AURORA WATER DEPARTMENT STORMWATER DIVISION OPERATIONAL PLAN 2013

AURORA WATER

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STORMWATER OPERATIONAL PLAN

INTRODUCTION

Stormwater is a division within the Aurora Water Department.

Aurora Water's Mission
Provide safe and dependable water services for the citizens of Aurora.

Aurora Water's Vision
To become a recognized leader in the Water Industry

Aurora Water's Values
Customer Service, Teamwork, Integrity, Excellence, Innovation

The purpose of this Operational Plan is to give the reader a base understanding of what the core functions of the Stormwater Division are, and how, where, when, and why the SW staff performs these tasks.

The City of Aurora Stormwater Division (SW) performs many core stormwater and flood management functions and provides many services to the city's residents, other city departments, the Mayor and City Council, other municipalities, and other government entities. It is Stormwater's mission to be as cooperative, responsive and as efficient as possible when dealing with concerns related to stormwater management.

The Aurora Water Department operates a Drainage Enterprise Fund for the purpose of constructing and maintaining an efficient storm drainage system. The City Code defines this system in section 17-17 as "All drainage facilities owned, operated or maintained by the city which are used for the conveyance, control or storage of stormwater to, through and from drainage areas to points of final outlet, including but not limited to any and all of the following: conduits, canals, ditches, channels, streams, gulches, gullies, flumes, culverts, streets, curbs, gutters, catch basins, detention and retention ponds, siphons, bridges, pump stations, and all features appurtenance thereto. (Code 1979, 17-17; Ord. No. 2005-74, I, 10-10-2005).

The Stormwater Division is responsible for the cleaning and maintenance of the City's curb inlets, storm drains, detention ponds, and storm channels; removing sediment and vegetation from channels, forebays, and ponds; revegetation associated with channels and ponds; maintaining handrails and other fall protection devices for the public using stormwater facilities; flood management; and snow removal.

The Stormwater conveyance system is maintained by 26 Full Time Employees and a varying number of seasonal employees (4-6) hired May – October. The City is divided into three stormwater geographical areas: South, Central, and North.

Administrative support includes requisition of purchase orders, payment of invoices, payroll, and personnel management.

COA Stormwater Facilities Inventory:

Manholes	6,991
Inlets	8,190
Outfalls	2,032
Flap Gates	18
Miles of Storm pipe COA	369.72
Miles of Levee	0.5
Miles of All City Owned Drainage Ways	76.3
Miles of Concrete Boxes and Box Culverts	7.1
Miles of Earthen Channels (Developed w/improvements)	68.0
Miles of Concrete Channels	8.5
Easements earthen (Acres)	1,251.8
Easements (UDFCD maint)	94.7
Ponds (COA)	19
Detention ponds (COA)	26
Water Quality Ponds (COA)	39
Regional Water Quality Ponds (COA)	2
Dams	3
Gate Valves (for ponds)	7
Ponds (Private)	57
Detention ponds (Private)	331
Water Quality Ponds (Private)	287
Box culverts/concrete boxes	222
Concrete overflow tracts	146
Earthen overflow tracts	59

CUSTOMER SERVICE

As shown throughout this manual, the City of Aurora Stormwater Division (SW) provides many services to the city's residents, other city departments, the Mayor and City Council, other government entities, such as, Urban Drainage Flood Control District, Army Corp of Engineers, and other municipalities. It is SW's mission to be as cooperative, responsive, and as efficient as possible when dealing with these other entities' concerns.

SW receives complaints and concerns in several ways: direct calls to SW, calls through the Operations Service Center, requests through Access Aurora, calls through the Flow Control Center (FCC), or issues identified in a City Council Request. The following is the procedure whereby SW receives, processes, investigates, takes action on, and follows up on the reported concern or issue:

- **During normal business hours, 7:00 AM - 3: 30 PM:** calls to wastewater, stormwater and/or environmental compliance go to **303-326-8050** either directly or via transfer from the Operations Service Center or another city department.

    1. Citizen or customer calls will be answered by the Stormwater/Wastewater administrative staff. SW/WW administrative staff collects the appropriate information, including name, time, phone number, address, and information about the citizen/customer concern.
    2. SW/WW administrative staff communicates to the citizen/customer that personnel from the appropriate SW or WW division will contact them and/or respond to the concern ASAP.
    3. SW/WW administrative staff determines which SW supervisor (north, central or south) should respond to the concern and communicates the information required to initiate a response.
    4. The supervisor will investigate the issue either directly or thru delegation. During the investigative process, the supervisor or a designee will initiate contact with the citizen/customer via phone or an on-site meeting. The supervisor or designee will explain the city's responsibility as it relates to the identified issue and provide any required contact information.
    5. The supervisor or designee will create a *SW/WW OPS Incident Report* that includes all of the information that was obtained during the site visit and/or conversations with the concerned party and information gathered by SW/WW administrative staff.
    6. The completed *SW/WW OPS Incident Report* is given to the Supervisor and Superintendent for review; if follow up actions are required to complete the report, the required follow up activities are completed and documented on the report and the report is re-submitted to the Supervisor and Superintendent.
    7. The completed *SW/WW OPS Incident Report* is documented in HANSEN and the hardcopy is filed by the SW/WW administrative staff.
    8. SW/WW administrative staff will summarize the information from the *SW/WW OPS Incident Report* and include this information in the Weekly Report.
    9. The SW superintendent reviews the Weekly Report and makes appropriate changes before it is forwarded to Aurora Water administrative staff.

- **Outside of normal business hours:** calls are received by the Flow Control Center (FCC) **303-739-6741**

    1. FCC collects all of the required information from the citizen/customer.
    2. FCC logs all calls and associated activities on the AWFCC daily events log.
    3. FCC contacts the Wastewater on-call personnel (this person covers all Stormwater, Wastewater and Environmental initial contacts) and gives that person the required information. Except for during the Rain Watch season when SW staff is on call for flooding related emergencies.
    4. The on-call WW staff person will investigate the issue and will make any necessary contacts with the on-call supervisor, if the situation requires this elevated level of communication. Either the WW on-call staff person or the supervisor will initiate contact with the citizen/customer about the city's responsibility or resolution.
    5. The supervisor or WW on-call person will create a *SW/WW OPS Incident Report* with all of the information that was attained during the incident, including information gathered by FCC and the necessary field work.
    6. The completed *SW/WW OPS Incident Report* form is given to the Supervisor and Superintendent for review the following business day; if there is a need for follow up, the required activities are completed and the report is re-submitted to the Supervisor and Superintendent.
    7. The completed *SW/WW OPS Incident Report* form is documented in HANSEN and the hardcopy is filed by the SW/WW administrative staff.
    8. The completed Citizen Response hardcopy is kept on file for two years.

- **Access Aurora requests**

    1. The SW Superintendent receives a copy of an Access Aurora request from Aurora Water Administration via email.
    2. The Access Aurora request is reviewed and assigned to the appropriate SW supervisor.
    3. The supervisor will investigate the issue either directly or thru delegation. During the investigative process, the supervisor or a designee will initiate contact with the citizen/customer via phone or an on-site meeting. The supervisor or designee will explain the city's responsibility as it relates to the identified issue and provide any required contact information.
    4. The supervisor or designee will create a *SW/WW OPS Incident Report* that includes all of the information that was obtained during the site visit and/or conversations with the concerned party and information gathered by SW/WW administrative staff.
    5. The completed *SW/WW OPS Incident Report* is given to the Supervisor and Superintendent for review; if follow up actions are required to complete the report, the required follow up activities are completed and documented on the report and the report is re-submitted to the Supervisor and Superintendent.
    6. The completed *SW/WW OPS Incident Report* is documented in HANSEN and the hardcopy is filed by the SW/WW administrative staff.
    7. SW/WW administrative staff will summarize the information from the *SW/WW OPS Incident Report* and include this information in the Weekly Report.

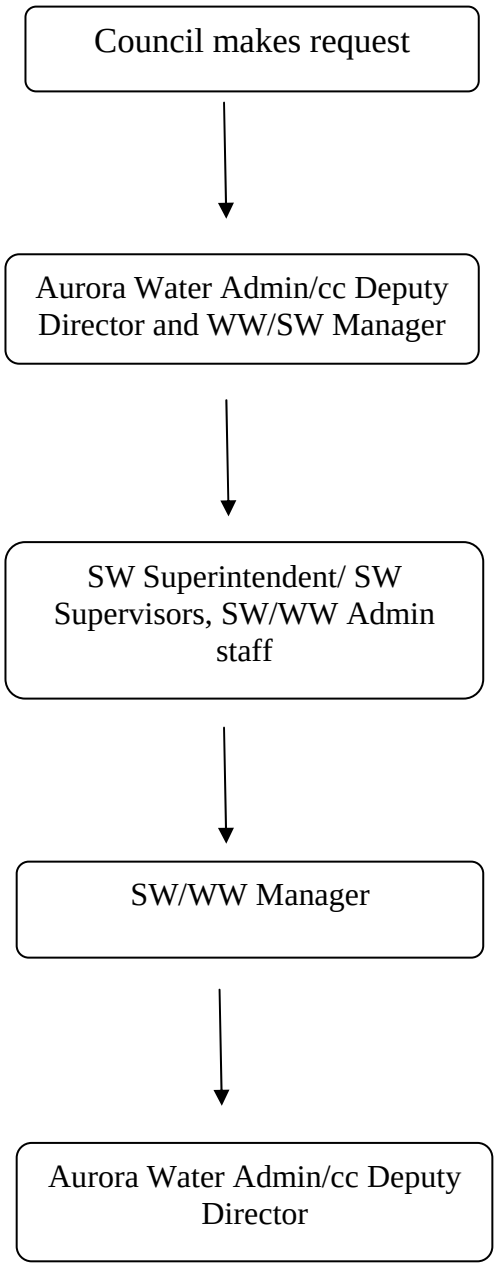
8. The SW Superintendent prepares a response memo to the Access Aurora request that summarizes the issue and the resolution. This memo is routed through the SW/WW Manager to Access Aurora and is sent to the appropriate Aurora Water Administration administrative staff person who then forwards the response to Access Aurora.

- **Aurora City Council Requests: typically a three day response time**

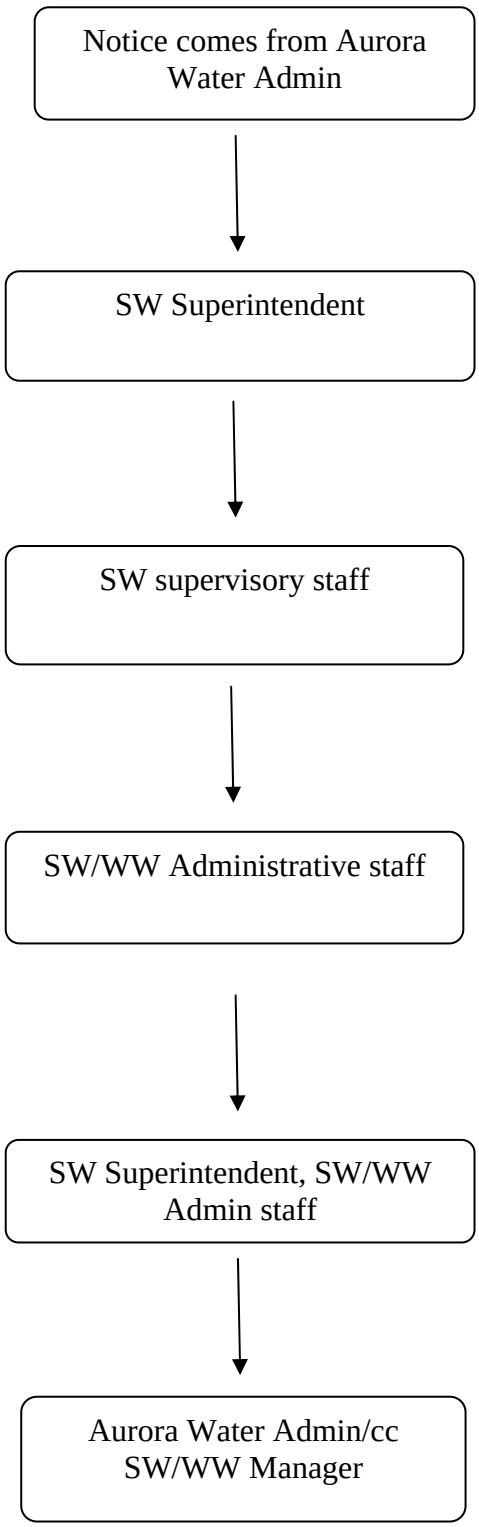
1. Council Requests are forwarded by Aurora Water Administration to the SW/WW Manager and then to the SW Superintendent for further investigation.
2. The SW Superintendent, SW supervisors and SW staff investigate the issues associated with the Council Request.
3. The SW Superintendent summarizes the findings associated with the request and provides a summary to the SW/WW Manager.
4. The SW/WW Manager responds to the Council Request and this response is forwarded to the Deputy Director and Aurora Water Administration.

