcing a discharge detection and elimination program that includes the following:

1. Illicit Discharge Prohibition Ordinance – An ordinance shall continue to be amended as necessary and enforced by the permittee that prohibits anything other than storm water, allowable non-storm water and pollutants for which an NPDES permit has been issued and when the discharge is in compliance with the permit from entering the MS4. The ordinance shall include language that enables the permittee to inspect private property if an illicit discharge is suspected and penalties for non-compliance.

The ordinance shall be enforced by the permittee for the duration of the permit.

2. Illicit Discharge Detection and Elimination Program – A program shall continue to be implemented to identify and eliminate illicit discharge to the MS4. The program shall include annual dry weather flow inspections of all outfalls not already inspected since flows from newly developed or re-developed areas have been discharged from the outfalls, sampling and analyses of these dry weather flows, procedures to identify the sources of the dry weather flows and procedures for disconnecting illicit connections. Records shall be kept of when inspections are performed, the results of the inspections and measures taken to identify and, when appropriate, eliminate the sources of any dry weather flows. The plan shall be evaluated annually to assess the effectiveness of the program and any necessary changes made. All illicit discharges found must be eliminated no more than 21 days after discovery. If it is not possible to eliminate an illicit discharge within 21 days of discovery, the permittee shall submit to the Department

the reasons why the discharge cannot be eliminated within 21 days of discovery and a plan which contains a timeline of activities which will result in the elimination of the discharge. This statement and plan shall be submitted within 21 days of discovery of the illicit discharge. If the Department does not approve the plan, the permittee will then be required to eliminate the discharge no later than a date specified by the Department. All illicit discharges shall be reported to the Department no later than the end of the first business day after the day of the discovery.

The program shall be implemented by the permittee for the duration of the permit.

D. Construction Site Storm Water Runoff Control

The permittee shall continue implementing and enforcing a construction site storm water runoff control program to reduce pollutants in any storm water runoff from construction activities for which storm water permit coverage is required and that includes the following:

1. Construction Site Runoff Control Ordinance – An ordinance shall be amended as needed and enforced on all sites for which NPDES permits are required that requires proper soil erosion and sediment control. This ordinance shall also address waste at construction sites that may cause adverse impacts to water quality such as building materials, concrete truck washout, chemicals, solid waste and sanitary waste. Authority to issue an order to terminate activities due to failure to implement or maintain pollution control BMPs, authority for the permittee to enter private property for the purposes of compliance inspections and penalties for non-compliance shall be included. The ordinance shall require site plan and pollution prevention plan review and approval by the permittee prior to issuance of any permits for the site by the permittee. The ordinance shall require compliance with the Department's Storm Water General Permit no. 2.

The ordinance shall be enforced for the duration of the permit.

2. Construction Site Review and Inspection Program - The permittee shall require site plan and pollution prevention plan review and approval by the permittee prior to issuance of any permits for the site by the permittee for construction activities for which an NPDES permit is required. The program shall require compliance with the Department's Storm Water General Permit no. 2 and inspections by the permittee of all sites for which coverage under General Permit no. 2 is required. The program shall require each of these sites be inspected by the permittee at least once each calendar quarter and as complaints are received. City personnel shall ensure that all topsoil preservation requirements stipulated by General Permit no. 2 are implemented on those sites for which they are required.

The program shall be implemented by the permittee for the duration of the permit.

E. Post-construction Storm Water Management

The permittee shall continue implementing and enforcing a program to address storm water runoff from new construction and re-construction projects for which storm water coverage is required. The program must ensure that controls are in place that will prevent or minimize water quality impacts and shall include the following:

1. Construction Site Runoff Control Policy Ordinance – An ordinance shall continue to be amended as necessary and enforced which will address the control of runoff from building activities after construction has been completed. The ordinance shall require water quality and quantity components be considered in the design of new construction and implemented when practical. The ordinance shall promote the use of storm water detention, retention, infiltration, other Best Management Practices specific to each site which address water quality and quantity issues and proper operation and maintenance of these facilities.

The ordinance shall be enforced by the permittee for the duration of the permit.

2. Inspection of Runoff Control Devices – Storm water control devices and structures shall be inspected and reviewed for proper maintenance. Educational materials shall be developed and made available to landowners which outline proper maintenance procedures. The permittee shall properly maintain its own control devices and structures.

Inspections shall continue to be conducted by the permittee for the duration of the permit. The educational materials shall continue to be made available for the duration of the permit.

3. Inspection of Structural Controls – Storm water structural controls owned by the permittee shall continue to be inspected and reviewed for proper maintenance.

Inspections shall be conducted by the permittee for the duration of the permit.

4. Watershed Assessment Program – A watershed assessment program and comprehensive land use plan shall continue to be implemented which outlines measures to be implemented which reduce flooding, reduce erosion in ditches and streams, improve water quality and reduce degradation of habitat for fish and wildlife. The permittee shall then implement the program whenever possible to meet these goals.

The program shall be implemented by the permittee for the duration of the permit.

F. Pollution Prevention/Good Housekeeping

The permittee shall continue implementing an operation and maintenance program, including a training component, that shall prevent or reduce pollutant runoff from municipal operations and that shall include the following:

1. Operation and Maintenance of MS4 - A program for inspecting, maintaining and cleaning all components of the MS4 including street sweeping shall continue to be implemented. All above-ground components of the MS4 shall be inspected at least once every ten years and maintenance performed as appropriate

The program shall be implemented by the permittee for the duration of the permit.

2. Pesticide and Fertilizer Management Program – A pesticide and fertilizer management program shall continue to be implemented and enforced which shall reduce pollutant discharge associated with storage, application and disposal of pesticides and fertilizers for municipal operations. The program shall identify all entities that apply pesticides and fertilizers, require that application of these chemicals be applied by properly trained individuals, require training on management techniques addressing storage, application and disposal. Data regarding the application rates of pesticides and fertilizers shall be gathered and evaluated to determine if lower rates would be equally effective. Should it be determined that lower application rates would be equally or nearly as effective it shall be required that the lower rates be applied.

The program shall be implemented by the permittee for the duration of the permit.

3. Training Program for Municipal Employees – The permittee shall continue to implement a program for training appropriate municipal employees regarding practices to be implemented in city operations to reduce pollutants in storm water. This is not to be construed as requiring training for all municipal employees but only those whose activities would likely have an impact on storm water quality.

The program shall continue to be implemented by the permittee for the duration of the permit.

4. City Facilities BMPs – A program shall continue to be implemented to assess BMPs at city facilities to be implemented that reduce pollutants in storm water from these facilities. These measures shall then be implemented whenever practical for the duration of the permit.

The program shall continue to be implemented by the permittee for the duration of the permit.

G. Monitoring Industrial and High Risk Run-Off

The permittee shall require monitoring and the control of pollutants in storm water discharges from all municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the permittee determines are contributing a substantial pollutant loading to the MS4. An inventory of these facilities shall be maintained. The following activities are required:

1. These facilities shall be inspected in accordance with the approved SWMP.
2. The permittee shall ensure each facility certifies annually, on or before December 31 of each calendar year, that the facility complies with all applicable storm water management plans and with the facility's storm water permit.
3. Analyses shall be conducted once per calendar year for the following parameters:

Any pollutants limited in an existing NPDES permit for the facility, oil and grease, chemical oxygen demand, pH, biochemical oxygen demand (5 day), total suspended solids, total phosphorus, total Kjeldahl nitrogen and nitrate plus nitrite nitrogen.

A minimum of one grab sample shall be taken during the first one hour of discharge of a storm event resulting in 0.10 inches or more of rainfall. The storm event shall have occurred at least 72 hours since the previous storm event.
4. The permittee shall obtain information concerning the discharge or potential discharge of pollutants as required under 40 CFR 122.21(g)(7)(iii) and (iv).
5. The permittee shall ensure each facility provides sampling results. Inspection information and sampling results shall be reported in the annual report.

PART III. REPORTING REQUIREMENTS

Annual Report

The permittee shall prepare an annual report to be submitted to the Department no later than July 31 of each calendar year. The report shall be submitted to the appropriate Department field office and shall include the following:

1. The status of implementing the components of this permit. Any modifications developed by the permittee and approved by the Department or required by the Department shall also be addressed.
2. A summary of the data, including monitoring data, that is generated within the reporting period including a narrative description of storm water quality improvements or degradation.

3. An estimate of the previous fiscal year's expenditures for implementation of the requirements of this permit and the budget for the current fiscal year.
4. A summary describing the number and nature of inspections, enforcement actions, illicit discharges discovered, ordinances adopted, public education programs conducted, components of the MS4 cleaned, stream restoration activities, meetings held and any other actions taken by the permittee required by this permit during the reporting period.

PART IV. SPECIAL CONDITIONS

Only storm water, allowable non-storm water, and pollutants for which an NPDES permit has been issued and when the discharge is in compliance with the permit, are allowed to be discharged to the MS4. The permittee shall not have nor allow any discharge of pollutants from a site, facility or source for which an NPDES permit is required unless an NPDES permit has been issued for the discharge. Upon discovery of any unpermitted discharge for which a permit is required or, if an NPDES permit has been issued for the discharge, a discharge not in compliance with the permit, the permittee shall report the discharge to the Department no later than the end of the next business day after the discharge is discovered. Floor drains and other potential sources of pollutants shall be considered discharges even if no actual pollutants have been observed entering the MS4 from such a source.

The permittee is prohibited from issuing any permit, authorization or license allowing any construction, excavating, clearing, grubbing, or any other soil disturbing activity and is prohibited from allowing a person, persons, company, political unit or other entity, public or private, from doing same for which, in whole or as part of another project, coverage under an NPDES permit is required without first ensuring that a storm water authorization from the Department has been issued for the activity.

A construction site inspection program shall continue to be developed and implemented for construction projects owned or operated by the permittee that include areas of soil disturbance for which NPDES permits are required. The inspection program shall be used to ensure that contractors are correctly implementing BMPs which have been approved in the pollution prevention plan and any additional necessary measures. The program shall require inspections by the permittee at least every 7 days and include any other provisions necessary to ensure compliance by contractors with the storm water General Permit no. 2. Inspections made by the permittee that satisfy the requirements of General Permit no. 2 may be used to satisfy the requirements of this permit.

A map of the MS4, including all outfalls, shall be maintained for the duration of this permit.

All salt storage shall be in a structure impervious to precipitation and any spillage due to handling activities in an area subject to runoff shall be immediately removed.

The permittee may directly place snow, free of trash, into or onto a Water of the State.

The manner in which actions required by this permit are accomplished by the permittee is subject to review and approval by the Department. Should the Department give notice to the permittee that the approach used by the permittee to comply with any permit provision is unacceptable, the permittee must modify its approach as required in order to be considered in compliance with the permit.

PART V. STANDARD CONDITIONS

A. Permittee's Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. Issuance of this permit does not relieve the permittee of the responsibility to comply with all local, state and federal laws, ordinances, regulations or other legal requirements applying to the operation of this facility (see 40 CFR 122.41(a) and 567-64.3(11) IAC).

B. Duty to Provide Information

The permittee shall furnish to the Department, within a time specified by the Department, any information that the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee must also furnish to the Department, upon request, copies of any records required to be kept by this permit.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

D. Signatory Requirements

Storm Water Pollution Prevention Plans, reports, certifications or information either submitted to the Department or that this permit requires be maintained by the permittee, shall be signed as follows:

For a municipality, State, Federal, or other public facility: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes 1) the chief executive officer of the agency, or 2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

Certification Any person signing documents shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

E. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

F. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

G. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

H. State/Environmental Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act. No condition of this permit shall release the permittee from any responsibility or requirements under other environmental statutes or regulations.

I. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by the permittee only when necessary to achieve compliance with the conditions of the permit.

J. Inspection and Entry

The permittee shall allow the Department, an authorized representative or an authorized representative of the municipal operator of the separate storm sewer receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to: enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit; have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; inspect at reasonable times any facilities or equipment (including monitoring and control equipment); and to sample any discharge of pollutants.

K. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or discontinuance, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. This permit may be modified due to conditions or information on which this permit is based, including any new standard the Department may adopt that would change the required effluent limits.

L. Potential or Realized Impacts on Water Quality

If there is evidence indicating potential or realized impacts on water quality or on a listed endangered species due to any storm water discharge associated with industrial activity covered by this permit, the permit shall be modified to include different limitations and/or requirements of the Pollution Prevention Plan and its implementation.

M. Failure to submit fees

This permit may be revoked, in whole or in part, if the appropriate permit fees are not submitted within sixty (60) days of the date of notification that such fees are due.

N. Penalties For Violations of Permit Conditions

Section 309 of the CWA provides significant penalties for a person(s) who violates a permit condition implementing Section 301, 302, 306, 307, 318, or 405 of the CWA, or any permit condition or limitation implementing any such sections in a permit issued under Section 402. Any person(s) who violates any condition of this permit is subject to a civil penalty not to exceed \$25,000 per day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

PART VI. DEFINITIONS

1. Allowable Non-Storm Water means: discharges from fire fighting activities, fire hydrant flushings, potable water sources, waterline flushings, uncontaminated groundwater, foundation or footing drains where flows are not contaminated with process materials such as solvents, springs, riparian habitats, wetlands, irrigation water, air conditioning condensate, exterior building washwater when no detergents or other surfactants are used and

pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred and when no detergents or other surfactants are used.

2. Best Management Practices ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control facility site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
3. Calendar Quarter means each of the following periods: December thru February, March thru May, June thru August and September thru November.
4. CWA means Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972).
5. Department means the Iowa Department of Natural Resources (IDNR) or an authorized representative.
6. Discharge means the release of water and any elements, compounds, and particles contained within or upon, from property owned or controlled by an individual, individuals, or entity and where the release originates on said property.
7. Facility means any entity which discharges storm water.
8. Municipal separate storm sewer system means the conveyance or system of conveyances including storm sewers, roadways, roads with drainage systems, catch basins, curbs, gutters, ditches, constructed channels and storm drains owned or operated by the City of Cedar Rapids.
9. Permittee means the City of Cedar Rapids.
10. Point source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.
11. Significant materials includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designated under Section 101(14) of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); any chemical the facility is required to report pursuant to Emergency Planning and Community Right-to-Know Act (EPCRA) Section 313; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.
12. Storm water means storm water runoff, snow melt runoff, snow and surface runoff and drainage.
13. Storm water discharge associated with industrial activity means the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing or raw materials storage areas at an industrial plant. The term does not include discharges from facilities or activities excluded from the NPDES program. For the categories of industries identified in paragraphs (i) through (x) of this definition, the term includes, but is not limited to, storm water discharges from industrial plant yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters (as defined at 40 CFR Part 401); sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and finished products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to storm water. For the categories of industries identified in paragraph (xi) of this definition, the term includes only storm water discharges from all areas (except access roads and rail lines) listed in the previous sentence where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to storm water. For the purposes of this paragraph, material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate

product, finished product, by-product or waste product. The term excludes areas located on plant lands separate from the plant's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with storm water drained from the above described areas. Industrial facilities (including industrial facilities that are Federally, State, or municipally owned or operated that meet the description of the facilities listed in paragraphs (i) to (xi) of this definition) include those facilities designated under 122.26(a)(1)(v). The following categories of facilities are considered to be engaging in "industrial activity" for purposes of this subsection.