A copy of the *Stormwater Wastewater Ops Incident Report* is included in the appendix.

Council Request Originated Problems



Aurora Access Originated Problems



RAIN WATCH PROGRAM

In order to be prepared for flood conditions, the COA Stormwater Division participates in a Rain Watch Program throughout the rainfall season that encompasses the months of May through September.

The Rain Watch Program includes all Stormwater maintenance supervisors, heavy equipment operators and crew leaders. Each is placed on the Rain Watch standby schedule that encompasses the months of May through September. Standby starts every Friday at 3:30 PM and runs through the week, ending on the following Friday at 7:00 AM. SW Rain Watch standby personnel have access to a SW on-call vehicle while performing standby and are approved to take this vehicle home. Access to an on-call vehicle minimizes the time required to respond to significant rainfall events.

SW Rain Watch standby personnel utilize numerous resources to gather information regarding potential rainfall events: faxes from HERR meteorological bulletins, Urban Drainage Flood Control District rainfall alert system alarms on computer and alerts via cell phone. Alarms may also come from Flow Control, Aurora Police, and the Aurora Fire Department.

If the potential for heavy rainfall is significant or heavy rainfall occurs, the SW Rain Watch standby staff member will monitor the information sources and conduct field inspections to determine if emergency crews should be called in to respond. If a storm situation elevates to a level requiring crew mobilization, the SW staff member contacts a supervisor before additional SW staff are called in. If called out, crews will monitor predetermined trouble spot areas and take the actions required to minimize flooding impacts.

SW staff life safety is the first priority that must be considered during any flood response. SW staff do not expose themselves to hazardous situations, including but not limited to rapidly flowing water, entering a water body whose current water elevation significantly exceeds its normal water elevation, entering any water body after dark and responding to a hazardous situation without direct support from other SW staff.

SW staff uses information from UDFCD and pictures to document rainfall amounts and impacts associated with significant storm events. This information is stored in the stormwater section of the K drive.

TROUBLE SPOTS

The COA Stormwater Division inspects and maintains trouble spots on a monthly basis and after every significant precipitation event, rain or snow. The definition of a Trouble Spot is, “any grate, outfall, pond or structure that requires preventative maintenance directly after a storm event”.

Trouble spot inspection and maintenance activities consist of the removal of trash and debris from the outlet and/or inlet structures. This allows the water to drain through the water quality gates.

Trouble spots are divided into four (4) quadrants, SE, SW, NE, and NW. The trouble spot list includes over 220 sites in all. Each trouble quadrant list route can be performed and inspected in about one day.

Detention ponds are listed as a separate group project in the Stormwater data base, HANSEN. A group project is created through HANSEN and information input into HANSEN tracks what has been completed.

EMERGENCY FLOOD RESPONSE PLAN

Aurora Water's *Flood Response Plan* provides information to responders during a flooding event. The plan includes information about the proper actions and the chain of command utilized during a localized emergency flood response.

A copy of the *Flood Response Plan* is included in the appendix.

EMERGENCY PUMPING

The Stormwater and Wastewater Divisions maintain a fleet of pumps that allow both divisions to respond to emergency situations that require pumping. Pumps in the inventory range in size from 1.5" to 8". Staff maintains the inventory on a regular basis to ensure proper operation. Pumping equipment is inspected monthly to ensure proper operation and staff receives pump training as a part of the SW's on-the-job training program.

A copy of the *Stormwater/Wastewater Emergency Pumping Equipment Readiness* document is included in the appendix.

SNOW REMOVAL

Streets Snow Removal

Aurora Water supports the Public Works Department's snow removal operations by providing staff and equipment for the North and South area snow removal teams. This support ensures that there is adequate staffing to operate snow removal equipment during snowstorms. All snow removal activities will be performed in accordance with the *City of Aurora Snow Plan*. Winter storm conditions influence the required equipment and staffing levels for snow removal. The Public Works Department will be responsible for determining the shift timing and staffing in response to winter weather conditions.

A copy of the *Aurora Water Snow Procedures for 2012 – 2013* is included in the appendix.

Sidewalk Snow Removal
The Stormwater Division, during the winter months, is responsible for snow removal along drainage tracts and easements; i.e. sidewalks, bike paths, concrete access roads, walk bridges and steps.

The stormwater staff will coordinate snow removal efforts with the City of Aurora Parks Department. Below is a list of current snow removal areas that are maintained by the Stormwater Division.

A copy of the *Stormwater Sidewalk Snow Removal Areas* list is included in the appendix.

SPILL RESPONSE

The Stormwater Division's spill response responsibilities are identified in Aurora Water's *Stormwater/Wastewater Operations Spill Communication and Response Plan*. The Plan serves as a guide for the Stormwater and Wastewater Divisions to plan for and respond to spills and releases that threaten stormwater conveyances and/or State Waters. The plan is supplemental to City of Aurora Administrative Policy Memorandum 4-18, *Internal Spill Reporting*.

A copy of the Aurora Water *Stormwater/Wastewater Operations Spill Communication and Response Plan* is included in the appendix.

STORMWATER INLET MAINTENANCE

In an effort to comply with the NPDES (National Pollutant Discharge Elimination System) and the MS4 Stormwater Permit, the Stormwater Division inspects and maintains all stormwater inlets in the stormwater conveyance system every two years.

This maintenance program includes an inlet inspection procedure that utilizes map pages to identify SW assets located in quarter sections within the city. After an initial inspection, inlets that require cleaning are identified using a SW inlet asset number. The asset numbers are complied and used to create a SW inlet cleaning work order that is generated by the HANSEN maintenance management system.

Curb inlet inspections and cleaning activities occur primarily during the spring, summer and fall. A two-year preventative maintenance (PM) cycle is followed for cleaning and inspections. Reactive cleaning is also scheduled if an inspection determines cleaning is required. Historic information indicates that approximately ten percent of the curb inlets require cleaning more frequently than the PM cycle. Areas that routinely require more frequent cleaning include:

neighborhoods with mature trees, primary or arterial roads, and active construction areas. Stormwater staff has one vactor truck available for cleaning stormwater inlets.

STORMWATER INLET CONCRETE REPAIRS

Damaged concrete inlets, inlet decks, and inlet throats are identified and included in the Public Works' Concrete Maintenance Program when repairs are required. Public Works and Stormwater staffs develop a list that identifies the SW assets requiring repair. Assets identified for repair are typically grouped into concrete maintenance projects that occur within a specified area of the city. PW manages the activities, bidding and contractor supervision associated with the concrete maintenance program and funding for repairing SW assets included in the program comes from the SW budget. Annual expenditures for the repair of SW assets included in this program are typically $30,000.

STORMWATER PIPE INSPECTION AND MAINTENANCE

Storm sewer pipe has not been routinely inspected, either for condition assessment of the existing system or for acceptance and warranty certification. However, in 2008, the Wastewater Division began inspecting stormwater pipe with CCTV, since all of the CCTV equipment is assigned to the Wastewater Division. The rate of inspection was increased in a targeted manner to assess the more critical or higher priority storm pipes and develop a plan for replacement.

When the Stormwater Division receives information about problems with the stormwater conveyance system, CCTV inspection of stormwater pipe is used to inspect the condition of the pipe and to locate any obstructions in the stormwater conveyance system. For example, if a customer calls about a stormwater problem after a significant rainfall event, CCTV is one of the tools used to inspect the stormwater conveyance system, so problems can be identified and corrected.

This increased inspection effort has allowed the Stormwater Division to schedule and perform more preventative maintenance on the stormwater conveyance system. This, in return, has allowed for a more efficient use of SW equipment and personnel.

OVERFLOW TRACT & EASEMENT MAINTENANCE

In an effort to comply with the NPDES (National Pollutant Discharge Elimination System) and the Large MS4 Stormwater Program permit (MS4 is "municipalities with separate storm sewer systems" which service a population of 100,000 or more and are required to have this permit), the Stormwater Division proactively maintains tracts and easements to comply with the standards. Periodic maintenance is performed throughout the year, including trash and debris removal and limited vegetation mowing.

The primary goals for SW mowing operations are to conserve resources by implementing a more conservative mowing approach and to implement a mowing program that produces a result that is consistent with mowing operations conducted by other city of Aurora departments. Mowing operations conducted by UDFCD within Aurora will mirror the goals established for SW property mowing operations.

Maintenance Functions

1. All concrete, earthen and other easements/tracts will be inspected and cleaned once annually by Stormwater staff.
2. Maintenance will include: trash and debris removal, weed management, graffiti removal, concrete repair, bollard and cable fence inspection and/or repair, riprap outfall maintenance, fall protection, railing inspection, and chain link fence inspections.
3. Weed and vegetation mowing is limited on overflow tracts and easements and activities are coordinated with the Open Space and Natural Resources Division of the Parks Recreation and Open Space Department.

POND MAINTENANCE

In order to better control flooding along drainage ways, detention ponds are sometimes incorporated into the drainage system to detain and release flows at an engineered rate. The Stormwater Division maintains city of Aurora owned detention ponds on a monthly basis. Ponds are checked for trash and debris, sediment, erosion and for any other issues that may adversely impact inlet and outlet structure performance.

Detention ponds are designed to allow for the controlled release of stormwater and to capture sediment that has the potential to adversely impact stream water quality.

Water quality grates are cleaned after significant rainfall events or, at a minimum, monthly and deficiencies are corrected as needed.

Ponds are maintained monthly in an effort to bring them to an acceptable level of operational efficiency.

Annual pond inspections are initiated by the Environmental Coordinator. Completed reports are forwarded to the Stormwater Superintendent. The SW Superintendent summarizes the information from the reports and enters it into the Pond Channel Inspection Information Management Program (PCIIMP) Excel file, so SW supervisors and SW staff can review information included in the reports, complete the required maintenance activities and document the maintenance activities performed that addressed issues identified in the pond inspection reports.

Safety issues identified by Operations Compliance inspectors during inspections are immediately forwarded to the SW Superintendent and the SW supervisors for immediate resolution. SW

supervisors create work orders and initiate the activities required to correct identified safety issues.

During the fall and winter, when accumulated sediment can be removed from the ponds and storm channels, materials are hauled to and stored at the Aurora Storage Facility (ASF). Sediment removed from ponds and channels that is stored at ASF comes from projects completed by contractors and the city.

HANSEN group projects are created for the monthly pond maintenance. Photos may be taken to document pre- and post-maintenance activities.

STORMWATER CRITICAL INFRASTRUCTURE MAINTENANCE PROGRAM

In order to protect the safety of Aurora citizens, the Stormwater Division performs periodic field observations and maintenance on three dams and one levee located within the city of Aurora. The maintenance activities associated with dams and one levee includes, but is not limited to the removal of trash/debris, noxious weed management, sediment removal, erosion control, woody vegetation management, structural component operation and rodent control. These maintenance activities occur on a monthly basis with additional field observations and maintenance occurring after significant rain events. Aurora Water's Source of Supply Division Dam Inspection Group performs all critical infrastructure inspections annually. The State of Colorado requires that the dams be inspected as required in each dam's operation and maintenance manuals. These manuals are located in the office of the Stormwater Superintendent and are available for review. The Federal Emergency Management Agency requires the City to perform annual levee inspections.

The City of Aurora is the sponsor for Kelly Road Dam (KRD), located in the Lowry development. Prior to 2013, the City of Aurora was responsible for all maintenance and inspection activities associated with the dam. In 2013, an agreement between Aurora, Denver, UDFCD and the Army Corp of Engineers should be completed and will transfer all maintenance and inspection responsibilities to UDFCD. The City of Aurora will continue to be the sponsor for KRD.

Levee System Maintenance

Purpose

To protect the safety, welfare, and property of people living in areas along Sand Creek within the city of Aurora. To maintain a standardization of flood control via a levee operation and maintenance program. Of special concern is the area along Sand Creek in the vicinity of Star K Park.

Levee and Floodwall System Inspection and Operation Program

1. Inspection shall be performed annually by the Aurora Water Source of Supply Division's Dam Inspection Group, to evaluate the integrity of the levee, performance of stormwater features that could affect floodplain protection and compliance with all FEMA regulations.
2. Historical records shall be obtained, maintained and considered in a manner that can help identify potential maintenance concerns for corrective action.
3. City of Aurora Environmental Inspection Personnel shall coordinate and comply with all appropriate Colorado and Federal agencies, including the Urban Drainage and Flood Control District.

A copy of the *Levee and Floodwall Inspection Plan* is included in the appendix.

Levee and Floodwall System Maintenance Plan
The City of Aurora Stormwater Division shall be responsible for maintaining the levee in the vicinity of Star K Park. The Stormwater Division shall conduct field observations for the levee and flap gate on a monthly basis and after a major rain event. This will further ensure the reliability of the levee and identify any issues that require attention. Maintenance will be prioritized and performed on an as needed basis.

Observation and Maintenance will include:

1. Visible signs of overflow
2. Trash and debris removal
3. Evidence of burrowing animals and insects and their control
4. Removal of woody vegetation on slopes
5. Structure integrity
6. Rip-Rap protection around pipes and headwalls
7. Erosion control
8. Noxious weed control to promote healthy and dense vegetation on the levee structure and surrounding areas
9. Trails and service roads
10. Levee ends and slopes
11. Structural controls, such as flap gates
12. Survey marker presence and condition
13. Any other condition that may affect the integrity of the levee

Maintenance may be performed by contractors depending on the scope and expertise required to meet the needs of the City of Aurora.

Levee Recertification
The Sand Creek Levee was accredited by FEMA in 1990. The levee was recertified in 2010 by Tetra Tech and the certification will be valid for ten years, until February 14, 2020. Recertification activities can take several years, so the City should perform the initial reviews for recertification several years in advance, sometime in 2017.

<u>Dam Maintenance</u>

Purpose
To protect the safety, welfare, and property of people living in areas downstream of the dams located in the City of Aurora. To maintain the structural integrity of three dam structures located in the City of Aurora: Southshore/Senac Creek Dam, Jewell Wetland Detention Dam and Exposition Park Dam.

Dam Inspection and Maintenance Plan
1. Maintenance activities shall be performed monthly by City of Aurora Stormwater personnel to evaluate the integrity of the dam and performance of stormwater features that may affect flood plain protection and compliance with all regulations issued by the Office of the State Engineers Division of Water Resources Dam Safety Branch.
2. The City of Aurora Dam Inspector will perform annual inspections of the dams as well as any additional inspections mandated by each dam's operations and maintenance manual.
3. City of Aurora Stormwater personnel shall coordinate and comply with all State and Urban Drainage Flood Control (UDFCD) regulations.
4. Inspections by the Office of the State Engineers Division of Water Resources Dam Safety Branch will be conducted according to the schedule contained in each dam's specific operations and maintenance manual. These manuals contain detailed information and are located in the Stormwater Superintendent's office.
5. Historical records shall be obtained, maintained and considered to help identify potential hazards and maintenance concerns for corrective action.

Dam Maintenance Plan
The City of Aurora Stormwater Division will be responsible for performing field observations monthly and after significant rain events. This will further ensure the reliability of the dams and identify potential maintenance issues. Maintenance will be performed as required to ensure compliance with Colorado Dam Safety Branch regulations.

Observations and maintenance activities will include:
1. Visible signs of overflow
2. Trash and debris removal
3. Evidence of burrowing animals and insects and their control
4. Removal of woody vegetation on slopes
5. Structure integrity: outlet structures, outlet valve operations, etc
6. Rip-Rap protection around pipes and headwalls
7. Erosion control
8. Noxious weed control to promote healthy and dense vegetation on the dam structure and surrounding areas
9. Trails and service roads
10. Any other condition that may affect the integrity of the dam

FLAP GATE MAINTENANCE

The City of Aurora maintains seven flap gates within the city limits and four flap gates at the Kelly Road Dam located in the City and County of Denver.

Flap gates allow a controlled release of stormwater flows into creeks and channels during heavy rain events. Controlled releases prevent flows from surcharging the drainage system and because the gates are spring-loaded, flap gates prevent flows from re-entering the channels.

1. Automatic drainage gates must be kept clean if they are to function properly.
2. The hinged flap acts as a skimmer and can cause trash and debris to catch between the flap and the seat at low flow.
3. Periodic inspection and cleaning should be scheduled when the water flowing through the flap gate carries floating material.
4. Flap gates mounted 12" - 18" above the apron are more likely to be self cleaning.
5. Lubrication of pivot points on the flap gates is usually not necessary.
6. City of Aurora Stormwater inspects all city owned flap gates on a quarterly basis. The crews will check the following:
    a. debris trapped between the gate and seat
    b. operate the gate to check pivot points
    c. make sure the seat is securely mounted to the headwall
    d. replace missing or broken parts

EROSION CONTROL

In an effort to conform to the City of Aurora Erosion Control Standards and to minimize the impact of sediment loading in creeks and channels, the Stormwater Division utilizes a variety of Best Management Practices (BMPs) when performing maintenance activities. In addition, SW contracts with outside vendors to provide the following BMP services:

Silt fence – used as a barrier to prevent sediment from leaving an area of disturbed soil from an area of construction activities.

Straw waddles – used on slopes and other areas to prevent sediment from migrating from the construction area.

Hydro mulch – a product that is sprayed on a slope or rough terrain to hold soil and seed in place.

Erosion control matting – is biodegradable matting used to hold soil and seed in place on slopes and rough terrain.

The Stormwater Division also utilizes the following practices and techniques for erosion control:

Cobblestone rock with landscape fabric - is used for aesthetic value.

Reseed bare areas with appropriate seed mix

Erosion Control matting - is a biodegradable matting used to hold soil and seed in place on slopes and rough terrain.

Rip rap protection around outfalls and along drainage easements – to prevent erosion from undermining the structure.

Silt fence removal after area is stabilized

Administrative support includes the requisition of purchase orders and the payment of invoices.

TREE MANAGEMENT

Trees provide many positive attributes, including shade, improved water quality, erosion control, aesthetic enhancement of drainage ways and wildlife habitat. The COA maintains approximately 68 miles of earthen channels and creeks. In an effort to enhance these areas, the Stormwater Division periodically, as a maintenance function, inspects these areas for dead trees and replaces them when necessary.

Dead trees will not be replaced if it is determined that their chance for survival is unlikely, because their location isn't supported by adequate ground water. When it is determined that dead trees need to be replaced, an appropriate species will be planted. Newly planted trees will be watered as needed until well established. Winter is primarily the time for pruning and removing trees.

New trees will not be planted that could potentially create a hazard, blockage and/or increase the potential for maintenance in the channel. The Stormwater Division monitors trees for disease and damage. Contract services may be used to treat diseased trees or to prune large trees.

Tree management activities on stormwater properties focus on the maintenance of desirable species, the removal of noxious species, Russian olive and Siberian elm, and the removal of trees that adversely impact stormwater assets or the performance of the stormwater system.

Copies of the *Woody Vegetation Management Guidelines* and the *Tree Mitigation Plan* are included in the appendix.

WILDLIFE MANAGEMENT

Mosquito Control

In an effort to minimize and control mosquitoes in the COA owned channels, ponds and other stormwater infrastructure, the Stormwater Division contracts with a licensed mosquito control contractor and this contractor inspects identified areas and when required, controls mosquito larvae with larvicide. The treatment season is generally from late spring to early fall. The start of the season is initiated based on the amount of moisture received and the temperature. SW works with other intergovernmental agencies, such as, Tri County Health Department and CDPHE, in an effort to control mosquito borne diseases (West Nile Virus and Western Equine Encephalitis).

The Stormwater Division treats areas identified by customer complaints with a mosquito larvicide. The larvicide is applied by stormwater personnel utilizing gas-powered broadcast equipment.

The contract for mosquito control services is currently held by Colorado Mosquito Control. The mosquito control contractor samples water bodies to determine if mosquito larvae are present. When larvae are present the contractor treats the area with larvicide.

Prairie Dogs
Prairie dogs populations are evaluated and managed on a case by case basis. If necessary, the Colorado Division of Wildlife is consulted during the evaluation and development prairie dog management plans. If necessary, the Stormwater Division utilizes the services of a licensed pest management contractor to manage prairie dog populations.

Beaver Population Management
Beaver populations are present in many of the creeks and channels throughout the City of Aurora. Adverse impacts caused by beavers, such as; blockages in channels, dams across channels, and the loss of trees, require that beavers be removed from the affected area. The Stormwater Division utilizes the services of a licensed contractor to live-trap and relocate beavers. All contractors utilized by the Stormwater Division to manage beaver populations must be licensed by the Colorado Division of Wildlife.

During the live trapping season, May through August, beaver activity is monitored and when adverse impacts are identified, the Stormwater Division notifies a licensed contractor and live traps are set in an appropriate locations. Trapped beavers are relocated to locations within Colorado approved by the Colorado Division of Wildlife.

Beaver populations living in the following areas are not managed with live trapping: Sand Creek between Airport Blvd and Chambers Rd, Star K Ranch, and Tollgate Creek between Alameda Ave and Chamber Rd, Delaney Farm. Beaver dams in the previously identified channel sections are not removed. In all beaver management situations, SW reserves the right to manage beaver related floodplain in a manner that minimizes the potential for flooding.

Rodent Control
Burrowing rodents, such as Norway rats, voles, muskrats and moles are present in many of the creeks and channels throughout the City of Aurora. The burrowing activities of these rodents can cause extensive damage and compromise stormwater infrastructure by creating voids in and around drainage structures and contribute to erosion of earthen dams, levees and channel banks. The destructive nature of these rodents often contributes to the need for rodent management activities within drainage ways. The Stormwater Division utilizes the services of a licensed pest control contractor to manage rodent populations.

TURF MANAGEMENT

Service Level Agreement between Aurora Water and Aurora Parks, Recreation and Open Space Department for Operation and Maintenance of Aurora Water Irrigated Turf

The purpose of the Service Level Agreement (SLA) is to formalize an arrangement between the Aurora Water Department (AW) and City of Aurora Parks, Recreation & Open Space Department (PROS) to operate and maintain, at an agreed-upon cost, irrigated turf areas currently owned, operated and maintained by Aurora Water's Stormwater Division. The SLA provides details for operation and maintenance services and approved improvements to be provided by the Parks O&M Division.

Scope of Agreement

AW (through the Stormwater Division) currently maintains approximately 117 acres of irrigated turf located in various drainage tracts throughout the City. AW is also responsible for the operation and maintenance of the irrigation systems for these turf areas.

PROS currently maintains in excess of 8,500 acres at various parks, golf courses and open space properties. The Parks O&M Division maintains 1250 acres of irrigated properties. It was determined that the most cost effective method to maintain the irrigated turf areas within the stormwater drainage areas was to include these areas in the city owned turf maintenance operations performed by the Parks O&M Division.

Services Covered Under This Agreement

Maintenance of Irrigated Turf Areas: Provide routine and periodic maintenance, including mowing, trimming, edging, weed control, insect and disease control, tree and shrub care, aeration, fertilization, trash removal, general cleanup, and other necessary maintenance to keep areas looking consistent with surrounding landscaping (i.e. similar to adjacent park or other landscaped area) Furnish all labor and materials to perform maintenance operations in accordance with the identified requirements.

A copy of the *Service Level Agreement between Aurora Water and Aurora Parks, Recreation and Open Space Department for Operation and Maintenance of Aurora Water Irrigated Turf* is included in the appendix.

WEED MANAGEMENT

The COA Stormwater Division in accordance with the requirements of City code and the Colorado State Noxious Weed Act performs weed management activities on stormwater drainage channels, detention ponds, tracts and easements. The Division utilizes various methods to manage weeds in an effort to promote the establishment of native vegetation, reduce fire hazards and maintain maintenance access roads.

The Stormwater Division's weed management program corresponds closely with the Open Space and Natural Resources (OSNR) Division's weed management program. Stormwater and OSNR coordinate weed control efforts on shared areas. Stormwater and OSNR responsibilities are delineated by channels, bike paths and other geographic features.

Service Level Agreement between Aurora Water and Aurora Parks, Recreation and Open Space Department for Noxious Weed Management Along Stream Corridors

The purpose of the Service Level Agreement (SLA) is to formalize an arrangement between the Aurora Water Department and City of Aurora Parks, Recreation and Open Space Department, Open Space and Natural Resources Division (OSNR) to provide noxious weed management along city-owned stream corridors within open space and natural areas historically maintained by the Stormwater Division (SW). The results of this effort will improve efficiencies by coordinating efforts and give all city-owned open space, natural areas and stream corridors consistency of care and appearance and meet the city's obligation to treat state listed noxious weeds.

The SLA provides details for noxious weed management services to be provided by OSNR. These services will be performed on an as needed basis to control noxious weeds for all stormwater related conveyance systems, i.e. channels, detention and retention ponds.

Scope of Agreement

Aurora Water (through the SW Division) currently maintains approximately 950 acres of land along stream corridors that in many cases are adjacent to open space and natural areas. Noxious weed management, in select areas along stream corridors, historically has been provided by a private contract and funded by SW, and supplemented by SW operational staff.

OSNR currently maintains over 6,000 acres of open space and natural areas, providing noxious weed control among other services. The goal of this SLA is to expand noxious weed management services to include all areas within stormwater conveyance systems in an effort to provide a systematic and efficient approach to noxious weed management. It has been determined that the most cost effective method to manage noxious weeds is to have OSNR perform these activities.