- (i) Facilities subject to storm water effluent limitations guidelines, new source performance standards, or toxic pollutant effluent standards under 40 CFR Subchapter N (except facilities with toxic pollutant effluent standards that are exempted under category (xi) of this definition);
- (ii) Facilities classified as Standard Industrial Classifications 24 (except 2434), 26 (except 265 and 267), 28 (except 283 and 285), 29, 311, 32 (except 323), 33, 3441, 373;
- (iii) Facilities classified as Standard Industrial Classifications 10 through 14 (mineral industry) including active or inactive mining operations (except for areas of coal mining operations no longer meeting the definition of a reclamation area under 40 CFR 434.11(I) because the performance bond issued to the facility by the appropriate SMCRA authority has been released, or except for areas of non-coal mining operations that have been released from applicable State or Federal reclamation requirements after December 17, 1990) and oil and gas exploration, production, processing, or treatment operations, or transmission facilities that discharge storm water contaminated by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished products, byproducts or waste products located on the site of such operations; inactive mining operations are mining sites that are not being actively mined, but that have an identifiable owner/operator;
- (iv) Hazardous waste treatment, storage, or disposal facilities, including those that are operating under interim status or a permit under Subtitle C of RCRA;
- (v) Landfills, land application sites, and open dumps that have received any industrial wastes (waste that is received from any of the facilities described under this subsection) including those that are subject to regulation under Subtitle D of RCRA;
- (vi) Facilities involved in the recycling of materials, including metal scrap yards, battery reclaimers, salvage yards, and automobile junkyards, including but limited to those classified as Standard Industrial Classification 5015 and 5093;
- (vii) Steam electric power generating facilities, including coal handling sites;
- (viii) Transportation facilities classified as Standard Industrial Classifications 40, 41, 42 (except 4221-25), 43, 44, 45 and 5171 that have vehicle maintenance shops, equipment cleaning operations, or airport deicing operations. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, airport deicing operations, or that are otherwise identified under paragraphs (i) to (vii) or (ix) to (xi) of this subsection are associated with industrial activity;
- (ix) Treatment works treating domestic sewage or any other sewage sludge or wastewater treatment device or system, used in the storage treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge that are located within the confines of the facility, with a design flow of 1.0 mgd or more, or required to have an approved pretreatment program under 40 CFR Part 403. Not included are farm lands, domestic gardens or lands used for sludge management where sludge is beneficially reused and that are not physically located in the confines of the facility, or areas that are in compliance with 40 CFR Part 503;
- (x) Construction activity including clearing, grading and excavation activities except: operations that result in the disturbance of less than 5 acres of total land area that are not part of a larger common plan of development or sale;

Facility Name: City of Cedar Rapids Municipal Separate Storm Sewer System

Permit Number: 57-15-0-05 Final permit

(xi) Facilities under Standard Industrial Classifications 20, 21, 22, 23, 2434, 25, 265, 267, 27, 283, 285, 30, 31 (except 311), 323, 34 (except 3441), 35, 36, 37 (except 373), 38, 39, 4221-25, (and that are not otherwise included within categories (i) to (x)).

14. Waters of the State means any river, stream, lake, pond, marsh, watercourse, waterway, well, spring, reservoir, aquifer, irrigation system, drainage system and any other body or accumulation of water, surface or underground, natural or artificial, public or private, which are contained within, flow through or border upon the state or any portion thereof.



Attachment B – SOPs and Notes for TV Inspection Video Cataloguing

SOPs and Notes for TV Inspection Video Cataloguing

This is a TV Inspection Report:

CITY OF CEDAR RAPIDS
ENGINEERING DEPT. SEWER DIVISION
TV INSPECTION REPORT

SURVEY: # 01

TRUCK: 219 236 247 251

DATE: 4-4-13

OPERATOR: KB BH LH ML

SET-UP

PIPE	
TYPE:	SANITARY <input type="checkbox"/> STORM <input checked="" type="checkbox"/>
SIZE:	6 <input type="checkbox"/> 8 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 12 <input type="checkbox"/> 15 <input type="checkbox"/> 18 <input type="checkbox"/> 21 <input type="checkbox"/> 24 <input type="checkbox"/> OTHER =
MATERIAL:	CIP <input type="checkbox"/> LINED <input checked="" type="checkbox"/> PVC <input type="checkbox"/> PVC TRUSS <input type="checkbox"/> RCP <input type="checkbox"/> VCP <input type="checkbox"/>
LOCATION:	6504 Danbern Ln NE.
FROM MH:	15241W-028
TO MH:	15241W-014
FROM MH DEPTH:	
DIRECTION:	WITH <input checked="" type="checkbox"/> AGAINST <input type="checkbox"/>
REASON:	CIP <input type="checkbox"/> ENG REQUEST <input type="checkbox"/> PEP <input type="checkbox"/> PM <input type="checkbox"/> SEWER CALLOUT <input checked="" type="checkbox"/> OTHER = Supervisor

OBSERVATIONS

ROOTS:	HEAVY <input checked="" type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT <input type="checkbox"/>	Used Root Rat!
ORIGIN:	JOINTS <input type="checkbox"/> SERVICE <input checked="" type="checkbox"/> BOTH <input type="checkbox"/>	
DEBRIS:	HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT <input type="checkbox"/>	
GREASE:	HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT <input type="checkbox"/>	
MINERALS:	HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT <input type="checkbox"/>	
OFFSET JOINT AT (footage):		
PROTRUDING TAP AT (footage):		
PIPE LENGTH:	244 120	SAG: 1/4 <input type="checkbox"/> 1/2 <input type="checkbox"/> 3/4 <input type="checkbox"/> Full <input type="checkbox"/>
OTHER COMMENTS:	Used root rat on roots, liner looks good!	
NEEDS REPAIR OR SLIP LINED:	YES <input type="checkbox"/> NO <input type="checkbox"/>	

Information Needed:

- TV Inspection Report
- TV Inspection DVD
- Work Orders (optional)
- GIS Access
- Lucity Access

Procedure:

1. When the paperwork and DVD(s) come in, check to make sure the DVD is readable, then assign a Catalog number to each DVD by writing the number on the containing envelope and the DVD itself.
2. Create a folder in <\\citycr.local\Sharedocs\Sewer\Pipe Hunter\CAM FOOTAGE> and name it according to the Catalog Number assigned.
3. Copy the video files into the new folder.
4. Separate the TV Inspection Report(s) from the Work Order(s) and staple any additional information related to the Work Order to the Sewer Work Order form.
5. Read the Work Order paperwork for any GIS or maintenance related notes, then give to Marchelle.
6. Enter the information on the TV Inspection Report in the DVD Catalog, located at <\\citycr.local\Sharedocs\Sewer\Pipe Hunter>. Pay attention to the "Direction" attribute on the report, as this will help you determine which is the upstream manhole (USMAN).

DIRECTION: WITH <input checked="" type="checkbox"/> AGAINST <input type="checkbox"/>
--

Basic Info:

SURVEY: # 01	Survey Number 1
LOCATION: 6504 Danburn LN NE.	House 6504 Street Name DANBURN Street Type LN Quality NE
TYPE: SANITARY <input checked="" type="checkbox"/> STORM <input type="checkbox"/>	Type SANITARY
FROM MH: 15241W-028 TO MH: 15241W-014	USMAN 15241W-028 DSMAN 15241W-014
DATE: 4-4-13	Survey Date 4/4/2013
TRUCK: 219 <input type="checkbox"/> 236 <input type="checkbox"/> 247 <input checked="" type="checkbox"/> 251 <input type="checkbox"/>	DVD Unit 247
OPERATOR: KB <input type="checkbox"/> BH <input type="checkbox"/> LH <input checked="" type="checkbox"/> ML <input type="checkbox"/>	Operator HOKE

Notes:

Operators	
KB	Brown
BH	Hemphill
LH	Hoke
ML	Leaven

Camera Types (Trucks)		
219	Jet Cam	1 mi / day (est.)
236	Mainline Camera	½ mi / day (est.)
247	Mainline Camera	½ mi / day (est.)
251	Mainline Camera	½ mi / day (est.)

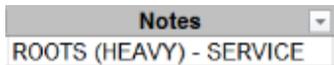
- Once the basic information is complete, play to video to confirm the information on the Intro Screen matches the information on the paperwork and the DVD catalog.



- Scroll to the end of the video to make sure the length on the video, the "Pipe Length" row on the Work Order, and the Length for the line in the GIS match. Make changes to the GIS and Lucity, as necessary.
- Check the paperwork for any observations or comments the inspectors may have made during the video.

OBSERVATIONS	
ROOTS: <input checked="" type="checkbox"/> HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT	<i>Used Root Rat!</i>
ORIGIN: <input type="checkbox"/> JOINTS <input type="checkbox"/> SERVICE <input type="checkbox"/> BOTH	
DEBRIS: <input type="checkbox"/> HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT	
GREASE: <input type="checkbox"/> HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT	
MINERALS: <input type="checkbox"/> HEAVY <input type="checkbox"/> MEDIUM <input type="checkbox"/> LIGHT	
OFFSET JOINT AT (footage):	
PROTRUDING TAP AT (footage):	
PIPE LENGTH: <i>244 120</i> SAG: <input type="checkbox"/> ¼ <input type="checkbox"/> ½ <input type="checkbox"/> ¾ <input type="checkbox"/> Full	
OTHER COMMENTS:	<i>Used root rat on roots, liner looks good!</i>
NEEDS REPAIR OR SLIP LINED: YES <input type="checkbox"/> NO <input type="checkbox"/>	

10. Record observations in the “Notes” field in the DVD Catalog.



11. Put on Preventative Maintenance List, PMS, and/or assign a value to the “Needs Work” field in the DVD_Catalog or GIS (if eligible for CIP list).

Problem	Severity	Location	Instance	Action
Roots	Heavy	Joints	-	Add to CIP List
		Services	<3	Add to CIP List
				>=3
	Medium	Joints	-	Add to CIP List
		Services	<3	Add to CIP List
				>=3
	Light	Joints	-	Add to CIP List
		Services	<3	Add to CIP List
				>=3
Debris	Heavy	-	-	Make Note in DVD_Catalog/GIS
	Medium	-	-	Make Note in DVD_Catalog/GIS
	Light	-	-	Make Note in DVD_Catalog/GIS
Grease	Heavy	-	-	Make Note in DVD_Catalog/GIS
	Medium	-	-	Make Note in DVD_Catalog/GIS
	Light	-	-	Make Note in DVD_Catalog/GIS
Minerals	Heavy	-	-	Make Note in DVD_Catalog/GIS
	Medium	-	-	Make Note in DVD_Catalog/GIS
	Light	-	-	Make Note in DVD_Catalog/GIS
Offset Joint	<1"	-	-	Make Note in DVD_Catalog/GIS
Protruding Tap	any	-	-	Track on Protruding Tap Spreadsheet
Crack / Separation	<1"	-	-	Add to CIP List
				>=1"
Sag	any	-	-	Add to CIP List
Hole	any	Crown	-	Report to Jeff Oberthien
		Side	-	Report to Jeff Oberthien
		Trough	-	Report to Jeff Oberthien
Offset	<1"	-	-	Make Note in DVD_Catalog/GIS
				>=1"
I & I	any	Manhole	-	Report to Jeff Oberthien
		Main	-	Add to CIP List
"Needs Repair or Slip Lined"	any	-	-	Add to CIP List (if KB or LH)

*For additional information, see the Sewer Maintenance Policies document, located at <\\citycr.local\sharedocs\PWsewer\Sewer Files\SOP Manual – ongoing\>.



Attachment C – Best Management Practice for Maintenance of Private Storm Water Facilities

**Best Practices Assessment of the
Public Works Department**

CITY OF CEDAR RAPIDS, IOWA

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matrix 
consulting group
721 Colorado Avenue, Suite 101

August 2014

Table of Contents

1. DEPARTMENTAL ADMINISTRATION	2
2. ASSET MANAGEMENT.....	6
3. MAINTENANCE MANAGEMENT	9
4. SANITARY AND STORM SEWER COLLECTION	13
5. URBAN FORESTRY MAINTENANCE.....	19
6. STREET MAINTENANCE	24
7. TRAFFIC ENGINEERING	31
8. ENGINEERING.....	38
9. CONSTRUCTION MANAGEMENT.....	47

BEST PRACTICES ASSESSMENT OF THE PUBLIC WORKS DEPARTMENT

Cedar Rapids, Iowa

The best practices analysis of the Public Works Department provides a comprehensive analysis of operations, organization, and management. In order to make the assessments of operational strengths and improvement opportunities, the project team developed a set of performance measures which we call “best management practices” against which to evaluate the Department. These measures comprise the main thrust of this diagnostic assessment.

The measures utilized have been derived from the project team's collective experience and represent the following ways to identify Departmental strengths as well as improvement opportunities:

- Statements of "effective practices" based on the study team's experience in evaluating operations in other agencies or “industry standards” from other research organizations such as the Governmental Finance Officers Association, the American Public Works Association, the American Waterworks Association, etc.
- Identification of whether and how the Department meets the performance targets.

The purpose of the diagnostic assessment was to develop an overall assessment of the Department. Detailed analysis of the issues identified here will be conducted in the next several weeks, leading to the development of the draft final report.

1. DEPARTMENTAL ADMINISTRATION

Best Practice	Strengths	Opportunities for Improvement
<p>1. The Department maintains and publishes a clearly written, multi-year (five years at a minimum) strategic plan to provide vision and direction for the department's effort. The plan clearly delineates the department's goals, and objectives and strategies for achieving them.</p>		<p>The Department does not maintain and publish a clearly written, multi-year (five years at a minimum) strategic plan.</p>
<p>2. Goals, objectives, and performance measures have been developed that measure the outcomes of the Department's programs and services, and link outputs to specific outcomes that are meaningful to citizens.</p>	<p>The City's operating budget includes goals, objectives, and performance measures.</p>	<ul style="list-style-type: none"> • The goals within the budget for the Public Works Department are not goals, per se, and are not comprehensive. • The objectives within the budget for the Public Works Department are not objectives – they are not specific, measurable, and time-based, etc. • The performance measures are not comprehensive, but are limited.
<p>3. The Department's performance management system has a balanced mix of performance measures that include input, process, output, efficiency, and outcome measures</p>		<p>The Department's performance management system does not have a balanced mix of performance measures</p>
<p>4. Managers provide regular progress reports (e.g. monthly or quarterly) to executive management relative to performance goals and objectives outcomes.</p>		<p>Managers do not provide regular progress reports (e.g. monthly or quarterly) to executive management.</p>
<p>5. The Department has developed department-wide policies and procedures to guide the management and operations of the department.</p>	<p>The Department, in the ramp-up to accreditation by the American Public Works Association, is developing policies and procedures.</p>	

Best Practice	Strengths	Opportunities for Improvement
6. The Department prepares an annual Performance Scorecard, a report to citizens and project owners on the results and progress of key performance indicators		The Department does not prepare an annual Performance Scorecard.
7. Customer satisfaction with the Department services is routinely monitored through measures such as Survey Monkey and connections to service requests, and satisfaction with those services is high.	The administrative staff conducts monthly surveys of a random sample of residents who have called in the previous month. Respondents are asked to rate the services they received on a 5-point scale. The Sewer Superintendent reports that average scores are approximately 4.3 (5 being highest rating).	
8. The number of management layers within Department does not exceed 4 (the number of layers required to reach the Director).	The number of management layers within Department does not exceed 4 (the number of layers required to reach the Director).	
9. The ratio of non-supervisors to first line supervisors (span of control) is 10 to 1.		In many instances, the ratio of staff to first line supervisors (span of control) is not is less than 10 to 1. In other instances, it far exceeds 10 to 1.
10. The American Public Works Association has accredited the Department.		The American Public Works Association has not accredited the Department.
11. The Department policies and procedures are written, comprehensive, and regularly updated.		The Department policies and procedures are not written, comprehensive, and regularly updated.
12. A long-term information technology plan has been prepared for the Department (e.g., GIS, mobile computing, AutoCAD, etc.).		A long-term information technology plan has not been prepared for the Department.