Services Covered

The following services are to be provided by OSNR.

Noxious Weed Control: Provide initial and periodic inspection of properties to determine infestations of noxious weeds as defined by the Colorado Department of Agriculture. Treatment plans will be executed utilizing an integrated pest management approach which will employ the most effective control measures at the most effective time. Control methods may include collecting seed heads, herbicide application, biological controls and any other available methods

of control. Herbicide applications will be determined by OSNR's noxious weed experts, based upon the proximity to waterways, time of year and type of weeds to be managed.

A copy of the *Service Level Agreement between Aurora Water and Aurora Parks, Recreation and Open Space Department for Noxious Weed Management Along Stream Corridors* is included in the appendix.

Weed Management Methods

Mechanical Control

Stormwater utilizes off-road tractors with various types of mowing attachments. In areas where tractors cannot be utilized, small self-propelled mowers and trimmers are used to mow and trim along fence lines, around trees, sign posts, etc. Monthly mowing operations start in May of each year and end in late September. Mowing activities are coordinated by the stormwater supervisors and completed in areas where there is a need for mowing. Entire areas are not mowed and mowing is commonly used to control and manage weeds.

Chemical Control

The application of herbicides is used to control noxious weeds on Stormwater properties. A Service Level Agreement (SLA) with OSNR provides the framework for noxious weed chemical control activities that occur on natural areas located on SW properties. Licensed SW staff also perform chemical weed management activities on SW properties; primarily concrete easements. Chemical weed control will start at the same time as the mechanical mowing, providing the weather conditions are appropriate for chemical applications.

Weed control in irrigated turf areas owned by the Stormwater Division that are maintained by the COA Parks Department under a Service Level Agreement (SLA).

Group projects are created through the HANSEN Asset Management Program to record weed control activities performed by SW staff.

GRAFFITI REMOVAL ON CONCRETE CHANNELS & STRUCTURES

As part of maintaining concrete channels and structures, the Stormwater Division inspects for graffiti and paints over graffiti that adversely impacts the visual appearance of all stormwater property.

Requests

Requests are addressed in a proactive manner. Requests commonly originate from citizens who call Aurora Water Administration, the Aurora Water Service Center, or Access Aurora. Calls may also come from the Police Department, Fire Department or other city departments.

Routine Maintenance

During channel maintenance activities, if graffiti is observed, the location will be documented and painted over on the Tuesday or Thursday that immediately follows the date the graffiti was

reported or observed and documented by Stormwater staff. If the graffiti contains offensive language or offensive images painting typically occurs as soon as possible and typically within 24 hours of a complaint or observation. If the scope of work is small, Stormwater personnel will paint the impacted area. If the scope of work is large or requires pressure washing activities, a graffiti contractor will be contacted to complete the work.

A copy of the *Stormwater Graffiti Removal Guidelines* is included in the appendix.

FALL PROTECTION

In an effort to protect the life safety of the citizens of Aurora, the Stormwater Division will address and maintain adequate fall protection devices for all stormwater infrastructures as required by the Stormwater Standards in the COA Roadway Design Criteria as follows:

1. Fall protection is required wherever storm infrastructure is less than 30 feet from a sidewalk, trail, or pathway, and has a vertical drop of 30 inches or greater.
2. SW will monitor infrastructure, install fall protection as needed, and establish priorities for railings to be either modified or installed.
3. The COA will match existing railings if modification is required.
4. All railings will be inspected and maintained as needed on an annual basis.
5. Minor repairs will be handled in house utilizing the trades group. Work order requests will be submitted to the Water Services Group.
6. Larger projects may require the use of a contractor to meet the needs of SW.

CABLE FENCE INSTALLATION

The Stormwater Division utilizes cable fencing in areas where needed to deter motorized vehicles from damaging natural vegetation and turf along stormwater channels. This type of fencing can also be utilized to secure structures and protect the public from fall hazards. The Stormwater Division coordinates with the Open Space and Natural Resources Division to determine boundaries of jurisdiction and areas of responsibility prior to installation of new cable fence.

Cable fencing can be used to protect the public where there is a 30 inches or greater vertical drop and that occurs within 30 feet of a sidewalk or trail.

This fencing can be installed by Stormwater staff or a qualified fence installation contractor.

FENCES

Fences located on Stormwater properties are typically maintained by SW staff, but there are several fences on SW property that are identified in license agreements. Fence maintenance

activities for these fences should be completed by the private party identified in the license agreement. A flow chart in the appendix provides guidance for addressing fence issues.

When SW staff receives an inquiry about a fence issue the following steps are completed.

1. SW staff visually inspects the fence to evaluate the current conditions and repair requirements.
2. SW staff contacts Real Properties staff. Real Properties staff completes the research required to determine if there is an existing license agreement for the fence and to identify any other documents associated with the property.
    a. If a license agreement is located, SW staff contacts the responsible party identified on the license agreement and discusses the issues associated with the fence.
    b. If a license agreement is not located, SW staff evaluates the fence's current condition and determines if the fence should be repaired or removed. If it is determined that the fence should be removed, the adjacent property owners are notified.
3. SW staff conducts the research required to locate development plans and then reviews the plans to see if there is any language in the plans about fences associated with the development.

Fences located on SW properties that are identified in a license agreement must meet the following criteria.

1. The fence must be a six foot high privacy fence.
2. The fence must allow stormwater flows to pass under the fence. A minimum clearance of one foot must be provided between the fence and the flow line. Public Works Engineering will evaluate the location to determine if greater clearance between the fence and the flow line is required.
3. The fence must meet all City of Aurora building codes.
4. The licensee must agree to pay all costs associated with the fence, including but not limited to materials, installation, permits and maintenance.
5. Fences that block a SW easement on two ends must provide a gate of an approved width and design at one end of the SW easement. The width of the gate may vary with the width of the easement. Additionally, the two sides adjacent to the easement must be fenced with six foot high privacy fence.

A copy of the *AW Stormwater Fence Management Flowchart* is included in the appendix.

CHANNEL & POND INSPECTION AND MAINTENANCE COORDINATION

Each year Operations Compliance performs an inspection for the SW ponds (city owned) and channel segments in the COA. The reports from these inspections include information about:

Flow Conditions
Water Quality

Trash/Debris
Vandalism/Graffiti
Sedimentation
Erosion/Scour
Vegetation
Structure Conditions
Outfall Conditions
Utility Conditions
Equipment/Maintenance Accessibility
Supervisory Review

Annual pond and channel inspections are initiated by the Environmental Coordinator. Completed reports are forwarded to the Stormwater Superintendent. The SW Superintendent summarizes the information from the reports and enters it into the Pond Channel Inspection Information Management Program (PCIIMP) Excel file, so SW supervisors and SW staff can review information included in the reports, complete the required maintenance activities and document the maintenance activities performed that addressed issues identified in the pond and channel inspection reports.

Safety issues identified by Operations Compliance inspectors during inspections are immediately forwarded to the SW Superintendent and the SW supervisors for immediate resolution. SW supervisors create work orders and initiate the activities required to correct identified safety issues.

STREET ASPHALT OVERLAY PROGRAM

The Construction section of the Wastewater Division will provide a Water Crew Leader to oversee the street overlay program for the Wastewater and Stormwater Divisions. An additional person will be provided by either division to assist the Water Crew Leader in the pre/post inspection process.

The inspection crew will do pre inspection on both in-house and private contractor work for the overlay program. The crew will work full time on the overlay program unless a situation arises that requires their expertise. It is anticipated that the pre-inspection process would last approximately two months total (this is taking into account vacation, sick and miscellaneous issues). There may be times where T&D and WW/SW inspection crews work together during the overlay project. These times may include high traffic and low visibility along with other miscellaneous times.

The Streets Department will first create a list of streets to be overlaid for the overlay season (an overlay is new asphalt). After the Street's Department has finalized their list of overlay, the list is then passed onto a Water Administrative Specialist who creates a service request. Once a service request has been created for the areas or streets, the service request is passed onto the Wastewater Administrative Specialist who subsequently transfers the preceding service request into work orders. Once the work order is made, it is then received by the Construction section

personnel in charge of overlay inspections. When they receive the work orders they go to the assigned area or street and inspect all sanitary and storm sewer manholes **pre-overlay**.

Pre-Overlay Inspection:

1. Physically inspect all Sanitary and Storm Sewers.
2. Inspect for damage and wear to lid and manhole frame as well as any riser rings on the frame.
3. Inspect the cone and barrel sections for integrity of materials and structure.
4. Inspect apron and channel to ensure good flow and no possible hazard of stoppage.
5. If any problems are found with the manholes in the area before the milling process the problems are fixed correctly and with good work quality.

After the pre-overlay inspection and prior to any rotomilling, staff identifies areas that will be rotomilled and coordinates rotomilling activities with Public Works staff to ensure that these activities do not damage stormwater infrastructure. Damage can occur when rotomilling activities are completed around stormwater vaults or when rotomilling removes the entire pavement section along with a portion of the sub grade. In the northern portion of the city, stormwater pipes were installed with very little cover, so the top of the pipes are often adjacent to the pavement section and can be easily damaged by rotomillings activities associated with the street overlay program.

Since the area has been inspected, the **pre-overlay** work order is then closed. After the pre-inspection has been completed the overlay of the area begins. Once the overlay of the area has been completed, the public improvements inspector calls the Ops Service Center to report that the finished area is ready for post-inspection. Once the Ops Service Center has received the report of a finished area, they notify the Wastewater Administrative Specialist to create **post-overlay** inspection work order. Once the work order is made, it is then received by the Construction section personnel in charge of overlay inspections. When they receive the work orders they go to the assigned area or street and inspect all sanitary and storm sewer manholes **post-overlay**.

Post-Overlay Inspection:

1. Physically inspect all Sanitary and Storm Sewers.
2. Inspect for damage and wear to lid and manhole frame as well as any riser rings on the frame that may have occurred during milling or paving process.
3. Inspect the cone and barrel sections for integrity of materials and structure.
4. Inspect apron and channel to ensure good flow and no possible hazard of stoppage.
5. If any problems are found with manholes after a proper pre-inspection has taken place a punch list is generated for inspector. Once the punch list items have been repaired the items are inspected again for completion. If problems are corrected properly the work order is then closed out and we begin inspection on a new area.
6. If no problems are found the work order is then closed out and the inspection process is started all over again for another area.

STORMWATER STAFF & ACTIVITY SCHEDULING

Stormwater supervisors meet before the start of the work shift to plan daily work activities. Most projects are planned in advance; however, numerous variables impact the planning of work, i.e.; weather, equipment availability, emergencies, citizen complaints, etc. Preventative maintenance activities determine what work will be scheduled; such as, monthly pond maintenance, channel maintenance, monthly trouble spot maintenance, inlet maintenance and cleaning. Each task is prioritized based on many factors that typically include manpower, time of year, equipment availability and weather.

Supervisors alternate with each other filling out the schedule one week at a time. Schedules are kept in a binder for future reference.

HANSEN asset management program work orders are generated for each work activity. Work crews enter their time, materials used, and equipment hours on the HANSEN form. SW/WW administrative staff then enters this information daily.

Required Staffing Levels

Staffing levels for work days throughout the year and specifically for the day before and the day after holidays must be maintained at specified levels to ensure that stormwater issues can be addressed in a proactive manner. Work days in October through April require a minimal staffing level of eight SW personnel, to include at least one SW supervisor, one SW heavy equipment operator and six SW support staff. Work days in May through September require a minimal staffing level of twelve SW personnel, to include at least one SW supervisor, two SW heavy equipment operators and nine SW support staff.

A copy of the Stormwater Monthly Calendar is included in the appendix.

PRODUCTION TRACKING

Stormwater production refers to the number of inlets inspected or cleaned, the miles of channels maintained, and the number of ponds and trouble spots maintained. Production is tracked with work orders through HANSEN. The WW/SW/OC Data Support Technician produces weekly, monthly and annual reports that track production. In addition, the Stormwater Superintendent maintains a production matrix using this information. The matrix is updated monthly and the SW Supervisors are evaluates on production for each month accordingly.

In 2011, Stormwater changed the emphasis of our inlet inspections to include a structural evaluation. This will be much more time consuming but will provide us a much needed evaluation of our existing infrastructure. Our inlets have been kept in a good clean condition. This will be time well spent and we should still be able to meet our annual goals for channels, and our monthly cleaning goals for ponds and trouble spots.

SPECIAL PROJECT SUPPORT

Highline Canal Cleanup
The Stormwater Division supports the Highline Canal Cleanup by providing staff and equipment. The cleanup is held once a year, usually in March. The event is organized by WQEP. Water Operations provides volunteer staff and a 1 ton flatbed truck which is used to deliver tools and trash bags to the volunteers stationed at the different segments along the Highline Canal.

SW approved staff support: 10 truck drivers receive paid overtime or comptime. SW staff that volunteer their time have their volunteer activities documented as a significant accomplishment on their EPMP.

Household Chemical Roundup
The Stormwater Division supports the Household Chemical Roundup by providing staff and equipment. The event is organized by WQEP staff and occurs once a year, usually in September at the COA Central Facility complex. Stormwater staff provides logistical support: preparing the site the day before the event, setting up stations, distributing materials including ice and water, performing collection duties and breaking down and cleaning up the site after the event. The household hazardous waste collected during the event is managed and disposed of by an environmental contractor.

SW approved staff support: The Operations Compliance Coordinator and 5 SW/WW operations staff members receive overtime. SW staff that volunteer their time have their volunteer activities documented as a significant accomplishment on their EPMP.

Water Festival
The Stormwater Division supports the Water Conservation Division with volunteers who set up and operate the Drippial Pursuit game board (a game created to demonstrate the water cycle) and set up canopies for other activities. The purpose of the COA Water Festival is to educate school children about the issues pertaining to water, including the different sources of water, the different types of water treatment, the importance of water in our lives, how pollution impacts our water, etc.

SW approved staff support: 3 SW staff members volunteer to support this event which occurs during normal work hours.
Administrative support includes assistance with organizational needs for these projects and volunteering for the events.

AURORA STORAGE FACILITY

The Aurora Storage Facility (ASF) is a 97 acre site located on a closed landfill site that was in operation from 1969-1975. It is located near the intersection of E 6th Ave and Gun Club Road, 1351S Gun Club Road, Aurora, CO 80017. Additional names for ASF include the Highway 30 Landfill. The landfill was permanently closed March 1, 1975. The State of Colorado considered

the landfill officially closed via a letter dated June 29, 1995. According to the State, materials stored at ASF must be reused or recycled or they can be considered solid waste and the risks to human health and the environment were 'very low' at ASF.

Annually SW pays for a Solid Waste Annual Post-Closure Facility Fee to the Colorado Department of Public Health and Environment, customer #8228, for the Highway 30 Landfill. The State conducts periodic inspections of the ASF site to ensure regulation compliance. ASF activities are managed by the Stormwater Division. Materials stored on this site include rip rap, sandstone, topsoil, fill dirt, pipe, rotomillings, and mulch. Wet materials cannot be dumped and/or stored at ASF due to the cap that was placed on the former landfill. Other city departments including streets, planning and parks store materials at ASF.

ASF is a secure facility that is locked and surrounded by fence. Different locks provide access for other departments and contractors. An inventory of materials delivered to, hauled from and stored at ASF is maintained. Positive drainage is maintained at ASF and the required corrective maintenance activities to eliminate any puddling water are performed. Excavation into the landfill cap is prohibited. The integrity of the landfill cap must be maintained and infiltration of surface water through the cap must be minimized. Driving on vegetated areas within ASF is discouraged.

SW staff should be warned about the presence of poisonous snakes at ASF.

If materials containing an excessive amount of liquid are delivered to ASF, dry soils can be mixed with the liquid soils to minimize the storage of materials that contain an unacceptable liquid percentage. Use a Paint Filter Liquid Test, method 9095B, to determine the presence of free liquids in a sample of materials proposed for delivery to and storage of at ASF. Proper BMPs should be used to contain these piles.

NON-TYPICAL STORMWATER MAINTENANCE RESPONSIBILITIES

The City has unique geographical areas contained within the City limits that have unique and/or limited maintenance responsibilities. The purpose of this document is to identify and assemble known information and agreements in regards to maintenance responsibilities for utilities services provided by Aurora Water (AW): Water (W), Wastewater (WW) and Stormwater (SW). Each of the following areas will have a description of the location, map of impact area, key point of contact if applicable, defined responsibilities and applicable agreements.

The areas include:

1. Fitzimmons Campus – Veterans Administration Hospital (VA)
2. Fitzimmons Campus – University of Colorado Health Sciences (UCHS)
3. Fitzimmons Campus – Fitzimmons Redevelopment Authority (FRA)
4. Lowry Campus – Heat Campus
5. Buckley Air Force Base – (BAF)- Base

6. Buckley Air Force Base – (BAF) – Base Housing
7. Aurora Public Schools- (APS)
8. Cherry Creek School District- (CCSD)
9. City and County of Denver (CCD) - Stapleton Campus
10. Front Range Airport- (FRA)
11. Cherry Creek Town Center – (CCTC)
12. Windmill Creek Reserve
13. Arapahoe Commons

A copy of the *Non-Typical Maintenance Responsibilities* document is located in the appendix.

AURORA WATER & PUBLIC WORKS MEMO OF UNDERSTANDING

Most of the storm drainage system has traditionally been maintained by the Stormwater Division of the Aurora Water Department. However, some items, such as streets, curbs and gutters, have been maintained by the Streets Division of the Public Works Department. In some cases these responsibilities overlap. The Memo of Understanding (MOU) attempts to clarify the financial responsibilities of the Stormwater Enterprise Fund and the General Fund, Public Works, relative to the repair, maintenance and improvement of the system. While the intent is to clarify the Departments' respective financial responsibility, both Departments are encouraged to share resources and equipment to accomplish the necessary repair, maintenance and improvement activities.

A copy of the *Memorandum of Understanding between Aurora Water and Public Works Department* is located in the Appendix.

INTEGRATED MANAGEMENT PLAN

The City of Aurora is committed to protecting the health and safety of the community and preserving its natural resources. Providing a comprehensive approach to flood and stormwater management is critical to satisfying multiple community needs. The Integrated Management Plan (IMP or Plan) is guided by a regulatory framework and Best Management Practices (BMPs) to protect Aurora's citizens and property; reduce the severity of flooding during storm events; protect stream corridors from the impact of future development; and safeguard the City's natural resources and beauty.

Parks, Recreation and Open Space (PROS) and Aurora Water (AW) are responsible for land management within stream corridors and are stewards of these properties regardless of funding sources used for maintenance and capital improvements. The Departments will communicate and convey consistent maintenance concepts to limit impacts and disturbances within stream corridors and thus ensure efficient use of resources and enhance sustainability.

The IMP's purpose is to collaboratively prioritize, manage and maintain Aurora's stream corridors. The IMP contains components to assure regulatory compliance, influence future design, guide development and define goals and responsibilities for maintenance activities while considering the multi-use features Aurora's stream corridors provide. AW and PROS both contribute to stream corridor design, development, management and maintenance, and share responsibilities within these areas.

For the purpose of the IMP; a stream corridor is defined as the stream, its floodplain, and a transitional upland fringe; a natural open space area is defined as land or water in an essentially undisturbed natural state or enhanced for the purpose(s) of resource preservation, conservation or recreation uses and shall be protected from any future re-development. Other areas covered by the IMP include golf courses, developed parks, 100-year floodplains, wetlands, trails, detention ponds and reservoirs.

SEDIMENT MANAGEMENT PLAN

The Stormwater Division is responsible for the maintenance of approximately 75 miles of drainage channels throughout the City of Aurora. Maintenance of these channels includes trash/debris and sediment removal. Storm channel aggradation, a condition where the level of a stream bed is raised or filled by deposition from sediment, is an ongoing channel characteristic and must be managed. Sedimentation that is not managed effectively has the potential to compromise the overall function of the conveyance system and the water quality features of the channel.

Regulators at the Federal, State and Local level require that Stormwater Management Plans / Programs be developed and implemented in order to maintain regulatory compliance. These regulatory requirements and subsequent Stormwater management plans create a situation where multiple objectives for managing flood risk and environmental impact risks are realized. These multiple objectives are a result of Federal Emergency Management Agency (FEMA) maintenance activity guidance; Federal wetlands 404 permit guidance and the stormwater quality requirements of the Clean Water Act.

In an effort to meet these multiple objectives a comprehensive and systematic sediment management program is critical to develop and implement. This plan is intended to consider drainage functionality, environmental stewardship, and fiscal resource management while managing risk and maintaining regulatory compliance.

A copy of the *Stormwater Operations Sediment Management Plan* is included in the appendix.

STORMWATER TRAINING PROGRAM

The on-going training of personnel is designed to give employees the necessary proficiencies to maintain a safe, efficient, and productive working environment. Employee training is recorded and tracked by the SW supervisors and the SW/WW administrative staff.

The Stormwater and Wastewater Divisions provide the following training opportunities:

- Commercial Drivers License (CDL) – Performed by Stormwater staff
- Excavation and Trenching Safety – Provided by the Service Aurora Division training section
- Confined Space Safety training – Conducted by the Wastewater Division
- Erosion control device installation training (BMPs) – Red Rocks Community College
- Standard Operating Procedures (SOPs) – Training conducted by Stormwater staff members
- Equipment training – Light to heavy equipment training performed by Crew Leaders and above
- Wastewater certification training classes – Conducted by Stormwater and Wastewater staff
- Automated External Defibrillator (AED), First Aid, and Cardio Pulmonary Resuscitation (CPR) training- Performed by Aurora Water Training Division
- Channel inspection training – Conducted by Operations Compliance staff

LEADERSHIP DEVELOPMENT

In 2012, Leadership Development for the Stormwater Supervisors & Superintendent focused on the communication attribute. Communication issues within the Division had been a challenge in recent years, so a targeted focus on communication initiated the essential activities required to improve communication throughout the Stormwater Division. Magazine, journal and books that provide information about coaching were used to structure activities related to the development of the communication leadership attribute. Information obtained from these resources was discussed in group meetings that included the superintendent and the supervisors. Information from these discussions was distributed to additional members of the Stormwater staff during team and individual meetings. The SW team attended a seminar in March presented by Hal Pitt, *How to Become an Exceptional Communicator: Tips and Strategies for Communication Excellence*. Robin Amadei, Common Ground Mediation, provided mediation service for some members of the SW team and interviewed all SW employees to develop a greater understanding of the successes and challenges associated with the work group. Information generated during the interviews provided the foundation for a November training session that focused on personality types and team building.

In 2013, the SW team will continue its focus on communication. The SW supervisors will explore methods to enhance cooperation and the SW Superintendent will enhance his delegation skills.

Within the entire Stormwater team there is an ongoing need for training that focuses on interpersonal communication and other communication skills. The Stormwater team will work with continue to identify educational opportunities that focus on identified needs.

CROSS TRAINING WITH WASTEWATER

Cross training opportunities for SW personnel occur throughout the year when Stormwater personnel are assigned to assist the Wastewater Division during the performance of their maintenance activities. These tasks typically include WW cleaning lines & WW MHs, assisting with CCTV of WW lines and working on the WW construction crew. Cross training is an essential part of SW's operations, so SW staff can obtain the required hands on training for certifications required for career progression and career advancement opportunities.

PURCHASE ORDERS

The SW/WW administrative staff will submit for signature(s) a requisition for a purchase order to encumber funds with a company for specified supplies and services. The requisition is processed and signed by the appropriate SW/WW administrative staff member, and then, according to the amount of the purchase order, by the superintendent, the Division Manager, the Department Director, and the Deputy City Manager, if above $25,000.

The requisition is sent to Purchasing, and then sent back to the SW/WW administrative staff when finalized. The purchase order is kept in a file by company and invoices are processed using the purchase order number. The SW superintendent and SW supervisors receive an electronic copy of purchase orders. The purchase order amount is entered on an Excel spreadsheet by the SW/WW administrative staff. The balance is monitored regularly by the SW superintendent, SW supervisors and SW/WW administrative staff.

If insufficient funds have been encumbered, a change order may be submitted to increase the funds encumbered by a purchase order. The change order form can be found on the K:/ drive. After the form is filled out, the SW superintendent and SW/WW Manager will initial the change order, and the Department Director must sign. It is then sent to Accounting/Purchasing for finalizing.

Tracking Purchase Orders
Purchase orders are received from the Purchasing Department and the Supervisors and Superintendent are notified that the PO is available for use.

A copy of the PO is made. The original goes to the Stormwater purchase order file under the name of the company. The copy goes to the billing file under the name of the company.

The PO number is entered into the "(year) Purchase Orders.xlsx" Excel file for tracking, and into the "PO list.xlsx" Excel file, which is the summary to send out of all POs.

As invoices are received, the information is entered into the tracking file which contains a running total balance. The end total number is then entered into the summary file. The summary file is sent out periodically, with more frequent distribution towards the end of the life, either monies or time, of the PO.

Notification is sent to all regarding the status of the PO, so that monies will not be spent that aren't available, or monies will not be encumbered beyond the time limit of the PO.

Stormwater POs have variable due dates as most are for summer work, with others being for year round or special projects.

JUSTIFICATION MEMO PROCEDURES

The Stormwater Superintendent uses justification memos to support requests for action by upper management on numerous issues. These may include requests for purchase orders, change orders, career progression, hiring requests, salary proposals, or travel & training requests. These memos are generally directed to the Deputy Director of Water Operations/Engineering thru the Manager of Stormwater/Wastewater.