Best Practice	Strengths	Opportunities for Improvement
<p>13. Staff assigned to the Department receive job-related training and professional development at levels comparable to ASTD benchmarks. (32 hours of training per employee per year).</p>		<p>Staff assigned to the Department do not receive job-related training and professional development at levels comparable to ASTD benchmarks</p>
<p>14. Departmental training needs have been evaluated and identified; a training strategy has been developed, including a management and supervisory development program</p>	<p>All employees in leadership positions must take “Leadership Development”, “How to Write Effective Performance Appraisals”, a one-time, ten-week course on conflict management, and two leadership electives annually.</p>	<p>Departmental training needs have not been evaluated and identified</p>
<p>15. Management and supervisory training is provided on an ongoing basis to all supervisors.</p>	<p>All employees in leadership positions must take two leadership electives annually. The Human Resources Department maintains an on-line listing of training courses.</p>	
<p>16. A career development program has been developed that identifies the procedure for progressing within the department and the necessary skills required to perform departmental classifications.</p>		<p>A career development program has not been developed.</p>
<p>17. A formal safety program is in place that includes training, guidance documents and operational procedures, all of which are prominently posted.</p>	<p>The Human Resources Department has developed a formal safety program.</p>	
<p>18. The rate of employee days lost from work due to non-fatal illness or injury – the OSHA Form 300A rate – for Public Works Department staff is comparable to other water utilities.</p>		<p>The Days Away/Restricted or Job Transfer Rate for Public Works – Maintenance Division for 2011 and 2013 was much higher than the rate reported by BLS for water and sewer utilities, for local government, etc. It was somewhat higher for 2014.</p>

Best Practice	Strengths	Opportunities for Improvement
19. An employee recognition program has been developed that acknowledges employee accomplishments.		An employee recognition program has not been developed.
20. The driving record of employees is checked annually for citations and license suspensions.		The driving record of employees is not checked annually for citations and license suspensions.
21. A formal program exists for driver and operator training in general and for problem drivers.		A formal program does not exist for driver and operator training in general and for problem drivers.

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2. ASSET MANAGEMENT

Best Management Practice	Strengths	Opportunities for Improvement
22. The City has adopted an asset management policy to establish the overall intentions and direction of the City with regard to asset management that establishes the goals, objectives, and measures of performance; and defines organizational roles and responsibilities in the implementation of asset management.		The City has not developed and adopted an asset management policy.
23. The Public Works Department has developed a comprehensive inventory of the assets owned by the City including an automated asset inventory and GIS system map.	An inventory has been developed for some of the assets such as the sanitary sewer collection system	<ul style="list-style-type: none"> • Some of the assets lack an inventory such as the City's street trees. Other assets lack a complete inventory such as the City's traffic signals. • There is little in the way of GIS layers for the non-enterprise system assets assigned to Maintenance Services.
24. The asset registry is complete and updated as new assets are placed into service and old ones disposed of.	The sanitary sewer collection system asset registry is complete and updated as new assets are placed into service and old ones disposed of.	Overall, the asset registry is not complete and updated as new assets are placed into service and old ones disposed of.
25. A written policy and procedure have been developed for the continuous updating of the asset inventory.		A written policy and procedure has not been developed for the continuous updating of the asset inventory.
26. Asset management is supported by system-wide master plans including strategies for system preservation, operating efficiency, new facilities, and safety.	The Public Works Department is in the process of developing an asset management plan for the City's street system.	The Public Works Department does not have up-to-date system-wide master plans including strategies for system preservation, operating efficiency, new facilities, and safety for street trees, the sanitary collection system, the stormwater collection system, the sidewalk system, traffic regulatory signs and striping, traffic signals, etc.

Best Management Practice	Strengths	Opportunities for Improvement
<p>27. The Public Works Department tracks progress in achieving the system-wide master plan and communicates this progress.</p>		<p>The Public Works Department does not have system-wide master plans including strategies for system preservation, operating efficiency, new facilities, and safety for street trees, the sanitary collection system, the stormwater collection system, the sidewalk system, traffic regulatory signs and striping, traffic signals, etc.</p>
<p>28. A capital improvement program for the system-wide master plan is detailed with sources and uses and planned over a 5-year period. The capital improvement program identifies how it meets established policies, goals, and objectives, and how it incorporates system preservation, operating efficiency, new facilities, and safety improvements. The program includes a financial analysis that identifies how the program will be carried out, financing methods and funding sources, and assesses funding capability and constraints.</p>	<p>The City has developed and adopted a 5-year capital improvement program.</p>	<p>The Public Works Department does not have system-wide master plans including strategies for system preservation, operating efficiency, new facilities, and safety for street trees, the sanitary collection system, the stormwater collection system, the sidewalk system, traffic regulatory signs and striping, traffic signals, etc.</p>
<p>29. The Public Works Department has developed a “useful life” for the assets assigned to its care.</p>		<p>The Public Works Department has not developed formal written “useful lives” for the assets assigned to its care.</p>
<p>30. The Public Works Department has designated an “asset manager” as a single point of accountability for asset management for the assets assigned to the Department.</p>		<p>The Public Works Department has not designated an “asset manager”.</p>
<p>31. The Public Works Department performs regular condition assessment of all assets and develops estimates of remaining useful lives.</p>	<p>The Public Works Department conducts regular condition assessments of the sanitary sewer collection system via CCTV and its sidewalk system. It is currently conducting a formal assessment of its street system.</p>	<p>The Public Works Department does not conduct regular condition assessments of its traffic signals, traffic regulatory signs, and its stormwater collection system,.</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>32. The Public Works Department has defined the levels of service necessary to sustainably (lowest life-cycle cost) maintain the assets assigned to its care, and tracks actual performance over time.</p>		<p>The Public Works Department has not formally, in writing, defined the levels of service necessary to sustainably maintain most assets assigned to its care (e.g., sanitary sewer collection system, traffic signal controllers, regulatory signs, etc.).</p>
<p>33. The Public Works Department reports on an annual basis the state of asset management and preservation (e.g., deferred replacement) including performance measures and targets.</p>		<p>The Public Works Department does not report on an annual basis the state of asset management and preservation.</p>

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3. MAINTENANCE MANAGEMENT

Best Practice	Strengths	Opportunities for Improvement
34. The most recent version of EnerGov is installed and deployed.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
35. A System Administrator has been designated. The System Administrator is responsible for maintaining and operating Energov, database management, backup and disaster recovery coordination, contributing to Energov technical strategy, policy and procedure development, production of system documentation, problem call tracking, coordinating enhancement requests, database error checking (e.g., duplicate or poorly designed work types), etc.	A System Administrator has been designated within the Information Technology Department.	
36. Public Works Department staff utilizes PDA's with wireless capacity and Energov Mobile / Mobile Work Manager to input and retrieve data from Energov.	PDA's will be deployed selectively, at the supervisory and management level.	There are no plans to deploy PDA's at the crew level.
37. Public Works Department staff that use Energov have all received initial training in the use of Energov and annual refresher training.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
38. The Energov training has included a course outline, training manual, and desk reference materials.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
39. Public Works Department staff that use are not allowed to use EnerGov without first receiving formal classroom training in its use.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.

Best Practice	Strengths	Opportunities for Improvement
40. A EnerGov Quick Tips Guide has been developed.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
41. The EnerGov training includes an introduction, how to find information in EnerGov, how to enter a work order, work order planning, tracking work and recording results, reviewing actual work and completing the work order, building job plans, creating preventive maintenance work orders, using the asset catalog, inventory requisition entry, inventory management, etc.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
42. The Public Works Department provides web-based training in the use of EnerGov.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
43. EnerGov is fully utilized for work orders (requests and tracking), preventive maintenance (requests, scheduling, inspections, tracking etc.), inventory management (tracking stocking levels, reordering, issuing stock, etc.), equipment asset management (asset number, asset type, location, condition monitoring, etc.), work planning (job plans, routes, safety plans, etc.), resource management (staff, staff by craft, service contracts, etc.), and reporting.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
44. EnerGov and PeopleSoft are linked to enable downloading of labor expense data from PeopleSoft, and downloading of labor, service and supply expense from EnerGov. EnerGov captures all labor, material and service costs to assets and align with the general ledger within Finance.		There are no plans to link EnerGov and PeopleSoft.

Best Practice	Strengths	Opportunities for Improvement
<p>45. EnerGov is installed and fully utilized including a work order system, annual work program, weekly or bi-weekly work planning and scheduling system, staff resource leveling (staff available versus workload), a reporting system to report actual versus planned performance, asset management system, and defined service levels and performance standards for each work activity.</p>		<p>There are no plans to utilize EnerGov beyond a work order system.</p>
<p>46. EnerGov captures “fully loaded” costs for performing maintenance services including labor, parts, materials, supplies, and vehicle utilization.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>
<p>47. A weekly schedule is developed by the first-line supervisors in EnerGov for all of the work performed by the Public Works Department.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>
<p>48. The weekly schedule is leveled to the staff resources available.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>
<p>49. The compliance with the weekly schedule is approximately 80%.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>
<p>50. Work orders are used to record all maintenance and repair activities in EnerGov.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>
<p>51. The work order is always linked to an asset.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>
<p>52. EnerGov is used to track and report repair work that is outsourced to vendors.</p>		<p>EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.</p>

Best Practice	Strengths	Opportunities for Improvement
53. Work order types are clearly prioritized such as emergency, corrective-scheduled/backlog, corrective-unscheduled/urgent, backlog, etc.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.
54. There is a formalized method to track service requests and document response time in EnerGov.		EnerGov has not been installed. The plan is to install EnerGov within 4 to 6 months.

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4. SANITARY AND STORM SEWER COLLECTION

Best Practice	Strengths	Opportunities for Improvement
<p>55. Sanitary sewer collection staff are encouraged to keep skill levels current through financial incentives to obtain state certification.</p>	<p>There are no financial incentives, however, attainment of certain certifications is necessary for each position level in the Unit. The Sewer Superintendent is required to obtain a Grade 4 Collection System Operator certification within 4 years. The Lead Sewer Maintenance Specialist must obtain a Grade 3 within 3 years. Collection System Maintenance Worker IV must obtain a Grade 2, and other positions must obtain Grade 1.</p>	
<p>56. Sanitary sewer and storm sewer collection services are provided as an enterprise fund.</p>	<p>Sewer services – sanitary and stormwater - are provided as an enterprise fund.</p>	
<p>57. An effective asset management system has been installed that includes an inventory of the assets to be maintained with details (e.g., size) about components to be maintained and where the components are located, condition assessments, maintenance and rehabilitation strategies, and sustainable funding levels for maintenance and rehabilitation for the infrastructure.</p>	<p>The sanitary sewer infrastructure is in the GIS and is tied to the CMMS. This allows the viewing of all maintenance events that have occurred on a given segment of line.</p>	<p>The stormwater system is not linked to the CMMS.</p>
<p>58. A GIS has been developed for the sanitary sewer collection system that provides both mapping data on the location of the collection system assets as easy access to other data such as maintenance history and asset information (installation date, material, size, condition, etc.).</p>	<p>Sanitary sewer assets are in the GIS and are linked to Lucity, which provides the maintenance history for specific segments of sewer line.</p>	

Best Practice	Strengths	Opportunities for Improvement
59. The sanitary sewer collection system maps are maintained and updated in an ongoing basis.	Sanitary sewer maps are maintained and updated as changing conditions require.	
60. A standard protocol has been established and communicated for reacting to an emergency situation.	Emergency events are addressed in the policies and procedures, however these relate primarily to the staffing of the emergency response if these occur after hours.	The policies and procedures should be enhanced to include response protocols (crew sizes, equipment required, response time for specific emergencies, etc.). These policies should address such emergencies as sewer stoppages, main breaks and collapses, overflowing manhole, force main breaks (in both residential and non-residential areas), and other areas.
61. The manager for the sanitary sewer collection system reports performance on a monthly basis that includes blockages, SSO's, SSO volume, etc.	Sanitary Sewer Overflows (SSO) are reported internally immediately, and Iowa DNR is informed within 8 hours of the event.	
62. The chain of communication for reporting SSO's has been designated in writing.	Calls go to crews, who notify the Sewer Superintendent. Once it is determined to be a City main, the DNR is called to report the SSO. A work order is generated to televise the line and determine the cause of the SSO. The line is either cleaned immediately or put on a list for repair. The Department transmits a letter to DNR.	
63. Sanitary sewer collection staff are trained on an ongoing basis regarding how to respond to SSO's.	The causes of, and responses to, SSOs are discussed periodically during brown-bag lunch forums.	

Best Practice	Strengths	Opportunities for Improvement
64. Sanitary sewer collection staff are trained on an ongoing basis regarding how to respond to SSO's.	The causes of, and responses to, SSOs are discussed periodically during brown-bag lunch forums.	
65. The cause of each SSO is formally investigated and written findings developed.	All SSOs, in addition to being reported to Iowa DNR, are formally investigated, with causes and remediation formally documented.	The Waste Water Collection and Conveyance document that serves as the collection system management plan outlines the notification procedure, but this procedure does not address the timing of notification, the form of documentation of findings, nor the items that should be reported.
66. A wastewater collection master plan has been developed.	Certain elements of a collection master plan are present, such as CMOM management plan. This includes sections on sewer call response protocols, on call service, televising sewer mains, inspections and cleaning, routine PM, CIP planning, and others. However, these items address only the processes and procedures.	There is no formal wastewater collection system master plan. This plan should be a formal documentation of the current and future needs of the wastewater collection system rather than the processes related to carrying out specific activities such as televising the system, responses to SSOs, etc.
67. A five-year capital improvement plan has been developed for the repair, replacement, or addition of infrastructure.	The City develops a 5-year CIP.	
68. A formal wastewater main rehabilitation and replacement program is in place for improving the reliability of the systems, linked directly to a long-term capital and financial planning program to assure adequate funding.	A wastewater master plan was developed in 1998 by Camp Dresser & McKee. Most of the elements have been or our being addressed, but the plan needs to be updated.	There is no formal main rehabilitation and replacement program in place. This plan should define the City's rehabilitation and replacement plan, and address elements related to the televising program, structural condition assessment, capital project development and how these are prioritized, and propose specific capital projects over a ten-year timeframe.