STORMWATER WORK ORDER PROCESS

HANSEN is the asset management system used to track all Stormwater assets, their usage, maintenance history and costing information. All pertinent information from initiation through completion is entered on the work order. It is also utilized to obtain annual report figures on the total cost of each activity performed throughout the year.

HANSEN work orders are created for each job performed by Stormwater field personnel. The supervisors are responsible for creating these work orders and assigning the correct activity code, asset number, initial details and a description of the job. A supervisor may request a group project to be created by the SW/WW/OC Data Support Technician. A group project is a collection of work orders produced for a set of pre-determined assets to perform a particular function, such as checking trouble spots after a storm, inlet inspections for a number of map pages or channel maintenance for a creek.

These work orders and group projects are given to the field personnel with their daily assignments. The crew leader will record all labor hours, vehicle hours and materials used for that day on the work order along with the status of the job and return it to their supervisor for verification and review. If the work has not been completed, the supervisor will then print another copy of that work order to send to the field again. The day's work orders are then sent to the Data Technician who enters the information into HANSEN along with any leave time and non-productive hours obtained from the timesheets. A quality control report verifies that the hours input into HANSEN equal the total hours available for all Stormwater personnel.

‘K’ DRIVE PURPOSE

The purpose of the “K” Drive is to have an on-line site where the COA Stormwater Division may share pertinent information with other Aurora Water Divisions and other COA Departments. The site is *read only* for these other COA entities. Revisions to the Storm Drain “K” Drive site are admitted by the Stormwater Superintendent only.

K Drive Resources

Spill Response Support
K:\Dept\Water\Divisions\Operations Compliance\Incident Response\RESOURCES\Spill Response Plan Information Resource Folder\Spill Communication Plan and Resources.pdf

Emergency Pumping Equipment Readiness:
pump readiness plan
..\..\..\Wastewater\Emergency Response Plans\PDF Emergency Response documents\Multiple PDF docs\pump readiness plan FINAL Copy 8-3-09 revised.pdf
SOP SMALL pumps
..\..\..\Wastewater\Emergency Response Plans\PDF Emergency Response documents\Multiple PDF docs\SOP SMALL pumps Final 5- 19- 09.pdf
6 and 8inch SOP Final
..\..\..\Wastewater\Emergency Response Plans\PDF Emergency Response documents\Multiple PDF docs\6 and 8inch S O P Final revised 5-19-09 .pdf

Flood Response Plan
..\..\COA Flood Plans\Flood Response Plan [2009-11-19]

Sediment Management Plan
..\..\Sediment\Sediment Management Plan revised 5-17-10 (2).docx

..\..\Sediment\Sediment Removal Matrix (2).xlsx

SLA’S
Aurora Water Irrigated Turf
..\..\Service Level Agreement\2012\PROS_AW_Turf_SLA_2012.pdf

Noxious Weed Management along Stream Corridors
..\..\Service Level Agreement\2012\PROS_AW_Weed_SLA_2012.pdf

APPENDIX

1. Stormwater Wastewater Ops Incident Report
2. Flood Response Plan
3. Stormwater/Wastewater Emergency Pumping Equipment Readiness
4. Aurora Water Snow Procedures for 2012 – 2013
5. Stormwater Sidewalk Snow Removal Areas
6. Stormwater/Wastewater Operations Spill Communication and Response Plan
7. Levee and Floodwall System Inspection Plan
8. Woody Vegetation Management Guidelines
9. Tree Mitigation Plan
10. Service Level Agreement between Aurora Water and Aurora Parks, Recreation and Open Space Department for Operation and Maintenance of Aurora Water Irrigated Turf 2012
11. Service Level Agreement between Aurora Water and Aurora Parks, Recreation and Open Space Department for Noxious Weed Management Along Stream Corridors 2012
12. Stormwater Graffiti Removal Guidelines
13. Stormwater Fence Management Flowchart
14. Stormwater Monthly Activity Calendar
15. Non-Typical Maintenance Responsibilities
16. Memorandum of Understanding between Aurora Water and Public Works Department 2012
17. Stormwater Operations Sediment Management Plan
18. Stormwater/Wastewater Infrastructure Repair Project Checklist

Levee and Floodwall System Inspection Plan

Owner: City of Aurora
Aurora Water Department
13646 E. Ellsworth Ave.
Aurora, Colorado 80012

Levee Location: Sand Creek at Star K Park

I. Purpose:

To maintain a standardization of flood control via a levee operation and maintenance program, to protect the health, safety, welfare and property of people living in the areas along Sand Creek and the City of Aurora. Of special concern is the area along Sand Creek in the vicinity of the Star K Park.

II. Levee and Floodwall System Inspection and Operation Program

1) Inspections shall be performed annually by City of Aurora Environmental Inspection Personnel, to evaluate for integrity of the levees, performance of storm drain features as may affect flood plain protection, and compliance with all FEMA regulations.
2) Historical records shall be obtained, maintained, and considered as best can to help identify potential maintenance concerns for corrective action.
3) City of Aurora Environmental Personnel shall coordinate and comply with all appropriate State and Federal Agencies, including Urban Drainage and Flood Control District.

III. Levee and Floodwall System Maintenance Plan

The City of Aurora Stormwater Division will be responsible for maintaining the levee in the vicinity of the Star K Park. The Stormwater Division will inspect the levee on a quarterly basis and after a major rain event. This will further ensure the reliability of our levee and identify potential maintenance activities needed. Maintenance will be performed on an as needed basis.

IV. Areas of inspection and maintenance will include:

1. Levee slopes
2. Access roads and trails
3. Ends of levee
4. Vegetation
5. Evidence of burrowing animals/insects
7. Structural controls, such as flap gates
8. Any other condition that may affect the integrity of the levee

Stormwater Graffiti Removal Guidelines

Purpose

To respond to graffiti concerns in an efficient and effective manner that supports and minimizes the impact to the Stormwater Operational Plan.

Citizen Requests

Citizen requests will be managed on a case by case basis. Information from call response forms will be utilized to determine location, extent of damage, structure affected and priority of response. Priority will be given to graffiti containing a racial or obscene message. Stormwater personnel will respond to these requests within 24 hours of the first call received.

Access Aurora Customer Request

Access Aurora requests will be handled in much the same way as a citizen request. With these requests the caller will sometimes wish to remain anonymous. In this case Stormwater personnel will be dispatched to the address to either remove or paint over the graffiti. The area supervisor will be responsible for responding to requests in his/her area within 24 hours of first receipt of the request.

Aurora Police Department Graffiti Unit

On occasion graffiti unit personnel will contact Stormwater regarding graffiti along our drainage channels. Stormwater personnel will respond within 24 hours of the notification. No further notification is required.

Contractor Support

The Stormwater Division currently utilizes temporary staff to respond and paint over graffiti. Situations do arise where the scope of work requires supplemental support from a contractor. Stormwater has a budget line item labeled “Technical Services” to pay for larger projects or projects that require special resources and or equipment.

Tree Mitigation Plan

Revised 11/07/12

Purpose:

This tree mitigation plan document is intended to be complementary to existing City policies on tree preservation. City policies protect trees that meet certain criteria in an effort to safeguard trees from damage or removal as a result of a construction or development process. *See City of Aurora Policy on Preservation of Existing Trees – 11/18/05*

Mitigation

A tree mitigation plan should be developed for all trees that meet the requirements within City policies. Tree mitigation and reconciliation is most effective and beneficial when it occurs prior to the design of any project. Mitigation costs can be calculated and the value of the loss can then become the minimum expectations and/or the minimum design requirements of the new project.

When tree mitigation is required the following should be guidelines to mitigate the loss. The first option and preference is for the calculated value of the loss to be integrated back into the project in the form of other desirable and approved trees. The second option is for the value of the loss to be mitigated by replacement of like value or relocation of existing, if possible, on approved public lands. The last option would be in the form of payment based on the value of the loss to be contributed to the city Tree Planting Fund.

Sensitive Activity

Any type of tree mitigation is considered a sensitive activity that by nature of the activity may trigger a citizen response or complaint. PROS, including the City forester and AW will need to coordinate and communicate all tree mitigation activities in an effort to mitigate complaints and assure effective interdepartmental communication.

New Construction/Project Planting

New construction or improvement projects require planting coordination preferable in the planning and/or design phases of a project. This will assure that: the value of loss for mitigation or site plan requirements can be coordinated, assure unrestricted access for maintenance activities, assure appropriate landscape materials and features are compatible with drainage functions and assure the appropriate species are used to compliment the surrounding area.

Volunteer Tree Planting Projects

Volunteer tree planting projects help to enhance and sustain natural environments and provide an opportunity for volunteers to connect with nature by instilling a sense of land stewardship. Coordinated and collaborated efforts by PROS and AW will mitigate the potential of tree planting projects in stream corridors that would create a management issue in the future.

Woody Vegetation Management Guidelines

Purpose

The purpose of this document is to establish woody vegetation management guidelines that protect human life and property while preserving other desirable aspects of natural stream corridors such as wildlife habit, wildlife travel corridors and recreational activities.

The regulatory requirements of the Federal Emergency Management Agency (FEMA) require that all stream corridors be maintained to a minimally acceptable level by keeping them free of trash, debris and managing woody vegetation growth.

Woody vegetation that is not managed in stream corridors creates the potential to impede flows and cause blockages resulting in flooding, erosion and a build-up of sediment. Management of all woody vegetation in stream corridors is necessary to prevent these conditions.

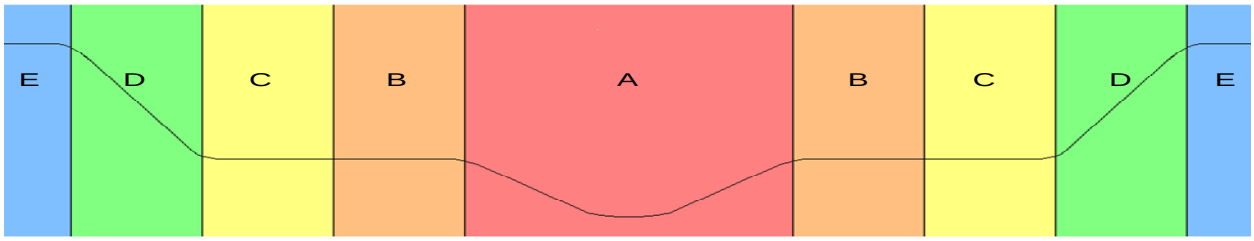
Hazard Trees

Hazard tree evaluations for trees growing on Stormwater property will be conducted by the City of Aurora Forester or a designee approved by the Forester. If observed tree conditions have the potential to damage private property, injure individuals or cause similar, adverse impacts; Stormwater staff will initiate the activities required to minimize the hazard and contact the City Forester to develop an appropriate hazard tree action plan.

General Guidelines

- All woody vegetation will be removed from center of channel (Low-flow zone).
- Woody vegetation such as willows should only be removed if they cause split flows or cause deflections resulting in channel bank erosion.
- Woody vegetation on top of channel banks and outward should only be removed if it is dead or dying or has the potential to become an impediment to flows.
- Woody vegetation will be managed within 20 ft. upstream and downstream of bike/pedestrian, low water, crossings.
- Woody vegetation will be managed within 100 ft. upstream and downstream of a roadway bridge or culvert crossings.
- Woody vegetation will be managed within 50 ft. of channel stabilization, grade control, structures.
- Woody vegetation will be managed within 15 ft. of any detention pond inlet or outlet structure. Other woody vegetation within the detention area may be removed as deemed necessary on a case by case basis.
- Woody vegetation will be managed from all outfalls when flows are impeded.
- Limbs growing from woody vegetation are typically pruned to a height of five to six feet above the ground when trees are growing adjacent to channels. Pruning to this height reduces the potential to adversely impact flows within the channels.

Below is a typical channel profile of which woody vegetation will be managed, removed/thinned/trimmed, depending on the channel zone in which they are located:



Zone "A"
All woody vegetation will be removed from the low-flow or "center of channel".

Zone "B"
Remove all noxious, dead and fallen trees from both sides of low-flow channel outward 10 ft (+/-). Trim woody vegetation as necessary within 10ft (+/-) buffer area.

Zone "C"
Remove all noxious trees, discretionary removal of dead and fallen trees and utilize discretionary thinning from 10ft (+/-) buffer outward to toe of channel bank. Tree stumps to be left in place for channel stabilization. If it is necessary to remove stumps, compact with suitable material.

Zone "D"
Remove all noxious trees, discretionary removal of dead and fallen trees and utilize discretionary thinning from toe of channel to top of bank. Tree stumps to be left in place for channel stabilization. If it is necessary to remove stumps, compact with suitable material.