CITY OF CEDAR RAPIDS, IOWA
Operations Review of the Public Works Department

Best Practice	Strengths	Opportunities for Improvement
69. The City replaces (or slip lines) 1% to 2% of its wastewater collection mains on an annual basis.	In the past 3 years (2011, 2012 and 2013), the City has replaced or rehabilitated 24.1 miles of sanitary sewer for an annual average of 8 miles (1.2% annual average).	
70. Operating and maintenance expenditures for the sanitary sewer collection system approximates \$0.50 to \$1 per foot of main per year.	There are 622 linear miles of main, which equates to 3,284,160 linear feet. The FY 15 budget for Personal Services is \$2573,070 and is \$349,053 for Discretionary Services. This equates to \$0.89 per linear foot. This does not include sewer lift stations.	
71. Operating and maintenance staffing for the sanitary sewer collection system approximates 25 to 40 miles of main per employee.	There are 31.35 FTE in the Sewer Section of the Maintenance Division, however 7 of these are non-field crew members (i.e., administrative, inspectional). With 622 linear miles of sewer mains, this equates to 25.5 linear miles per field FTE.	
72. Average response time to SSO's approximates 45 minutes from the receipt of call to having a crew on-site.		The Sewer Section does not report this metric.
73. A CCTV program is utilized on an ongoing basis to document structural deficiencies. 7% to 8% of the system is CCTV'd annually.		The Sewer Section televised 18% of the system in FY11, 25% in FY12 and 18% in FY13.
74. The results of the CCTV are utilized for repair of defects that can cause SSO's.	The results of the CCTV are utilized for repair of defects that can cause SSO's.	
75. 25% to 30% of the wastewater mains are cleaned on an annual basis.	The Sewer Section cleaned 249 miles in FY11 (37.6% of the system), 285 miles in FY12 (43.1%) and 262 miles in FY13 (39.6%), which exceeds the benchmark for this metric.	The levels of service for the cleaning of the sanitary sewer collection system are higher than metrics typically recommended by the Matrix Consulting Group.

Best Practice	Strengths	Opportunities for Improvement
76. Root removal occurs for 3% to 5% of the sanitary sewer collection system annually.	This is reportedly completed for 7% of the system each year.	
77. 15% to 20% of the manholes are inspected annually	This is accomplished at the same time as televising occurs, and equates to about 17% of the total manholes each year.	
78. A smoke and dye testing program is utilized to identify sources on inflow and infiltration for 2.5% to 5% of the sanitary sewer collection system annually.	Smoke testing is accomplished, and the Fire Department is notified prior to these events. However, the amount of smoke testing is minimized due to the potential of causing fear among residents as it occurs.	The Sewer Section does not maintain metrics on the number of miles of the system that are smoke and dye tested, however it reportedly equates to less than 1% of the system annually.
79. The average annual number of sewer breaks approximates 16 per 1000 miles.	This has averaged 6 breaks per 1,000 miles for the past three fiscal years.	
80. The average annual number of backups per 100 miles of sanitary sewer approximates 22.	There have been an average of 14.3 backups per year for the past three years. Given that there are approximately 622 miles of collection line in the system, this equates to 2.3 backups per 100 miles, which is well below the benchmark.	
81. SSO's approximate 4 to 7 SSO's / 100 miles of main per year.	There have been an average of 5 SSOs per year for the past three years, which equates to less than one per 100 miles.	
82. The City's catch basins / drain inlets are inspected annually, and cleaned when the depth of deposits reaches 60% of the sump depth as measured from the bottom of the basin to the invert of the lowest pipe into or out of the basin (in no case should there be less than 6 inches clearance from the debris surface to the invert of the lowest pipe)		10% of the inlets are inspected, and cleaned as needed, annually.

Best Practice	Strengths	Opportunities for Improvement
83. The Public Works Department inspects the stormwater collection system to basis to document structural deficiencies. 7% to 8% of the system is CCTV'd annually.		The Public Works Department does not inspect the stormwater collection system with CCTV.
84. 7% to 8% of the system of the storm water mains are cleaned on an annual basis.		The Public Works Department does not clean stormwater mains except in reaction to complaints or flooding problems.
85. Stormwater detention basins are inspected annually (inlet pipes and outlet pipes for structural integrity, removal of trash and debris, stability of the slopes, sediment accumulation, etc.) and cleaned when the accumulated sediment that exceeds 10% of the designed pond depth		Stormwater detention basins are not inspected annually and cleaned when the accumulated sediment that exceeds 10% of the designed pond depth.

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5. URBAN FORESTRY MAINTENANCE

Best Practice	Strengths	Opportunities for Improvement
86. Tree maintenance staff are encouraged to keep skill levels current through financial incentives to obtain state certification.		Tree maintenance staff are not encouraged to keep skill levels current through financial incentives to obtain state certification.
87. Urban Forestry maintenance staff receives not less than 40 hours of job-related training annually.		The Forestry staff does not receive ongoing job-related training.
88. Management and supervisory staff have obtained appropriate certification in their profession such as ISA Tree Worker Certifications and ISA Arborist Certifications. Pesticide applicators possess state-required applicators licenses..		Neither the Forestry Operations Supervisor nor the field crews possess any professional certifications.
89. A tree inventory exists of all trees in parks, medians and in streets right-of-way including location, size species, and condition.		There is no tree inventory, although the City reportedly has approximately 40,000 to 50,000 trees in City-owned property.
90. The city has been recognized by the National Arbor Day Foundation as "Tree City USA"	The City has been recognized as a "Tree City USA" for 38 straight years.	
91. A tree foundation acts as a catalyst for the city's urban forest's growth and protection. Our volunteer network provides the labor necessary to do large-scale plantings without significant costs and furthers the city's goal of involving the community in the rich tree traditions of the city.	The Forestry Section works with the "Trees Forever" group as well as another group that make tree plantings. Alliant and the Mid-America Electric companies also do promotions of tree plantings. IDNR also promotes tree plantings.	

Best Practice	Strengths	Opportunities for Improvement
<p>92. A (computerized maintenance management system) is installed and utilized including a work order system, annual work program, a reporting system to report actual versus planned performance, asset management system, and defined service levels and performance standards for each work activity.</p>	<p>The Forestry Section utilizes the standard work order system that the other sections of the Operations and Maintenance Division use. The work order is manually completed by crews, and is entered into the Lucity CMMS, with appropriate reports on workloads, productivity and cost generated.</p>	
<p>93. The CMMS is utilized to track customer service requests and document response time.</p>	<p>This is a primary use of the Lucity CMMS.</p>	<p>There is a 2 to 3 month backlog of requests for tree removals that have already been identified by the Forestry Section as being legitimate.</p>
<p>94. A GIS has been developed for the urban forest that provides both mapping data on the location of the street, median, and park trees as easy access to other data such as maintenance history and asset information (size, condition, etc.).</p>	<p>The Forestry Section has access to aerial photography to determine whether trees are in the rights of way.</p>	<p>There is no layer in GIS for trees that would identify the locations of trees and their coordinates and/or the type of tree.</p>
<p>95. The tree maintenance GIS layer is maintained and updated in an ongoing basis.</p>		<p>There is no layer in GIS for trees that would identify the locations of trees and their coordinates and/or the type of tree.</p>
<p>96. A strong and well organized citizen advisory group has been established to aid in setting policy, provide checks and balances, and advocate for the urban forest.</p>		<p>There is no advisory committee for urban forestry issues and policy in the City.</p>
<p>97. A strong public relations and public information program has been established geared to inform and educate public decision-makers, city management and city residents about the benefits and value of the urban forest, the cost to adequately maintain it, and the adverse results of withholding proper care.</p>		<p>A strong public relations and public information program has not been established.</p>

Best Practice	Strengths	Opportunities for Improvement
<p>98. The number of trees removed by the City on an average annual basis is less than the number of trees planted by the City.</p>		<p>The number of trees removed by the City on an average annual basis is more than the number of trees planted by the City. In FY 2013, 706 trees were removed by City Forestry staff; 9 trees were planted by City Forestry staff.</p>
<p>99. A street, median and park tree planting plan has been developed, with numerical objectives for the number of trees to be planted annually, costs of tree replacements, selection protocols ensuring use of the proper species for conditions and locations, and a plan to achieve an optimum tree density mutually supported by the general public, the citizen advisory group, political decision makers and the Division.</p>		<p>A street, median and park tree planting plan has been developed</p>
<p>100. The species of trees in the urban forest is diverse. No tree species exceeds 5% of the total park tree inventory.</p>		<p>Ash trees in Cedar Rapids comprise substantially more than 5% of the estimated inventory.</p>
<p>101. A comprehensive urban forestry maintenance master plan has been established based upon clearly identified, technically based arboriculture practices that consider costs/benefits for each activity.</p>		<p>A comprehensive urban forestry maintenance master plan has not been established.</p>
<p>102. An urban forestry policy has been adopted by the City Council that identifies the purpose, goals, and values of the urban forest, guidelines, standards, and recommended practices for the maintenance of the urban forest</p>		<p>An urban forestry policy has not been adopted by the City Council.</p>

Best Practice	Strengths	Opportunities for Improvement
<p>103. A plan to cost-effectively, and preferably profitably, recycle and utilize green waste and debris created by urban forest maintenance activities through such methods as milling products from large wood and recycling of wood chips as mulch for use within landscapes or as soil enhancement.</p>	<p>The Forestry Section takes wood chips to the Old Yard so that resident can collect and use in their private lawns.</p>	
<p>104. Urban Forestry utilizes aerial towers and brush chippers effectively to enhance the productivity of their staff.</p>	<p>The Section has access to three aerial towers (bucket trucks) and utilizes these in 2-person crews to prune and remove trees and related debris.</p>	
<p>105. The crew sizes utilized for tree maintenance are appropriate to the work performed. For example, the crew size used for responding to service requests consists of two staff.</p>	<p>The Section has access to three aerial towers (bucket trucks) and utilizes these in 2-person crews to prune and remove trees and related debris.</p>	
<p>106. The pruning cycle for the urban forest is 5 to 7 years.</p>		<ul style="list-style-type: none"> • In FY 2013, a total of 1,200 street trees were trimmed (ground and boom). There are an estimated 65,000 street trees. This represents a 54-year schedule for the trimming of street trees. • Trimming of street trees comprised only 35% of the available work hours of the Forestry Section staff in FY 2013.
<p>107. Pruning of trees is provided on a block-by-block basis so that each tree in a specified geographic area is pruned.</p>		<p>Pruning of trees is not provided on a block-by-block basis.</p>

Best Practice	Strengths	Opportunities for Improvement
<p>108. The City has developed a long-term plan to address the Emerald Ash Borer.</p>	<p>The City has developed a long-term plan to address the Emerald Ash Borer.</p>	<p>The long-term plan largely relies on removal. Other cities, such as Kansas City, Madison, Milwaukee, Chicago, and Des Moines, are treating Ash trees in good health and with good structure to allow time for replacement trees to develop canopy.</p>
<p>109. The Forestry Section is located in an appropriate place in the City organization.</p>		<p>The Forestry Section is not located in an appropriate place in the City organization given its responsibility for reforestation and the impact on Cedar Rapid's landscape.</p>

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6. STREET MAINTENANCE

Best Practice	Strengths	Opportunities for Improvement
110. The number of street and sidewalk maintenance staff approximates 1 staff for every 15 to 20 centerline miles of paved streets.		<ul style="list-style-type: none"> • There are approximately 622 center line miles of paved streets in the City maintained by 75 maintenance personnel (excluding ground maintenance), equating to a ratio of one working staff member per 8.3 center line miles. • The amount of staff assigned to street maintenance should enable the City to more effectively and aggressively address the City's needs for street repair, rehabilitation, and replacement.
111. Services requests for street and sidewalk maintenance and repair are closed promptly.		There are backlogs of work orders in each District. As of June 25, the West District, for example, had 57 backlogged work requests dating from March 4 to the present.
112. The crew sizes utilized for asphalt maintenance are appropriate to the work performed. <ul style="list-style-type: none"> • Two-person crews are utilized for pothole patching; and • Four-person crews are utilized for skin patching, base repair, and crack sealing. 		Crew sizes for pothole patching may be as small as 2 for cold patch in winter months, however they may range from 3 to 6 depending upon whether the street is a collector or arterial.
113. The productivity of the pothole patching crews meets reasonable standards or 1.5 to 2.5 tons per crew day.	The crews reportedly average 2 tons per day per crew.	

Best Practice	Strengths	Opportunities for Improvement
<p>114. Streets are crack sealed on an ongoing annual basis to mitigate the penetration of water into the street base.</p>	<p>The Grounds Maintenance Unit of the Street Operations Section has responsibility for City-wide crack seal. This is an ongoing operation, although crack seal should be applied during ambient temperatures of 45 to 65 degrees F, generally, and with little or no moisture on the paved surface.</p> <p>The Unit expended 4,084 hours of labor in crack sealing operations in 2013, equating to approximately 2.5 FTE (assuming 1,650 available hours per FTE). Given that the typical crew size for crack sealing is 5, this equates to about 102 days on which crack sealing was accomplished.</p>	
<p>115. Deep patching of streets is performed in-house on an ongoing annual basis when base and pavement repair is required (structural failures).</p>	<p>Deep patching is performed by in-house crews, however these crews are supplemented by contractors.</p>	
<p>116. Skin patching is performed on an ongoing annual basis to address raveling, rutting, and depressions or distortions.</p>	<p>If crews are preparing a section of street for crack sealing, District Supervisors may periodically instruct crews to perform skin patch if an area appears to be a candidate for this method of repair.</p>	<p>Skin patching is completed by crews as they deem appropriate. Interviews indicate that since the numbers of potholes in the City are so great, the vast majority of crew time is expended filling potholes.</p>

Best Practice	Strengths	Opportunities for Improvement
<p>117. A sidewalk inspection and repair program is in place that includes:</p> <ul style="list-style-type: none"> • A systematic inspection of sidewalks once every three to five years to identify tripping hazards; • Temporary patches of the tripping hazards within thirty days of hazard identification; and • Use of sidewalk replacement or grinding to eliminate tripping hazards. 	<p>The Engineering Division has developed a sidewalk inspection program that inspects the condition of the City's sidewalks on a 3-year cycle.</p>	<ul style="list-style-type: none"> • Temporary patches of the tripping hazards are not made within thirty days of hazard identification by the Engineering Division. • Sidewalk grinding is not utilized systematically to eliminate tripping hazards.
<p>118. The City's sidewalks are ADA-complaint in terms of sidewalk and curb ramps.</p>		<p>Approximately 80% of the City's sidewalks are not ADA compliant.</p>
<p>119. The concrete maintenance crew uses a sidewalk grinder on an ongoing / monthly basis to address small displacements.</p>		<p>The Street Operations Section has only a single sidewalk grinder for use by the three Districts, and was utilized only 19 hours in 2013. There were only 384 labor hours expended in sidewalk milling and grinding operations in 2013, which equates to about 128 hours per District. Given that the crew size for a grinding crew is two laborers, this equates to about 8 days per District dedicated to sidewalk grinding.</p>
<p>120. The crew size used for concrete maintenance and repair ranges from 1-staff for sidewalk grinding, 2-staff for base and construct forms and forms removal, 3-staff for concrete removal, to 4-staff for concrete placement and finishing.</p>		<p>The crew size utilized for sidewalk grinding is 2-persons.</p>

Best Practice	Strengths	Opportunities for Improvement
121. The concrete maintenance and repair crew removes and replaces 160 to 225 square feet of concrete per crew day.		
122. A one-person crew is utilized for street sweeping		<ul style="list-style-type: none"> • The crew sizes for street sweeping in each District amount to a 3-person crew (sweeper driver, flusher truck driver and Load-all driver for debris removal). • The Department utilizes 3-person crews for street sweeping. The use of a flusher truck to loosen debris and dampen the effects of dust is not typical, as sweepers are now equipped with spraying mechanisms themselves. • Further, the Department assigns a Load-all to each sweeper for the collection and transport of debris. This is also not typical, as there is excessive downtime awaiting a 6 cu yd hopper to fill with debris.
123. Regenerative air street sweepers are utilized for street sweeping to reduce equipment maintenance costs and downtime.		The Division mainly utilizes Elgin P-Series broom sweepers.
124. High dump street sweepers are utilized.		Maximum dump height is 9' 6". The Elgin P-Series is a front-dump model. By comparison, high dump sweepers typically reach a dump height of 11 feet.

Best Practice	Strengths	Opportunities for Improvement
<p>125. Waterless street sweepers are utilized to give the operator a choice of completely dry or wet dust control. Flexible skirts around the brooms provide efficient dust capture and fines removal, yet allow aggressive curb cleaning.</p>		<p>The Elgin has the capability of water spray, however, the Division allocates a flusher truck to dampen streets and loosen debris rather than utilize this feature of the sweeper.</p>
<p>126. The level of service for street sweeping is:</p> <ul style="list-style-type: none"> • Once every two weeks for residential; • Once daily for the major streets (e.g., arterials). 		<p>Although main arterials may be swept one or two more times than residential streets, each streets is swept only two to three times per year.</p>
<p>127. Street sweepers have GPS units installed.</p>	<p>All newer sweepers are equipped with GPS.</p>	<p>Older sweepers that are nearing the ends of their expected economic lives are not equipped with GPS.</p>
<p>128. Street sweeper operators are assigned routes for sweeping.</p>	<p>The three drivers in each of the three Districts are assigned routes.</p>	
<p>129. Drop boxes are located at strategic locations throughout the City to minimize lost time for street sweeper operators to dump their sweeper loads.</p>		<p>Drop boxes are not utilized. Each sweeper driver is assigned both a flusher truck (for dampening streets to contain dust) and a Load-all to accept debris from the sweeper as the hopper fills.</p>
<p>130. Street sweepers have large hoppers to minimize lost time for street sweeper operators to dump their sweeper loads.</p>		<p>The Elgin Pelican, which is the primary model used in the City has a max capacity of only 3.6 cu yds, which increases the frequency with which debris dumps must be made.</p>
<p>131. A parking ban has been adopted to aid street sweeping.</p>		<p>The City has no parking ban to aid street sweeping efforts.</p>

Best Practice	Strengths	Opportunities for Improvement
<p>132. Street sweeper productivity meets acceptable levels of productivity in terms of curb miles swept and the proportion of time spent sweeping.</p>		<p>There are no definitive figures available to determine the number of curb miles in the City. However if it can be assumed that there are 2 curb miles for every centerline mile and, further, about 80% of all centerline miles have curbs on both sides, there are approximately 995 curb miles in the City.</p> <p>In the South District, which has 222 centerline miles, there are 13 sweeping routes, and from late March till late June, Maintenance Services had completed 8 of these (61.5%). Using the same calculation of curb miles from the number of centerline miles, as was used above, this equates to 355 total curb miles. With 61.5% of these completed, this equates to about 218 curb miles swept to date. Given that there have been approximately 62 workdays in this time period, this equates to 3.5 curb miles swept per day.</p>
<p>133. The crew sizes for traffic sign and street striping and pavement legend painting are appropriate.</p> <ul style="list-style-type: none"> • A 1-person crew is used for sign installation and replacement; • A 2-person crew is used for pavement legend painting; and • A 2-person crew is used for street striping. 		<ul style="list-style-type: none"> • A 2-person crew is used for sign installation and replacement. • A 3-person crew is used for pavement legend painting. • A 3-person crew is used for street striping

Best Practice	Strengths	Opportunities for Improvement
<p>134. The productivity for traffic sign and street striping and pavement legend painting meets metrics.</p> <ul style="list-style-type: none"> • 8 to 11 signs per crew day • Long lane marking / street striping – 60,000 linear feet / crew day • Pavement legend painting – 8 to 10 intersections / crew day 		
<p>135. In laid thermoplastic is used for pavement legends.</p>		<p>In laid thermoplastic is not used for pavement legends.</p>
<p>136. Pre-formed tape is used for street striping.</p>		<p>Pre-formed tape is not used for street striping.</p>
<p>137. Retroreflectometers are used to test the reflectivity of traffic regulatory signs.</p>		<p>Retroreflectometers are not used to test the reflectivity of traffic regulatory signs.</p>
<p>138. The organizational location of grounds maintenance is appropriate.</p>		<p>The organizational location of grounds maintenance is not appropriate. It duplicates services provided by the Parks and Recreation Department.</p>

7. TRAFFIC ENGINEERING

Best Management Practice	Strengths	Opportunities for Improvement
Transportation Planning		
<p>139. Traffic Engineering has developed a formal written citywide Transportation Master Plan that identifies citywide traffic and transportation deficiencies and weaknesses, and recommends solutions and funding mechanisms for these improvements.</p>	<ul style="list-style-type: none"> • The Corridor MPO has developed a formal written Transportation Master Plan – Connections 2040. • The City, as part of the update of its general plan, is also updating its circulation element. • The City has developed and recently adopted a citywide Complete Streets Policy. • The City developed a Comprehensive Trails Plan in 2012 that included bicycle trails. 	<ul style="list-style-type: none"> • There appears to be little in the way of long-range transportation planning by Traffic Engineering • Traffic Engineering is not meaningfully participating in the update of the circulation element for the City's general plan. • Traffic Engineering has not developed a transportation master plan for the City itself to improve transportation safety, mobility, and reliability focusing on city issues such as traffic management (e.g., intersection improvements), traffic safety (e.g., mitigating high-accident intersections), traffic channelization (1-way versus 2-way streets), local street connectivity, pedestrian systems (e.g., sidewalks), parking management, etc.
<p>140. Traffic Engineering has developed and continuously updates a citywide traffic model that can forecast the traffic generated by increased roadway capacity and the effects this will have on downstream congestion, roadway costs, parking costs, pollution and sprawl.</p>	<p>The Corridor MPO has developed and continuously updates a regional traffic model.</p>	<p>Traffic Engineering has not developed and does not continuously update a citywide traffic model.</p>

Best Management Practice	Strengths	Opportunities for Improvement
Traffic Engineering		
141. Traffic Engineering has identified the levels of service (LOS) for its signalized intersections. ¹		Traffic Engineering has not identified the Levels of Service for its signalized intersections.
142. A total of 95% of all signalized intersections meet the City's LOS standards		Traffic Engineering has not identified the Levels of Service for its signalized intersections.
143. A traffic safety program in place to proactively identify high accident intersections and develop mitigation measures.	<ul style="list-style-type: none"> Over the past five years (2008 to 2012), the number of accidents in Cedar Rapids have decreased by almost 20% (although there was a 3% increase from 2011 to 2012). The reduction mirrors a trend in the State overall. The number of injury accidents over the past five years (2008 through 2012) have decreased by 22% although there was a 5% increase from 2011 to 2012). The reduction mirrors a trend in the State overall. 	<ul style="list-style-type: none"> A traffic safety program is not in place to proactively identify high accident intersections and develop mitigation measures. 5 of the top 200 accident intersections are located in Cedar Rapids. Traffic Engineering last generated an <i>Intersection Accident Summary</i> presenting the number of accidents, traffic volume, accident rate per million miles, and accident rank for intersections in Calendar Year 2005.
144. Traffic Engineering has developed and maintains a collision database system that can be utilized to identify high accident intersections.	Traffic Engineering began the maintenance in CY 2014 of a traffic collision database, tied to GIS, that can be used to identify high accident intersections.	

¹ Traffic engineers grade the operation of an intersection as A, B, C, D, E, or F level of service based on the amount of time each vehicle has to wait to go through the intersection during a particular hour. Grades give non-engineers a feel for how the intersection operates.

Best Management Practice	Strengths	Opportunities for Improvement
<p>145. On an annual basis, Traffic Engineering identifies all intersections and half-mile segments with three or more accidents in one year, analyzes the accidents that have occurred at these locations with collision diagramming software, and develops mitigation measures to reduce accidents such as revised signal operations (e.g., protected turns, longer clearance levels, etc.).</p>		<ul style="list-style-type: none"> • Traffic Engineering does not analyze intersections and half-mile segments with three or more accidents in a one year to develop mitigations measures to reduce accidents. • 5 of the top 200 accident intersections are located in Cedar Rapids. • Traffic Engineering last generated an <i>Intersection Accident Summary</i> presenting the number of accidents, traffic volume, accident rate per million miles, and accident rank for intersections in Calendar Year 2005.
<p>146. There is a formal written policy for the calculation of vehicle clearance intervals that reflects the differences in traffic characteristics at intersection approaches.</p>		<p>There is a not a formal written policy for the calculation of vehicle clearance intervals.</p>
<p>147. There is a formal written policy for the calculation of pedestrian clearance intervals that reflects the intersections at which pedestrians have special needs (e.g., children, elderly, handicapped, etc.).</p>		<p>There is a not a formal written policy for the calculation of pedestrian clearance intervals.</p>
<p>148. Traffic Engineering conducts traffic alignment studies on an ongoing annual basis to identify opportunities to improve traffic flow, reduce congestion, etc.</p>		<p>Traffic Engineering does not conduct traffic alignment studies on an ongoing annual basis.</p>
<p>149. A traffic improvement program is in place to proactively design and implement traffic system management measures on an annual basis to reduce traffic congestion and travel time delay</p>		<p>A traffic improvement program is not in place to proactively design and implement traffic system management measures on an annual basis.</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>150. A computer forecasting model is utilized to assess the trips generated by development, model different land use options, develop long-term forecasts of traffic, and the benefits of mitigation measures.</p>		<p>Traffic Engineering does not have such a model and modeling, when needed, is performed by the Corridor MPO.</p>
<p>151. Traffic Engineering maintains a traffic count program, conducting biannual counts on major arterial roads and collector streets, and specific location counts for special needs. Traffic counts are used as a baseline for evaluating the impact of additional traffic from new developments; to help traffic engineers create coordinated traffic signal timing along arterial streets; to track upward and downward trends that are used for long range planning; to determine the need for additional left or right turn lanes at intersections; and for specific traffic-related requests and studies</p>	<p>60 of the City's 230 intersections have automated traffic counters using the detection equipment at these signalized intersections.</p>	<p>Traffic Engineering maintains a traffic count program, and does not publish or report the or does it place traffic counters traffic counts at the 60 intersections, nor does it place</p>
<p>152. Traffic Engineering calibrates the timing the traffic signals and signal systems each year, and on a system wide basis on a three to five year cycle. Traffic signal optimization software is utilized for simulation of optimized timing, field installation, and observation and fine-tuning.</p>		<p>A citywide comprehensive recalibration of traffic signals has not been performed since 1987.</p>
<p>153. Signal optimization software (Synchro) is utilized for calculating signal timing and evaluating alternative phasing.</p>	<p>Traffic Engineering has acquired Synchro software.</p>	<p>Traffic Engineering does not utilize Synchro on an ongoing basis to evaluate signal timing on a citywide basis.</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>154. Traffic responsive or traffic adaptive signal controllers are used for signalized intersections with peak AM and peak PM traffic flows adjust the timing of signals at critical intersections in real-time and provide the automated flexibility to change the timing of signals in response to both daily and seasonal traffic patterns.</p>		<p>Traffic responsive or traffic adaptive signal controllers are not used for signalized intersections with peak AM and peak PM traffic flows.</p>
<p>155. Field reviews of signal operations are performed annually at all of the City's signalized intersections to reveal intersections with correctible operational problems such as unused green time at congested intersections or blockages from left-turn lanes.</p>		<p>Field reviews of signal operations are not performed annually at all of the City's signalized intersections.</p>
<p>156. Signal timing with adjacent intersections is coordinated using a common database.</p>		<ul style="list-style-type: none"> • Signal timing with adjacent intersections is not coordinated. • A citywide comprehensive recalibration of traffic signals has not been performed since 1987
<p>157. Traffic Engineering has developed a comprehensive inventory of approved signal phasing and timing settings for each intersection.</p>	<p>A signal phasing and timing database is maintained in the City's Actra traffic signal software.</p>	
<p>158. Traffic Engineering has developed and adopted written standard specifications for traffic infrastructure such as guidelines for driveway location and design, guidelines for urban major street design, guidelines for residential subdivision street design, etc.</p>	<p>The City has adopted written standard specifications for traffic infrastructure that are loosely based on the Iowa Urban Design and Specifications (SUDAS).</p>	<p>Some of the City's standards are inappropriate. Commercial curb cuts, for example, are allowed 10 feet from the radius of an arterial with the minimum distance between driveways on the same lot for commercial being 60 feet.</p>

Best Management Practice	Strengths	Opportunities for Improvement
159. The City has installed and utilizes a state-of-the-art intelligent transportation system	Over the next two years, Traffic Engineering and Information Technology will be deploying a state-of-the-art intelligent transportation system.	The City's Actra traffic signal software is obsolete.
160. The number of authorized positions for traffic engineering is comparable to cities of comparable population.		
Traffic Signal Maintenance		
161. Traffic Engineering has developed and maintains a traffic signal inventory that encompasses pole types, LED's, signal framework, controller cabinet contents, equipment serial numbers, etc.	Traffic Engineering has basic fixed assets data (i.e. location) on the GIS for traffic signals and streetlights. Traffic Engineering has initiated the process to maintain inventory on the EnerGov system.	Approximately 50% of the signalized intersection assets have been documented in EnerGov.
162. All of the traffic signal lamps have been converted to LED (light emitting diodes).		Not all of the traffic signal lamps have been converted to LED.
163. Traffic signals at critical intersections have been converted to UPS (uninterruptible power source).		Traffic signals at critical intersections have not been converted to UPS (uninterruptible power source).
164. Traffic signal cabinets are preventively maintained once a year including performing the input / output test, cleaning the cabinet, checking detectors, testing the conflict monitor, and a visual inspection.		Traffic signal cabinets are not preventively maintained once a year
165. An effective replacement program for signal controllers has been developed and deployed. Signal controllers are replaced once every ten years.		An effective replacement program for signal controllers has not been developed and deployed. Signal controllers are not replaced once every ten years.