Zone "E"
Woody vegetation management from top of channel bank outward to property line or other boundary to be conducted with the coordination of the Stormwater and Open Space and Natural Resources (OSNR) divisions utilizing established shared responsibility agreements. All areas outside of the established 100 – year floodplain area considered open space and subject to open space objectives.

Aurora Water Snow Procedures for 2012 – 2013

Introduction

The purpose of this procedure is to assure adequate staffing of snow removal equipment during snowstorms. This procedure was developed in accordance with Administrative Policy Memorandum 4-15. All snow removal activities will be performed in accordance with the City of Aurora Snow Plan. Winter Storm conditions will determine the necessary equipment and staffing levels for snow removal. The Public Works Department will be responsible for determining the shift timing and staffing in response to winter weather conditions.

General Administrative

1. Aurora Water (AW) will support the Public Works (PW) Department Snow and Ice Plan by providing Staff and Equipment in support of the North and South snow removal teams.

2. AW reserves the right to mobilize any and all AW staff and equipment in support of an AW declared emergency that may occur concurrently with a snow event.

3. AW reserves the right to maintain core functions and the ability to respond to department needs with appropriate staff and equipment.

4. AW administrative staff, Manager Mark Donelson, North team - Gary Edwards, South team - Coby Shurtleff, will provide support for PW snow team coordination.

5. AW recognizes all available staff, which currently hold or are required to have a valid Commercial Drivers Licenses (CDL's) and Medical Examiners Certificate verified and on file, as a resource to support the PW Snow Plan.

6. When PW mobilizes snow crews the AW supervisor who is on snow call is approved to take a City vehicle home and utilize the vehicle until the snow event is cancelled.

7. The snow season generally begins the first week in October and ends the last week of April.

8. Shift differential pay approved for non-exempt employees working (AM) or (B) shift.

Equipment

1. AW has fourteen (14) trucks and five (5) loaders that are available for the Snow Plan for both AM and PM shifts. Seven (7) trucks and (2) loaders will be available to support the South snow team. Seven (7) trucks and (3) loaders will be available to support the North snow team.

Staffing

1. PW has established Winter Storm Categories and corresponding staffing and equipment requirements. These totals include staffing all AW equipment and providing additional staff for PW support. Category III & IV events require additional AW staff to operate AW equipment (loaders). In the event of odd numbered staffing requirements PW requests that the additional staff be utilized on the a.m. or (B) shift.

    a. Category I (Trace – 2")
        i. **No** AW staff / equipment required
    b. Category II (2"-6")
        i. **40** total AW staff
        ii. North Team (**20** total staff 10 pm / 10 am) includes supervisors
        iii. South Team (**20** total staff 10 pm / 10 am) includes supervisors
    c. Category III (6"-12")
        i. **63** total AW staff
        ii. North Team (**31** total staff 15 pm / 16 am) includes supervisors
        iii. South Team (**32** total staff 16 pm / 16 am) includes supervisors
    d. Category IV (>12")
        i. **70** total AW staff
        ii. North Team (**35** total staff 17 pm / 18 am) includes supervisors
        iii. South Team (**35** total staff 17 pm / 18 am) includes supervisors

2. Two snow team lists have been developed from AW staff:

    a. North snow team list consists of:
        i. Customer Service
        ii. Water T&D
        iii. Water Pumping
        iv. Water Treatment/SOS
    b. South snow team consists of:
        i. Wastewater
        ii. Stormwater
        iii. Water Service

3. Efforts have been made to maintain a balanced Staff / Supervisor ratio as well as keeping work groups and Supervisors together. Staffing totals are listed:

    a. North Team Staff / Supervisors **64 / 17**
    b. South Team Staff / Supervisors **56 / 10**

4. Weekly snow lists will be staffed based on the Category II storm event.

General Procedures

1. Snow team lists will be used to schedule employees for a one week Snow Duty Rotation for both AM and PM shifts. The week of Snow Duty starts at 12:00 p.m. on Friday and ends at12:00 p.m. the following Friday.

2. The snow schedule for the entire snow season will be available typically by:
    a. Draft List - 8/31
    b. Employee Review / Edits -9/21
    c. Final List - 9/28

3. Each week an additional volunteer list will be solicited and utilized to provide coverage for unanticipated staffing needs like:
    a. AW North / South team support, due to an absence or approved emergency.
    b. PW staffing shortages or special equipment related requests. (Ex. Tanker operator). Note: any PW requests in addition to normal AW responses must be coordinated and approved by AW snow supervisor.
    c. When PW weather forecasts warrant additional staffing, Category III / IV, PW will coordinate with AW snow supervisors.

4. AW staff must fulfill their obligation to the regular snow schedule first. In other words you cannot be a supplemental volunteer while performing your scheduled snow duties.

5. AW staff must fulfill a minimum obligation of 6 shifts per snow season.

6. Employees who are on PM shift for one week cannot volunteer for the AM shift the next week because shifts change at noon on Fridays. If this were allowed it could put employees on a 24 hour snow call shift if they were working snow.

7. It is the responsibility of the employee to provide the appropriate contact information to the supervisor on snow duty.

8. It is the responsibility of the employee to contact their immediate supervisor and the snow supervisor in the event the employee cannot work due to: (sick, emergency situation etc.)

9. It is the responsibility of the employee when on Snow Duty to make necessary plans and prepare to be called in for duty, regardless of weather forecast.

10. **An employee performing core function stand-by will be exempt from the same week of snow duty**. Supervisors of employees on stand-by will be required to coordinate with the Team supervisor of the snow team in which their employee has been assigned.

11. Supervisors performing core function stand-by will be allowed to also perform snow duty concurrently.

12. In the event that employees are not notified in time to not report at 7:00 a.m. and have already left for work or are already at work, they will be given **two** hours of straight comp time. Then they will go home and return at 12:00 p.m. for snow duty.

13. If an employee works the a.m. shift and gets off at 8:00 a.m., at the request of the employee and approval from their supervisor and with consideration to budgetary impacts, the employee may stay at work until noon for four hours of comp. time or overtime. The employee also has the option to leave at 8:00 a.m. with 8 hours regular pay.

14. If an employee works the p.m. shift (noon to midnight) and they get off duty at 12:00 a.m.(midnight) and they are instructed to return to their normal duties the next morning the employee can report to work at 8:00 a.m. This allows a minimum of 8 hours between shifts.

15. If during a normal day at work and the a.m. shift employees are asked to report for snow duty at midnight, they will be released from normal duties to go home at 1:30 p.m. and compensated for the entire day. This allows a minimum of 8 hours between shifts.

16. Trades for snow duty will be allowed if an emergency situation arises. It is the employee's responsibility to ask their Superintendent of their section to be relieved of their duty for snow. The employee is responsible to find someone to take their place within reason. The snow team coordinator will exercise reasonable judgment for employee responsibility in extreme hardship situations.

17. South snow crews will report for snow duty at Central Facilities SW/WW building. Any subsequent shift changes will take place at the South Satellite. First shift employees will be shuttled back to their vehicles at Central Facilities.

18. North snow crews will report for snow duty at Central Facilities T&D bay area. Any subsequent shift changes will take place at the North Satellite. First shift employees will be shuttled back to their vehicles at Central Facilities.

19. In the case where the first shift crews are requested to report for snow removal duty and conditions do not yet warrant snow removal equipment to be on the streets, crews will remain at Central Facilities until conditions warrant the use of AW snow removal equipment or until released by Public Works.

20. PW will assign the snow routes to the AW department, and at PW's discretion, assign a PW employee to act as a lead worker for the assigned routes.

21. Typical response time to any snow event mobilization will be 1 hour from time of notification. PW will utilize discretion on when they will start pay. Example: If PW notifies AW snow supervisor at 1:00 am to mobilize crews ASAP and all AW staff respond by 2:00 am except 1 person and they respond at 3:30 am. PW works has the discretion of when the pay starts for the group and when the pay starts for the 1 person

who did not respond within the 1 hour window. Extenuating situations will be evaluated by PW and AW snow supervisor.

Snow Training

1. AW will provide an on-going training program for all employees who are required to support the PW snow program. The program will consist of:
    a. General Awareness (GA) Training (typically 2 hours)
        i. This training is required for all drivers and supervisors on an annual basis.
        ii. This training consists of a Power Point presentation by AW snow training staff focusing on general awareness and information.
        iii. This training also will consist of Equipment, Safety and Traffic regulations.
    b. General Awareness + Practical (GAP) Training (typically 2 hours)
        i. This training is required for all drivers and supervisors on an annual basis.
        ii. This training consists of hands on training and application with snow plow / sander set-up, and snow computer training for product application.
    c. Driving / Course Practice (as needed)
        i. This training is optional for all drivers and is based on supervisory discretion and need by the specific employee.
        ii. This training includes road and course practice with snow equipment mounted.
    d. New Employee Training (8 hours or more as needed)
        i. This training includes
            1. GA training
            2. GAP training
            3. Driving / Course Practice
            4. Additional training as needed

2. AW will provide the training based on the following calendar. (typically)
    a. GA Training (8/15 – 9/14)
    b. GAP Training (9/3 – 10/1)
    c. Driving / Course (9/3 – 10/1)

3. PW will pay for new driver training, up to an 8 hour shift, to ride along with AW staff or PW staff as applicable. N/S team leaders to schedule when practicable.

Disciplinary Action

1. In the event any employee is unable or does not respond to their assigned shift, this may warrant disciplinary action. Extenuating circumstances will be evaluated by the AW snow supervisor and employee supervisor.

Stormwater/ Wastewater Infrastructure Repair

-Project Checklist-

Project Planning

- [ ] Utilize Wastewater Division CCTV or other methods to determine the scope of work required
- [ ] Obtain Utility locations before starting excavations
- [ ] Perform a "Job Hazard Analysis" to identify safety issues
- [ ] Hold a "Pre-construction" safety meeting with all participants and determine crewmember's role in project
- [ ] Determine excavation/trench stabilization methods
- [ ] Determine sources of backfill ,bedding ,base and other materials (Central facilities-Aurora Storage Facility)
- [ ] Note the project's location (address or intersection) in case of emergency
- [ ] Notify City of Aurora Public Information Office (PIO), Flow Control Center (FCC) and other agencies if project will impact emergency responders, public transportation providers (RTD/school buses) etc.
- [ ] Determine traffic control needs (In-house or contractor)
- [ ] Continuously monitor traffic control devices throughout the work day
- [ ] Utilize qualified flaggers with traffic control paddles (Slow/Stop) when necessary
- [ ] Mark-out excavation cut on road or other surface
- [ ] Utilize asphalt/concrete cutting device(s) when necessary
- [ ] Continuously monitor for hazardous atmosphere in excavation or trench
- [ ] Utilize non-conducting hand tools,probes,etc. when performing handwork
- [ ] Follow Aurora Water/City of Aurora specifications relating to infrastructure repair/replacement
- [ ] Plan for possible water infiltration in excavations (pumps on site)
- [ ] Plan for securing excavations if leaving unattended after-hours (orange safety fencing,barricades,etc.)
- [ ] Utilize "Vehicle Tracking Control" material (3 1/2"angular rock) when applicable
- [ ] Utilize recycled tree chippings to provide traction in off-road situations
- [ ] Notify Fleet Maintenance Division to inform of after-hours work
- [ ] Keep Excavation/Trenching - Confined Space and other applicable SOPs on site at all times
- [ ] Perform "After Action" debriefing and compile report at project completion
- [ ] Inform **GIS** section if any map book changes are warranted after completing project

Materials / Equipment Checklist

- [ ] Compaction equipment
- [ ] Cement mixing trailer
- [ ] Repair couplers/other materials
- [ ] Asphalt patching (In-house or contract)
- [ ] Extra fuel/lubricants for equipment/power tools
- [ ] Concrete/Asphalt cutting devices
- [ ] Generators / Lighting for night work

Other _____

_____

_____

_____

_____

_____

_____

Personnel Support

- [ ] Have employees notify family of possible after-hours work
- [ ] Water/other drinks/cups on site
- [ ] Hand sanitizer, sunscreen, insect repellent, etc.
- [ ] Restrooms-Sanolets / Food establishment availability
- [ ] Insure all employees take lunch and rest breaks as applicable
- [ ] Plan for replacement personnel to comply with FSLA overtime rules
- [ ] Track employee hours and timesheet information

Other _____

Utility Locators

Utility Notification Center of Colorado (UNCC)	1-800-922-1987
Aurora Water Utility Locations	303-326-8645

COA Phone Numbers

(Utilize COA Emergency Standby Roster for After-Hours)

City of Aurora Public Information Office	303-739-7370
Flow Control Center	303-326-8387
Fleet Maintenance Division	303-326-8030
Street Dept Main #	303-326-78200
Water Dept Main#	303-326-8528

Supply Vendors

Suburban Ready Mix Concrete	(Concrete/Flow Fill)	303-421-0720	Dispatch
Brannan Asphalt	(Asphalt patching)	303-534-1231	Dispatch
National Barricade	(Traffic control rental)	303-744-2338	Dispatch
American Barricade	(Traffic control rental)	303-297-1665	Dispatch
Strait Lumber	(Hardware supplies)	303-366-3561	11150 E. Colfax Ave
ADS Pipe	(HDPE pipe)	1-800-733-8523	6800 Smith Rd
Aviation Industrial Supply	(Tools/specialty items)	303-355-2391	3900 Ulster St.
Bowman Construction Supply	(Erosion control supplies)	303-696-8960	10801 E 54th Ave
Contech	(Corrugated Pipe)	303-371-2360	6290 Clermont St.
Dalco Concrete Supply	(Concrete repair supplies)	303-371-3950	3730 Salem St.
Grainger	(Contractor supplies)	303-388-4683	4885 Paris St.
JS Contractor Supply	(Traffic safety supplies)	303-388-4683	4040 Grape St.
United Rentals	(Tools/equipment rental)	303-366-6629	600 Fraser St.