Best Management Practice	Strengths	Opportunities for Improvement
<p>166. The traffic signals and the signal controllers are compliant with National Transportation Communications for Intelligent Transportation System Protocol (a family of standards designed to achieve interoperability and interchangeability between computers and electronic traffic control equipment from different manufacturers) to enable communication between different traffic control equipment manufacturers. Products that support NTCIP standards enhance the possibility they will remain interoperable and not quickly become out-of-date, and enable exchange of information between different agencies and systems, helping bridge gaps in cross-jurisdictional communication.</p>		<p>The traffic signals and the signal controllers are not compliant with National Transportation Communications for Intelligent Transportation System Protocol.</p>
<p>167. Traffic signal technology has been acquired that enables the traffic signals to page signal technicians when it goes to “flasher.”</p>		<p>Traffic signal technology has not been acquired that enables the traffic signals to page signal technicians when it goes to “flasher.”</p>
<p>168. The number of staff authorized to maintain and repair traffic signals approximates one technician per 35 to 40 signalized intersections.</p>	<p>The number of staff authorized to maintain and repair traffic signals approximates one technician per 35 to 40 signalized intersections.</p>	
<p>169. The number of staff authorized for street light maintenance and repair approximates 6,500 streetlights per technician.</p>	<p>The number of staff authorized for street light maintenance and repair approximates 6,500 streetlights per technician.</p>	

8. ENGINEERING

Best Management Practice	Strengths	Opportunities for Improvement
<p>170. The ratio of supervisory and support positions to line employees in the Engineering Services is reasonable.</p>		<p>The span of control for the Engineering Services Director is larger than one individual can reasonably manager.</p>
<p>171. A five-year capital improvement program has been developed and adopted by the City Council and integrated into the City's annual operating budget</p>	<p>A 5-year CIP program has been adopted as part of the City's annual operating budget.</p>	<ul style="list-style-type: none"> • There is a 5-year Capital Improvement Program, however, the projects for the Paving for Progress / LOST and GRI have not been defined and priorities established. There is a definitional question regarding what is a capital project under LOST. For example are traffic signals, streetlights and poles and sidewalks including ADA required improvements eligible for funding with LOST. • The operating budget of the Sewer Maintenance Section includes \$13.4 million of capital outlay for projects such as Prairie Creek from J Street to the Cedar River project to replace 48 inch sanitary sewer with 60 inch sanitary sewer (FY 2014 project budget \$2.5M, and Indian Creek from Otis Road to Dry Creek project to replace 42 inch sanitary sewer with 60 inch sanitary sewer (FY 2014 project budget \$3.5M). These capital projects should be included in the 5-year CIP budget, and not the operating budget.
<p>172. A formal written capital improvement program prioritization process has been developed for the five-year capital improvement program.</p>	<p>An internal CIP Review Committee selects capital projects based on a variety of information.</p>	<p>There is no formal written program prioritization process.</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>173. Capital project proposal packages are developed that present needed information in a consistent format and with adequate depth.</p>	<p>Capital project proposal packages are developed and presented.</p>	<p>The CIP projects in the annual operating budget do not include a narrative overview of the project, time frame, individual responsible, funding required by year, a location map with a few project pictures.</p>
<p>174. When necessary, capital projects are proposed and budgeted by phase. This applies to large, multi-year projects that require significant community and stakeholder input or projects with limited funding or significant regulatory requirements.</p>	<p>Most projects (generally major) have varied multi-year phases to include environmental/design/construction, etc.</p>	
<p>175. Staffing requirements for all of the capital projects in the first year of the five-year capital improvement program have been identified.</p>	<p>All capital projects have total staff hour estimates.</p>	<p>Staff hour estimates by project need to be developed and charged to track design and construction management costs against each project. Currently a percentage allocation system is used based on the dollars of construction project in designed or being supervised.</p>
<p>176. Engineering Services has a systematic and formal process in place to determine whether an “alternative delivery” approach (e.g., Design-Build, Design-Build-Operate, Construction Management [CM] at Risk, self-performed construction, and other strategies) or the traditional Design-Bid-Build model would be most appropriate for increased quality and / or reduced cost for each project</p>		<p>Alternate delivery approaches are not fully considered.</p>
<p>177. The staffing for design of capital projects is based upon the use of cost of construction guidelines.</p>		<p>Cost of construction guidelines are used to identify Engineering staffing requirements</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>178. The staffing for the design and inspection of capital projects uses a resource loading approach (to avoid exceeding or underestimating staff capacity over a six to twelve month period) based on the use of cost of construction guidelines.</p>		<p>The staffing for the design and inspection of capital projects does not use a resource loading approach</p>
<p>179. Engineering Services has a clear design outsourcing strategy that focuses on core competencies and the continuity of the workload.</p>		<p>There is not a logical outsourcing philosophy. Small capital projects that should be designed in-house are outsourced.</p>
<p>180. Engineering Services has developed a fully documented / written capital project delivery approach and structure. This approach and structure clearly establishes how projects should be executed, including the roles, responsibilities, and measures of performance for all parties involved. This process should include not only individuals in this Engineering Services, but the ultimate "owner" of projects as well as any key support individuals or units.</p>	<p>A Designer's Guide is available.</p>	<p>The information is fragmented in several different locations on the computer system.</p>
<p>181. A different project control system is utilized for small capital projects than large i.e., use of standard designs, streamlined bidding process, site visits to equipment vendors, use of preferred construction vendors, etc.</p>	<p>The City Manager can award design contracts under \$25,000.</p>	<p>A formal response to a solicitation is required on projects over \$25,000 and a Public Hearing is required by State law when the about exceeds \$77,000. Internally the Department conducts a formal public hearing at \$65,000.</p>

Best Management Practice	Strengths	Opportunities for Improvement
182. Capital projects are scoped and cost estimates developed before the commencement of design.	Projects are scoped and estimated before design.	
183. A project manager is assigned to the management of the design, construction inspection, and construction management of capital improvement projects with the authority, expertise, and responsibility to keep capital projects within budget and on schedule for project development, design, construction inspection, construction management, and closeout.	Separate project managers are assigned for the design phase and the construction phase.	A project manager is NOT assigned with responsibility from Cradle to grave for CIP projects.
184. Standard design criteria (such as minimum grades for pipelines, maximum manhole spacing, etc.) have been established in writing.	Standard design criteria (such as minimum grades for pipelines, maximum manhole spacing, etc.) have been established in writing.	Standards for curb cuts be closely adhered to or an appropriate waiver issued based on sound engineering analysis and warranted special need or conditions.
185. An automated project management system has been acquired, and all of the engineering staff have been trained in and utilize the system.		The use of spreadsheets for project management and financial controls is extensive and time consuming. An automated project management system has not been acquired
186. The design consultant selection is qualification based.	Selection is qualifications as opposed to "low bid" based.	

Best Management Practice	Strengths	Opportunities for Improvement
187. An annual RFQ solicitation is used to develop an on-call list of pre-approved consultants.		The Public Works Department uses solicitation for every project.
188. A pre-qualification process is utilized for selecting design consultants for large and complex projects.	Large projects use the Request for Proposal process and sent to “qualified” vendors.	State Law requires that projects where design costs exceed \$77,000 a public hearing be held. The City’s internal policy is that when the \$65,000 threshold is reached, a hearing is held.
189. Design of capital projects are accomplished on a 2D CAD system.		Design of capital projects are not accomplished on a 2D CAD system.
190. Authority has been delegated to the Public Works Director to approve low dollar consultant and construction contracts.	Authority has been delegated to the city Manager.	Delegated dollar authority to the Department Director and Divisions Directors may be too low given best practice standards.
191. A consultant rating system is utilized that identifies and evaluates the quality of consultant performance.	Consultant ratings are not performed consistently done formally (e.g. narrative write-up) in a post-project conference. We would note that they are performed for State funded project as they are a requirement for project close out	While a rating system exist it is not used for locally funded projects.
192. The location of capital projects are portrayed in the City’s GIS system and on the department’s web site.		The location of capital projects are not portrayed in the City’s GIS system and not on the department’s web site.
193. Designers are required to develop a formal written project plan and schedule prior to the commencement of design.	Project plans are developed on spread sheets.	Project plans and schedules are not completely defined prior to the commencement of design.

Best Management Practice	Strengths	Opportunities for Improvement
<p>194. Appropriate internal control exists for reviewing plans, specifications and bid documents prior to issuance</p>	<p>There is a 14 page form submitted for approval with the project drawings and specifications for the development of appropriate boiler plate for the bid documents</p>	<p>This process works well; however, all final reviews are performed on all projects by the Engineering Manager who must sign off before a bid is let. The volume of work is too great and will only increase with the funding of additional projects. Therefore a system needs to be developed to delegate some projects to other staff members.</p>
<p>195. The capital project plan and schedule are reviewed with customers / stakeholders before the commencement of design.</p>	<p>Developed schedules are reviewed with stakeholders</p>	<p>.</p>
<p>196. When engineering design is provided for special revenue funds, internal service funds, or enterprise funds, the costs of design are charged to those funds.</p>	<p>Cost estimates are done and charged back to relevant funds.</p>	<p>Costs charged back are broader estimates as opposed to "actuals."</p>
<p>197. "Billability" targets have been set for the amount of hours that engineering staff charge to design and inspection of capital improvement projects and management monitors their success in meeting these guidelines.</p>		<p>There are no billability targets or performance standards for hours to be billed.</p>
<p>198. A Gantt chart schedule has been developed for capital improvement projects for a two to three year period that shows start and finish dates for projects.</p>		<p>A Gantt chart schedule has not been developed for capital improvement projects for a two to three year period that shows start and finish dates for projects..</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>199. There are clear, easily read capital improvement project status reports that match the level of detail needed by the expected audience.</p>		<p>There are no formal project status reports developed for the project end-user.</p>
<p>200. The customers receive quarterly project updates that contain status, schedule, task/time assessments, budget update, program update, potential problems, and critical issues.</p>		<p>There are no formal update reports developed for the project end-user.</p>
<p>201. A project cost accounting system is utilized to enable comparisons of planned versus actual staff hours for the design and inspection of capital projects.</p>	<p>A project cost accounting system is utilized. Comparison of estimates versus actuals are maintained in an Excel spreadsheet by Engineering Services, bit also and within the City's financial system.</p>	<p>The spreadsheets require a significant amount of time to maintain and the "official" information is contained in the financial records of the City maintained in the Finance Department. We recommend that the financial system reporting be tailored to meet the financial needs of Public Works.</p>
<p>202. Project managers have access to the automated financial management system to monitor the actual versus planned design, inspection, and construction costs for capital projects.</p>	<p>Project managers do not have access and/or knowledge to use fiscal information within the City's financial system.</p>	

Best Management Practice	Strengths	Opportunities for Improvement
<p>203. Engineering Services ensures that staff responsible for delivering capital projects are competent in performing their current and future project assignments. Engineering Services has established competency criteria for all key project management functions and activities, e.g., years of experience, professional certifications, education, and demonstrable capabilities in performing technical, engineering, and project management work from entry to advanced level. Engineering Services monitors training requirements for its staff, develops budgets and schedules to allow sufficient training, and maintains records of training and other professional development. These training activities are coordinated with Human Resources so that their training activities are complementary.</p>		<p>Engineering Services does not ensure that staff responsible for delivering capital projects are competent in performing their current and future project assignments</p>
<p>204. Contracts are let in a timely manner to maximize use of the construction season</p>		<p>A large number of contracts are let in the spring, summer and fall. This does not provide contractors the opportunity to plan their work and staffing requirements in the winter, potentially extending the length of the project and increasing the cost.</p>

Best Management Practice	Strengths	Opportunities for Improvement
<p>205. The Public Works Department effectively promotes competition in the construction contract bidding process.</p>	<p>The City has a policy to try to maximize the use of local construction firms by dividing larger projects into pieces or phases.</p>	<p>While the use of local contractors is admirable, recent bids appear to lack capacity in certain trades to perform the work. Some project bids were over the Engineer's Estimate of Cost and some received no bids at all. This will become more problematic as GRI and LOST projects come to fruition. E of larger bid [packages will enhance competition from contractors outside the area and reduce project costs.</p>
<p>206. The Public Works Department has developed a hydraulic modeling of the sanitary sewer collection system (all interceptors, trunks and collector lines) to determine the system capacity under dry weather and wet weather conditions and to enable the County to identify, characterize, and address hydraulic deficiencies.</p>		<p>The Public Works Department has not developed a hydraulic modeling of the sanitary sewer collection system</p>
<p>207. The Public Works Department has developed a hydraulic modeling of the storm drain system to determine locations where buildup of debris or sediment would produce an unacceptable loss of system capacity, and where cleaning is required on an ongoing basis. Pipes in some locations may be capable of conveying peak flows without cleaning. In other cases, the pipes may be self-cleaning if the flow ever becomes great enough.</p>		<p>The Public Works Department has not developed a hydraulic modeling of the storm drain system</p>

9. CONSTRUCTION MANAGEMENT

Best Management Practice	Strengths	Opportunities for Improvement
208. When construction inspection services are provided for special revenue funds, internal service funds, or enterprise funds, the costs are charged to those funds.	Time is billed to the project.	While cost data are collected at the project level, the information is hard to retrieve and therefore not used.
209. "Billability" targets have been set for the amount of hours that construction inspection staff charge for the inspection services of capital improvement projects and management monitors their success in meeting these guidelines.	Time is charged to projects through the City Financial system (PeopleSoft).	There are no billability targets or performance standards for hours to be billed. We recommend that targets and performance standards be established.
210. Construction Services uses standard forms for RFI's, change orders, pay applications, field clarifications, minutes of meetings, etc.	Standard forms are in place.	
211. Construction Services completes formal written post-project reviews for lessons-learned.		QA /QC is not done at a post-project conference.
212. For all major capital project management and inspection activities, the Division has developed measures or benchmarks to establish goals for project quality, time, costs, and customer satisfaction. Specific metrics have been developed to measure performance against project goals such as percent of projects on budget and schedule, size and number of change orders, and other key industry metrics.	Engineering Services has established the following goals: <ul style="list-style-type: none"> • 80% of projects within budget award plus 10%. • 80% of construction projects completed within the bid amount plus 5%. • 80% of the projects completed on time. 	Construction Services Division does not track and produce a report annually setting forth the results.

Best Management Practice	Strengths	Opportunities for Improvement
213. A formal written change order process is in place that defines all forms and methods necessary to finalize change orders.	A formalized change order process is in place.	
214. Change order authority has been appropriately delegated to the City Engineer and the Public Works Director for change orders up to the change order contingency.		Change order authority has been delegated as 10% of the project amount not to exceed \$25,000. Any amount in excess of that requires Council approval. This authority is low.
215. A change order contingency of 15% is set-aside at the start of a project.	A change order contingency of 10% is typically set-aside.	
216. A formal dispute resolution process is included in all contract agreements.	Formal dispute resolution has been standardized.	
217. Inspectors utilize automated input devices to record inspection results or display inspection history while in the field.	All inspectors have laptops or tablets to facilitate inspections.	PDA's and in-field software are not used to facilitate and record inspections.
218. Inspectors assure off-site compliance with NPDES requirements and City-Adopted best management practices to mitigate the impacts of construction on stormwater quality.	A standard checklist is in place to ensure compliance. This checklist can be modified dependent upon weather conditions.	
219. The inspectors and project manager make the final walk through of the project to develop a punch list of clean up items for the construction contractor.	A punch list is developed.	
220. After completion of the project, the construction contractor is required to complete as-built drawings	As-built drawings are required of the contractor as appropriate.	Historical as-built drawing may not be entirely complete or accurate.

Best Management Practice	Strengths	Opportunities for Improvement
<p>221. Nine months after substantial completion, the inspectors contact all applicable City Departments notifying them that the warranty period is expiring and any outstanding deficiencies should be reported.</p>	<p>Warranty information is <u>informally</u> tracked and notifications sent by email. A maintenance bond is required to cover utilities for four years and two years for other work (i.e. streets and curbs). .</p>	<p>A formal tracking system has not been established. Furthermore an E-mail notification is not sufficiently formalized whereby such records can be maintained in the project file for easy reference. The duration of the bonds is inconsistent.</p>
<p>222. Staffing for inspection of capital projects and private development projects are based upon cost of construction guidelines.</p>		<p>Staffing for inspection of capital projects and private development projects are not based upon cost of construction guidelines</p>
<p>223. A pre-construction conference is conducted at the beginning of each capital project construction contract. The prime contractor, pertinent subcontractors, the project manager, and inspector attend this conference.</p>	<p>Pre-construction conferences are always held. Both the Engineering and Construction Services participate. The meeting is chaired by Engineering Services and the project turned over to Construction Services at that time.</p>	
<p>224. The inspectors are responsible for checking and verifying the contractor's application for progress payment, and forwarding a recommendation of approved pay request for payment.</p>	<p>Inspectors are responsible for verifying and recommending progress payments. The request is routed to the Construction Services Manager for final approval.</p>	<p>The Finance Department sends an electronic notification of construction payments to the Engineering Services Manager for electronic signoff prior to the disbursement of funds.</p>
<p>225. Inspectors make the initial analysis of change order requests for capital projects.</p>	<p>Inspectors make the initial analysis regarding quantity, changes in site conditions and design, calling on Engineering Services for technical assistance as necessary.</p>	<p>Engineering Services is not advised when changes in design or a significant utility conflicts arise so these type issues can be minimized or avoided in the future.</p>

Best Management Practice	Strengths	Opportunities for Improvement
226. The inspectors maintain a personal project diary, prepare daily reports, and keep accurate records of change orders, correspondence, progress payments, shop drawings, project mix designs, material tests, samples and approved traffic control plans.	Personal diaries are maintained and included for each project.	
227. The inspectors verify the adequacy of construction survey and staking to ensure the work is correct including reviewing a sample of survey notes for grading, measurement of pay quantities, etc.	Pay quantities are verified.	Surveying and staking is not verified.
228. The inspectors schedule all testing with the contracted materials testing firm under current contract with the City and review the results of these tests.	Inspector's schedule and review materials testing.	
229. All materials are covered by adequate quality control and acceptance tests in accordance with the contract's schedule of test requirements. These tests include:		
<ul style="list-style-type: none"> Concrete cylinders shall be taken for each catch basin and specialty structure. Concrete tickets identified by location and station. 	A quality assurance program consistent with specifications is in place, consistent with this standard.	
<ul style="list-style-type: none"> Asphalt samples for gradation and oil content is taken every two hours of continuous paving. For T-Top and intermittent paving, samples are taken a minimum of every 200 tons 	IDOT standards are used and a quality assurance program consistent with the specifications is in place, consistent with this standard.	

Best Management Practice	Strengths	Opportunities for Improvement
<ul style="list-style-type: none"> For continuous paving, asphalt coring is done for each lane every five hundred feet. For T-Top paving, cores shall be taken every one thousand feet. For intermittent paving, cores shall be taken at the discretion of the Inspector. 	<p>IDOT standards are used and a quality assurance program consistent with specifications is in place, consistent with this standard.</p>	
<ul style="list-style-type: none"> Asphalt temperature is taken regularly during the paving process. This temperature reading is taken behind the laydown machine screed. The station and location of these readings are then be entered into the Inspector's Daily Report 	<p>IDOT standards are used and a quality assurance program consistent with specifications is in place, consistent with this standard.</p>	
<ul style="list-style-type: none"> Asphalt tickets are designated by lane, station, and date. 	<p>IDOT standards are used and a quality assurance program consistent with specifications is in place, consistent with this standard.</p>	
<ul style="list-style-type: none"> Asphalt samples for gradation and oil content shall be taken every two hours of continuous paving. For T-Top and intermittent paving, samples shall be taken a minimum of every 200 tons 	<p>IDOT standards are used and a quality assurance program consistent with specifications is in place, consistent with this standard.</p>	
<ul style="list-style-type: none"> For continuous paving, asphalt coring is done for each lane every five hundred feet. For T-Top paving, cores shall be taken every one thousand feet. For intermittent paving, cores shall be taken at the discretion of the Inspector. 	<p>IDOT standards are used and a quality assurance program consistent with specifications is in place, consistent with this standard.</p>	
<p>229. Newly constructed storm water mains are required to be videotaped before acceptance.</p>	<p>Videotaping is performed.</p>	

Best Management Practice	Strengths	Opportunities for Improvement
230. Newly constructed sanitary sewer mains are required to be air tested, flushed and cleaned, and videotaped.	Sanitary sewers are air tested.	
231. The construction contractors furnish product data, mix designs, shop drawings, material certificates and samples in sufficient detail to show complete compliance with all specified requirements.	The construction contractor furnishes data to show contract / specification compliance.	
232. The inspectors are given a copy of all approved submittals and shop drawings. During the construction phase, the Inspector verifies the products delivered to the project match the approved submittals.	Inspectors reconcile submittals and shop drawings with field observations.	
233. The inspectors are required to develop communication plans for the public for capital projects including the provision of notices to the public living in the project area regarding the project.	Inspectors oversee communications protocols that are required of contractor. These include flyers, weekly web updates, etc.	
234. Inspectors track warranty requirements and start and completion dates.	Inspectors track appropriate warranty information.	

Best Management Practice	Strengths	Opportunities for Improvement
235. Construction Management uses best practices for utility cuts including:		
<ul style="list-style-type: none"> The adoption of pavement deterioration fees in addition to right-of-way permit fees to be utilized for resurfacing of streets; 		There is no pavement deterioration or right-of-way permit fees and no fees are charged for new subdivisions or City utility cuts.
<ul style="list-style-type: none"> The requirement for a “T” trench cut; 	Required under certain circumstances (e.g. concrete).	“T” trench cuts are not required for asphalt pavements
<ul style="list-style-type: none"> The requirement for proper excavation backfill, compaction techniques, sufficient thickness of asphalt, and sealing of cut edges; and 	These protocols are followed.	
<ul style="list-style-type: none"> Utility cuts are inspected to verify compliance with the City’s standard specifications for utility cuts. 		Utility cuts are not inspected to verify compliance with the City’s standard specifications for utility cuts.



Attachment D – Best Practices Assessment of the Public Works Department

**BEST MANAGEMENT PRACTICE
FOR
MAINTENANCE
OF
PRIVATE STORM WATER FACILITIES**

CITY OF CEDAR RAPIDS, IOWA
PUBLIC WORKS DEPARTMENT
March 2008



Table of Contents

Preface	3
Detention Basin Maintenance	4
Rain Garden Maintenance.....	12
Underground Detention Maintenance.....	14
Fact Sheet – Urban Storm Water Retrofit.....	15

PREFACE

Purpose of this Best Management Practice

This practice has been developed to comply with requirements of the City's Municipal Separate Storm Sewer System (MS4) permit issued by the Iowa Department of Natural Resources. Permit Part II.B. "Areas of Commercial and Residential New Development or Redevelopment" requires the City to develop and distribute educational materials to property owners which outline proper maintenance procedures for privately owned storm water control devices.

Public Works' preparation of this document is intended to meet a permit requirement of the City's MS4 and is not an attempt to assume maintenance responsibilities of privately owned storm water management. This is to be used as a resource in the ultimate goal of reducing the impacts of post-construction site runoff.

The Public Works Department will provide technical and educational resources to the public and other City departments in improving water quality upon request. Any questions or comments regarding this document or water quality programs should be referred to:

Storm Water Utility Engineer
Cedar Rapids Public Works Department
(319) 286-5802

Detention Basin Maintenance



Your detention basin is a storm water Best Management Practice (BMP) designed to reduce the impacts of pollutants and increased storm water on local streams caused by development. It is an essential part of improving the quality of our streams, rivers, and lakes. However detention basins will fail prematurely if not properly maintained. Once a detention basin fails, it will no longer perform its intended function and it is often very expensive to replace.



Whether you are an individual property owner, homeowners' association member, or a residential/commercial property manager, this best management practice will provide you with instructions for storm water management facility maintenance. Routine maintenance will prolong the life of your detention basin, improve its appearance, reduce the potential of flooding and property damage, and enhance local streams.

Why are detention basins important?



When land is altered to build homes and other developments, the natural system of trees and plants over relatively spongy soil is replaced with hard surfaces like sidewalks, streets, decks, roofs, driveways, and lawns over compacted soils. As a result, less rainwater is soaked up and more rain runoff flows off the land at a faster rate. This can lead to streambank erosion within the local streams and possible downstream flooding.

In addition, pollutants in storm water include sediment, phosphorus and nitrogen from fertilizers, salts, and oil/ grease from roads and parking surfaces, and bacteria from pet waste. These pollutants, which result from a variety of common outdoor activities, degrade water quality and limit the habitat for wildlife in the stream. Every storm water detention basin located in Cedar Rapids plays an important role in improving and protecting water quality.



Detention basins help to slow the rate of runoff from the neighborhood and improve the quality of the storm water leaving the detention pond. They are important in protecting public and private property, public health and safety, and water quality. The basin collects and traps sediment from storm water that would otherwise end up polluting our rivers and streams and degrading the environment for fish, birds, and other wildlife.

The establishment of wetland vegetation within your basin as well as the creation of vegetated buffers or no-mow zones around the basin will help to improve water quality by filtering pollutants in storm water. This, in turn, helps to reduce algae growth within the basin and in downstream rivers, lakes, and streams.

Excess nutrients, including nitrogen and phosphorus, encourage algae growth. If fertilization of your property is necessary, use low-phosphorus, slow-release varieties. Laws including the Federal Clean Water Act, encourage or require the control of urban pollutants. As such, maintaining your BMP is an important part of Cedar Rapids' environmental protection efforts.

Do you have a detention basin near your property?



If your development was built after the mid-1990's, it may have a detention basin that manages storm water runoff. If you live in a residential community, your association bylaws or abstract may indicate the location and maintenance responsibilities for any detention basins. If you are unsure, contact the Cedar Rapids Public Works Department.

Are you responsible for detention basin maintenance?



Responsibility for maintenance varies by development. If your homeowners' association or business has a recorded maintenance agreement, you may be the responsible party. It is important to check your maintenance agreement to identify your specific legal obligations. If you are not sure who is responsible for maintenance, contact the City of Cedar Rapids.

Maintenance Tasks: Storm Sewer System

The storm sewer system includes pipes, intakes, and outlet structures that enter and exit the detention basin. It is important to regularly inspect the structural elements (pipes and grates) of your detention basin to ensure that storm water is flowing in and out of the pond as originally designed. Debris and sediment commonly clog detention basins and reduce the pond's overall effectiveness.

The following maintenance and inspection tasks should be included for the structural basin components. Also see the Detention Basin Inspection and Maintenance Record.

1. Inspect the inlet pipes and outlet pipes for structural integrity. (Annually) Check inlet/outlet pipes for structural integrity to ensure they aren't crumbling or broken.
2. Inspect riprap at the inlet pipes. (Annually) Replace when the riprap is clogged with sediment and debris.
3. Conduct routine inspections for trash or other debris that may be blocking the inlet or outlet pipes or emergency spillway. (Monthly and after rain events) Remove all trash and debris from the basin. Improperly maintained ponds can harbor breeding area for mosquitoes and reduce the storage volume of the pond.
4. Inspect and clean the storm sewer system and catch basins upstream from the detention basin. (Every 5 years or as needed)
5. Inspect for sediment accumulation at the inlet pipes. (Semiannually and after rain events) It's important to clean out sediment that might be restricting water flow. Remove accumulated sediment with a shovel and wheelbarrow if it is blocking water flow. Small amounts of removed sediment can be spread evenly on upland areas and seeded with natural vegetation.
6. Inspect the stone around the riser/standpipe (outlet pipe). (Semiannually and after rain events) If stone has accumulated sediment, vegetation and/or debris to an extent that water is not flowing through the stone and out of the pond as originally designed, then the stone should be replaced with clean 3" diameter stone choked with Class A road stone.
7. Inspect for excess sediment accumulation in the pond (Annually) Remove every 5-10 years or when the sediment accumulation is more than 6-12".
8. Have a Professional Civil Engineer inspect the pond to ensure it is functioning properly. (Annually) Compare existing conditions to as-built engineering plans.

Maintenance Tasks: Vegetation Management

Many detention basins rely on vegetation to filter sediment from storm water before it reaches the outlet of the basin and to prevent erosion of the banks and the bottom of the basin. Turf grass is the most common ground cover - although BMPs like rain gardens and wetland plants (wet ponds) can increase pollutant removal efficiencies.

In the spring and fall, inspect the vegetation along the side slopes/banks and in the basin. In the spring, dead cattails and other decomposing vegetation in the basin should be removed if they are clogging pipe openings. Eroded areas should also be repaired to minimize sediment entering the basin. Wetland vegetation that may be growing or has been planted in your detention basin will enhance the overall aesthetic appeal and reduce algae growth.

The creation of a vegetated “no-mow” zone (15’ to 25’) around the basin will also help reduce the amount of nutrients such as nitrogen and phosphorus entering the basin, and ultimately reduce algae growth in the pond. Wetland vegetation that may be found (or planted) in your basin includes Big Bluestem, New England Aster, Ironweed, Blue Flag Iris, Black-eyed Susan, Silkweed and Joe-pye weed. The following maintenance and inspection tasks should be included for proper vegetation management:

1. Re-establish permanent native vegetation on eroded slopes. (Annually in the spring and after rain events)
2. Maintain 15-25 foot “no-mow and chemical free” zone around the pond edge. (Annually)
3. Mow the “no-mow” buffer zone once a year to a minimum height of 6”. (Annually in late April/ early May) Rake mown material off and compost, burn or discard.
4. Inspect basin and “no-mow” zone for invasive species such as purple loosestrife, phragmites, buckthorn (common & glossy), honeysuckle and autumn olive that out-compete native vegetation. (Annually - July)
5. Have a professional selectively remove invasive species with applications of appropriate herbicides. (Annually - July/August) If woody debris is cut, cut 4” above the ground surface and treat the stumps with herbicide immediately after cutting. Monitor for sucker growth.
6. Purple loosestrife flower heads can be clipped off to reduce seed production until plant removal may be achieved. Pulling purple loosestrife is not an effective removal method. Pulling purple loosestrife may actually encourage plants to multiply. Herbicide application of plants is the most efficient method. If stands of loosestrife are dense, it may take several years of maintenance to eliminate the plants from the site. Apply one round of herbicide in mid-July. Reassess the site three weeks after application to ensure all plants have been treated successfully. Apply additional herbicide treatment as necessary.
7. Increase plant diversity. (Annually - fall or early spring) Purchase native seed mix and wetland vegetation from a native plant nursery and install plantings in the early spring or fall. Increasing plant diversity in your basin will enhance water quality, minimize algae blooms and encourage habitat for birds, frogs & toads and other wildlife.

Native vegetation and seed mixes may be purchased through a number of local plant nurseries.

Maintenance Tasks: Property Management

Property management refers to specific activities that you as a property owner can do to enhance the detention basin and minimize long-term maintenance. A number of these activities are described as follows:

1. Do not use pesticides, herbicides, or fertilizers in your pond. These products will leach from the pond and pollute our streams and rivers. In addition, these chemicals are harmful to wildlife, including frogs, toads, fish, dragonflies, etc. in the pond.
2. Do not place yard waste such as leaves, grass clippings or brush in the detention pond or in the storm drains located in the streets. These materials release excess nutrients as they decompose and will lead to more algae growth in the pond.
3. Do not dump any materials in the storm sewer system. Improperly disposed of materials will pollute the basin.
4. Consider contracting with a street sweeping company to minimize excess sediment from entering your storm sewer system and detention basin. This can reduce the need for future pond maintenance.
5. If you must use fertilizers, only use low-phosphorus, slow-release varieties. Keep fertilizers on the lawn and not on paved areas.
6. Pick up and dispose of pet waste with your weekly garbage.
7. Provide educational updates to the property owners. Discuss your maintenance plan at regular meetings, provide information in newsletters, and host annual clean-up days.



Detention Basin Inspection and Maintenance Record – Sheet 1

Task	Inspection Frequency	Year _____		
		Contractor (Name & Phone #)	Cost	Notes
Detention Basin Vegetation				
Inspect the inlet pipes and outlet pipe for structural integrity	Annually			
Inspect riprap at inlet pipes	Annually			
Conduct routine inspections for trash or other debris that may be blocking the inlet or outlet pipes or emergency spillway	Monthly and after rain events			
Inspect and clean the storm sewer system and catch basins upstream from the detention basin	Every 5 years or as needed			
Inspect for sediment & trash accumulation at the inlet pipes	Semiannually and after rain events			
Inspect the stone around the riser/standpipe (outlet pipe)	Semiannually and after rain events			
Inspect the riser/standpipe cover for trash and debris	Monthly and after rain events			
Inspect for excess sediment accumulation in the pond	Annually			
Remove accumulated sediment at basin inlets or in basin forebay	Semiannually and after rain events			
Have a Professional Civil Engineer inspect the pond to ensure it is functioning properly	Annually			
Have a Professional Civil Engineer inspect all outlet control structures to ensure they are functioning properly	Annually			

Detention Basin Inspection and Maintenance Record – Sheet 2

Task	Inspection Frequency	Year _____		
		Contractor (Name & Phone #)	Cost	Notes
Detention Basin Vegetation				
Inspect side slopes, berms and spillways for erosion	Annually and after rain events			
Re-establish permanent native vegetation on eroded slopes	Annually and after rain events			
Maintain 15-25 foot “no-mow and chemical-free” zone around the pond edge.	Annually			
Mow (or burn) the “no-mow” buffer zone once a year	Annually late April / early May			
Inspect basin and “no-mow” zone for invasive species such as purple loosestrife, phragmites, buckthorn (common & glossy), honeysuckle and autumn olive that out-compete native vegetation.	Annually July			
Have a qualified professional selectively herbicide invasive species	Annually July / August			
Increase plant diversity by planting additional vegetation in around the pond	Annually fall or early spring			
Property Management				
Common area maintenance	Annually			
Street sweeping	Semiannually			
Inspect basin for signs of chemicals (solvents, gas, diesel, paint, natural gas). Identify and remove / dispose of properly	Monthly and after rain events			
Review maintenance plan	Annually			

Bio-retention “Rain Garden” Maintenance

Bio-retention, or “rain gardens” are vegetated basins designed to mimic the conditions found in a mature forest floor. Acting as a sink and underlain with engineered layers of soil, sand, and organic mulch, runoff is trapped and treated by vegetation and microbes. A



native rain garden is not maintenance free and will regularly need some maintenance to remove weeds and dead plant material. Fortunately, time spent caring for the garden decreases over time. Native rain garden plants do not need fertilizers, winter protection or irrigation. Native plants are adapted to the climate and soils and can tolerate excessive heat, bitter cold, drought, and flooding.

The first two years require the most care while the plants are establishing themselves in the garden. As they are maturing during the first year, they need regular watering to encourage good root development. Irrigate the plants so the water soaks deeply into the ground. Short sprinkles of water encourage the roots to grow along the surface. When roots grow along the surface plants are less hardy during droughts and freezing temperatures.

Pull weeds to reduce competition for space, light, and water. Most weeds are pioneer species, which means they can grow very quickly. They fill in the open spaces and often can crowd out new rain garden plants. Additionally, they give the garden a messy, unkempt appearance. Spreading a three inch layer of wood chip or leaf mulch around the new planting helps control some of these uninvited species.

Much of the maintenance during the establishment years occurs during the summer months. Therefore, before summer vacation, enlist volunteers to monitor, water, and weed the garden during summer vacation. Local garden clubs, summer school students, scout troops, and families may be willing to volunteer during the summer.

Year 1

Watering

- For the first three weeks after planting, water the rain garden once per week. It is not necessary to water during a given week if one–inch of rain accumulates.
- Water the garden during droughty periods in mid-summer, if needed.

Weeding

- First identify what is a weed and what is a rain garden plant. Rain garden plants may be marked with planting stakes.
- Remove plants carefully so not to disrupt the rain garden species. Pull from the base of the plant. It is easier to pull weeds when the weeds are young and small.
- Dispose weeds in your yard waste container or place in a compost pile.
- Check status of weeds and pull them, if necessary, once every three weeks during the summer. A layer of mulch helps to reduce weed growth and weeding time.

Year 2

Watering

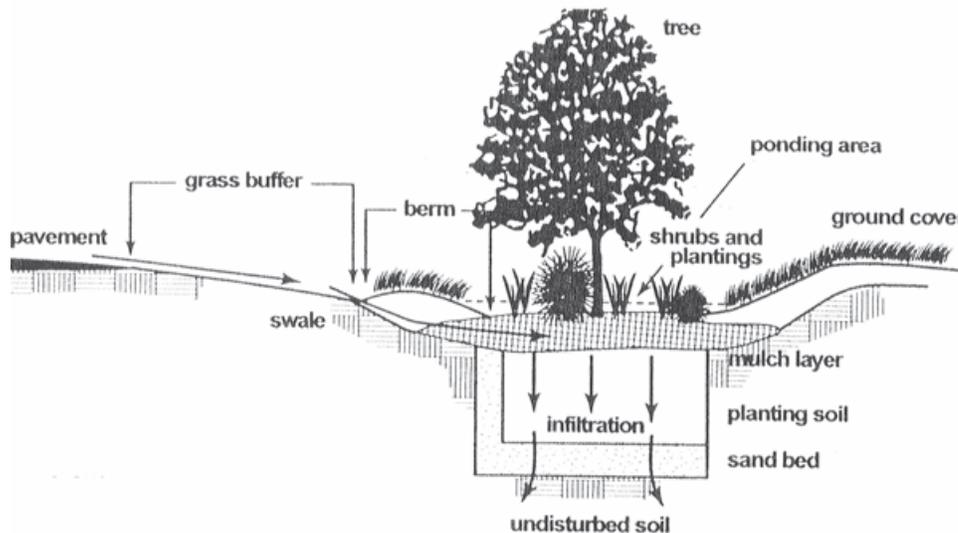
- Water only if in a drought.

Weeding

- Continue weeding as needed. Rain garden plants will fill in the spaces and form a dense root mass, which will significantly reduce weeding over time. It is still worthwhile to monitor the garden for weeds once every three to four weeks during the summer.

Maintenance is required when:

- Litter accumulates in the rain garden.
- Standing water is visible in the basin 72 hours after a rain event.
- Insects and/or odor become problems.
- Vegetation is wilting, discolored, or dying.
- Erosion is visible within the basin, on the berm, or on the slopes.
- Settling has occurred along the berm, if present.
- The overflow riser or grate is covered by debris.
- In spring when new growth begins, cut off dead plant material. (Keep stems and seed heads on during winter for visual interest, wildlife cover, and food for birds.)



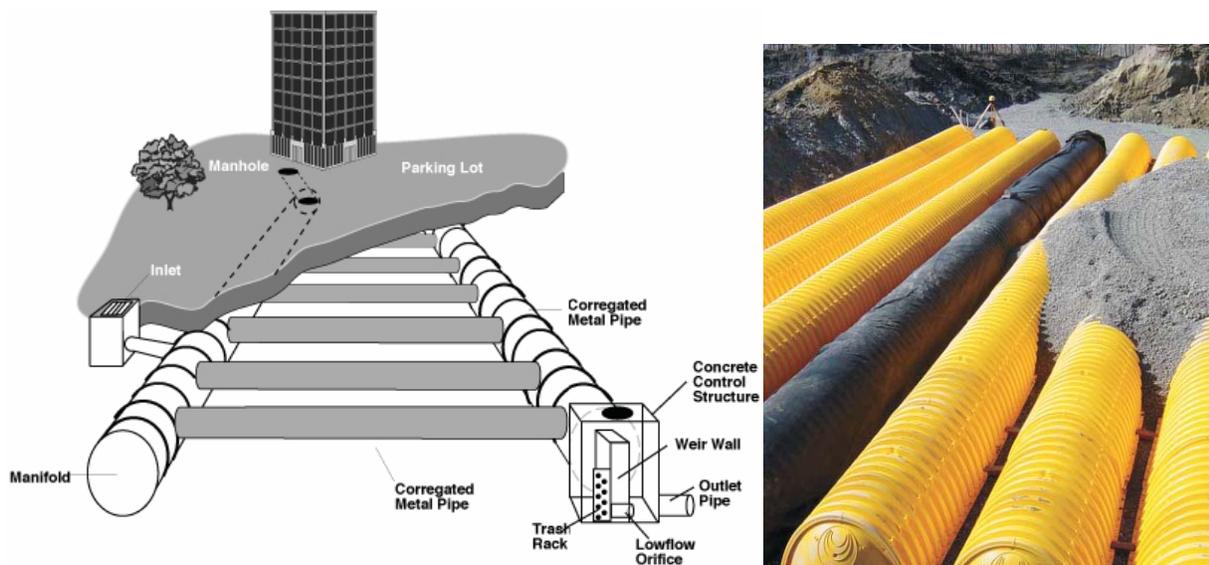
Underground Detention Maintenance

Underground detention consists of large underground pipes that provide storage and water quality treatment. Underground detention is often used in space limited areas, such as parking lots in commercial and industrial developments, where adequate land for a surface BMP facility is not available. Subsurface detention facilities are commonly associated with other manufactured pretreatment facilities to improve water quality before the storm water is released.

Establish a routine inspection schedule. This will be determined by the land use, anticipated pollutant load, imperviousness of the site, and climate. In the first year of operation, inspect the facility every six months. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

Maintenance is required when

- Significant amounts of trash and/or sediment has accumulated in the vaults or tanks. Clean when the depth of sediment exceeds three inches.
- There is visible damage to the inlets or outlets.



NOTE: If entry into a manhole is required, please follow OSHA rules for confined space entries.

Urban Stormwater Retrofit BMPs

Stormwater Detention Basins

The traditional approach to storm water management has been to quickly drain storm water off urban landscapes. This increases the volume and the rate of storm water runoff, which compounds flooding problems. Storm water detention basins have been used to manage the release rate and to control flooding. Although peak flows in stream corridors are decreased by storm water basins, the extended duration of elevated flows can cause stream bed and bank erosion. This degrades water quality and causes property damage.

The glaring deficiency of detention based stormwater management is that basins don't manage runoff from frequent, small rains. The first flush of large storms also moves rapidly through detention basins. Therefore, basins generally do not provide the needed water quality protection.

The new storm water paradigm calls for adding water quality protection to flood control priorities. Water quality can be protected by managing runoff from low intensity rainfall events. Managing runoff from small rains typically involves infiltration and filtration practices. Retrofitting existing detention basins can incorporate water quality protection components.

Stormwater Basin Retrofit Considerations

- ◆ Modify the outlet control structure-
Modify to retain water from small storm events
- ◆ Replace turfgrass with native vegetation-
Use native trees, shrubs, and grasses
- ◆ Install a sediment forebay-
Small basins help to trap sediment in vegetation
- ◆ Increase the time it takes water to travel thru the basin-
Increase flow length with small berms
Remove the low-flow concrete channels
- ◆ Increase infiltration opportunities in the basin-
Soil quality restoration with tillage and soil ammendments,
plant with native vegetation



A typical basin that could benefit from a water quality retrofit.

Resources

Iowa Stormwater Management Manual

<http://www.ctre.iastate.edu/PUBS/stormwater/index.cfm>

<http://www.ctre.iastate.edu/PUBS/stormwater/documents/Part2GDetentionPractices.pdf>

Minnesota Stormwater Manual- SW Ponds

<http://www.pca.state.mn.us/publications/wq-strm9-26.pdf>

Plants for Stormwater Design

<http://www.pca.state.mn.us/publications/manuals/stormwaterplants.html>

Villanova Urban Stormwater Partnership

<http://www3.villanova.edu/VUSP/bmp.html>

Case Studies

PEC's Stormwater Management Facility Retrofit Program

http://www.pecpa.org/_final_pec/html/Detention%20Basin%20Fact%20sheet%20FINAL.doc

Stormwater Basin Retrofit- Chester County WaterWays

<http://dsf.chesco.org/water/lib/water/pdf/newsletter/waterways1006.pdf>



A basin planted to natives with water quality benefits.



This information was compiled by ISWEP to build awareness of new or improved ways to protect water quality by retrofitting existing stormwater management facilities. ISWEP does not endorse any specific products or techniques.

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