AURORA WATER

Stormwater Operations
Sediment Management Plan
2010

Acknowledgements:
Urban Drainage and Flood Control District
City of Aurora Public Works
Aurora Water / Stormwater

Executive Summary

The Stormwater Division of the Aurora Water Department is responsible for the maintenance of approximately 75 miles of drainage channels throughout the City of Aurora. Maintenance of these channels includes trash/debris and sediment removal. Storm channel aggradation, a condition where the level of a stream bed is raised or filled by deposition from sediment, is an ongoing channel characteristic and must be managed. Sedimentation that is not managed effectively has the potential to compromise the overall function of the conveyance system and the water quality features of the channel.

Regulators at the Federal, State and Local level require that Stormwater Management Plans / Programs be developed and implemented in order to maintain regulatory compliance. These regulatory requirements and subsequent Stormwater management plans create a situation where multiple objectives for managing flood risk and environmental impact risks are realized. These multiple objectives are a result of Federal Emergency Management Agency (FEMA) maintenance activity guidance; Federal wetlands 404 permit guidance and the stormwater quality requirements of the Clean Water Act.

In an effort to meet these multiple objectives a comprehensive and systematic sediment management program is critical to develop and implement. This plan is intended to consider drainage functionality, environmental stewardship, and fiscal resource management while managing risk and maintaining regulatory compliance.

Objective

The objective of this plan is to develop a comprehensive and systematic sediment management decision tool, while not absolute, that will assist key decision makers in sediment management strategies for operational maintenance response.

Regulatory Requirements

The City of Aurora is a participating Community in the National Flood Insurance Program (NFIP) which is administered by FEMA. The NFIP offers reasonably priced flood insurance to communities that comply with minimum standards for floodplain management. The NFIP also manages the Community Rating System (CRS). The NFIP/CRS recognizes community efforts beyond those minimum standards by reducing flood insurance premiums for community property owners. The City of Aurora is currently a participating community and in good standing in the CRS program. As of 2008 there are 238 homeowners in Aurora who are required to have flood insurance with annual premiums of $168,529 dollars. The City's current maintenance program, recognized through the CRS program, provides for a 10% discount for policy owners, or $14,625 dollars in savings on an annual basis.

The Environmental Protection Agency (EPA) also mandates a permit program that is administered by State agency and implemented through local municipalities. This permit is a State of Colorado Discharge Permit issued through the Colorado Department of Public Health and Environment (CDPHE). This permit requires the permittee to operate a stormwater management program. One of the elements of the program requires the permittee to maintain a program of routine maintenance activities to reduce pollutants. Pollutants like sediment, trash / debris are required to be periodically removed from municipally-owned detention facilities and open-channel drainage ways. By engaging in on-going efforts to reduce pollutants, water quality can be maintained for beneficial use for both downstream and in stream use for aquatic and riparian life. In areas of new development for example, source controls, like forebays in water quality ponds, are now required that eliminate or reduce the excess sediment load to downstream receiving streams. However, it is generally not practicable to retrofit stormwater quality controls into drainage facilities of existing development. Hence, a managed approach to preventing or controlling sediment accumulation helps Aurora meet regulatory objectives pertaining to both flood control and water quality.

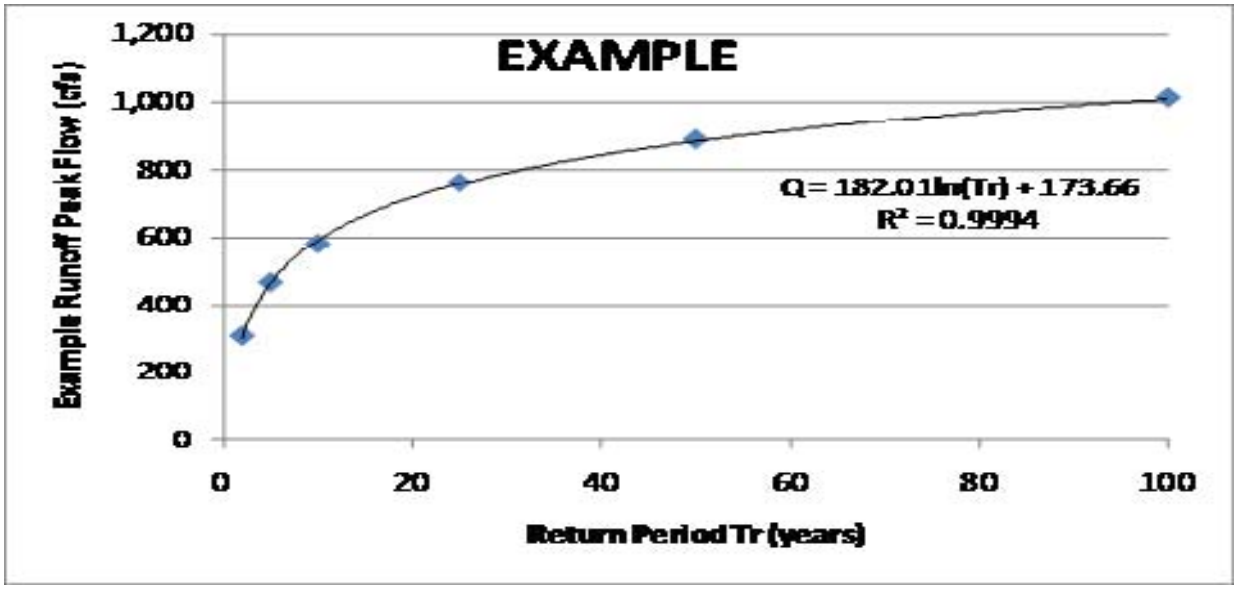
Design Criteria

The City of Aurora Storm Drainage Design Criteria and Urban Storm Drainage Criteria Manual require that open channels in a typical stormwater conveyance system be designed to meet a level of service or a design frequency. This level of service or design frequency standard is referred to as the 100-year flood level. This design requirement includes a minimum one foot free board as a safety factor. Free board is the margin of safety added to the base flood elevation to account for any change of conditions over time and to incorporate inherent inaccuracies of hydrologic calculations. However, this free board is not designed specifically to allow for sediment accumulation and storage but rather a general safety factor for changes that occur in channel roughness due to vegetation, debris in channel, partial clogging of crossing structures etc. This free board safety factor provides operational flexibility so that significant maintenance is not required on an annual basis.

Managing Risk

The starting point for defining acceptable risk is established as the 100-year flood conveyance. It is difficult to quantify the increased level of risk that may be incurred due to channel aggradation as a function of sediment management. However, reduced storm conveyance due to aggradation is not a linear relationship with the recurrence period. For example, the peak flow for a 50-year event is not ½ the peak flow of the 100-year event. In fact the 50-year peak flow is often in the range of 80% to 90% of the100-year flow. This varies with every drainage basin being considered but the general relationship holds true.

Applying this relationship to an example of a 20% loss of channel conveyance due to channel aggradation does not merely increase the 100-year event to the 80-year event (20% reduction). It is more dramatic than that. A loss of 20% of conveyance reduces the recurrence period that can be handled from the 100-year event to something significantly less. (20 - 40 year range). That is a dramatic reduction in protection, or increased risk that is incurred. The graph below provided by Urban Drainage and Flood Control District (UDFCD) shows the relationship between peak flows in cubic feet per second (cfs) and the recurrence period (year return period. (20 – 100 year event) on a hypothetical stream.



Managing risk is a challenging task when you factor in the dynamics of drainage characteristics while working to maintain a multi-objective plan that protects life and property while considering environmental stewardship and maintaining regulatory compliance. This is why a sediment management plan is critical to develop and implement.

Maintenance Intervals

Determining maintenance intervals for the periodic removal of sediments must be balanced with the designed service level and service expectation in mind. As an example, cleaning sediment from channels too frequently has the potential to disrupt the protective vegetation that exists to protect the channel from excessive erosion. In this case the protective vegetation must be considered as part of the overall asset and one of multiple objectives that stormwater management planning must consider and incorporate.

Managing designed service levels and service expectation also must consider fiscal stewardship of public resources. The fact that the City of Aurora has less flood damage insurance claims than any other major City in Colorado speaks to a balanced approach to maintenance intervals that are currently utilized within Aurora.

Operations and Maintenance (O&M)

An effective O&M plan for sediment management is key to maintaining a balanced approach to maintenance. Key elements that contribute to an effective sediment management plan include: annual inspection of all drainage ways, annual monitoring through photographic documentation, training of employees to insure consistency of maintenance decisions, measuring aggradation utilizing key conveyance system benchmarks like: partially blocked outfalls or

excessive accumulation on structures, and finally a prioritization process that considers the aggradation trigger points, risk assessment, service expectation and service levels.
The development of O&M plans based on these key elements should then be applied to specific channel reaches and / or segments. Based on industry best management practices sediment removal and channel restoration, to designed capacity, should be considered once the aggradation exceeds one foot for channelized or “improved” drainage way reaches.

Typical O&M plans to include:

1. Channel prioritization for inspections
2. Channel inspection
3. Risk assessment and evaluation
4. Aggradation evaluated and prioritized
5. Aggradation quantified by PW survey
6. Annual prioritized list of sediment mitigation projects

Conclusion

The Stormwater Division of the Aurora Water Department is responsible for the O&M of all drainage conveyance throughout the City of Aurora. Many regulatory agencies like, FEMA / EPA, require that participating communities comply with minimum standards for floodplain management. Compliance with these standards assures that multiple objectives for managing flood risk and environmental impacts are realized. This sediment management plan is intended to be a decision making tool to assist key decision makers in sediment management strategies for operational optimization. This plan considers drainage functionality, environmental stewardship, and fiscal resource management while managing risk and maintaining regulatory compliance.

Guidelines For Determining Risk Factors for Sediment Removal

1.Vegetation (Column E)

0-No vegetation

1-No woody vegetation present, tall grasses only.

2-Sparse to moderate woody vegetation present.

3-Moderate to heavily wooded vegetation present.

2. Horizontal distance between 100 year flood plain & private property line. (Column C)

0-No flood plain

1- >25 feet

2- 10-25 feet

3- <10 feet

3. Vertical height difference between 100 year flood plain & private property line. (Column D)

1->8 feet

2- 4-8 feet

3- <4 feet

4. Does the downstream structure convey the 100 year flow? (Column F)

1-Yes

2- No

5. Aggradation-use the actual depth expressed in feet or fractions of a foot.

SEDIMENT REMOVAL MATRIX STATUS AS OF February 25, 2011

The matrix shows information garnered from the annual channel inspections performed by Operations Compliance and topo Dfirm maps w/ 100 year flood plain information supplied by Public Works.

Currently there are 79 channel segments shown on the matrix as that is how many inspections have been forwarded to me to date from Operations Compliance. I update the matrix as the inspection reports come to me. To date, 40 of these have PW topo Dfirm maps associated with them, and that information has been added to the matrix also. More maps have been requested from PW.

These 40 have been prioritized and the top eleven (12) are shown as follows based on the information from the maps & the channel inspections (score). However, #1 & 11 are being done by others, #4 has good width and has too large a volume to consider at this time.

*1. West Tollgate Creek- Mansfield to Hampden (14.5): This is being addressed by a separate Urban Drainage Project.

2. East Tollgate Creek- Chambers @ 1st Ave to Evanston (confluence w/ West Tollgate Creek) (14.5): good candidate for sediment removal.

3. West Tollgate Creek- Quincy to Mansfield (14) : (good candidate for sediment removal)

*4. West Tollgate Creek-Mississippi to Gunnison Pl. (14): Because the horizontal distance between private property lines & the 100 year flood plain is sufficient (10-25'), and the volume of sediment exceeding 35,000 C.Y. probably relinquishes this channel segment from sediment removal @ this time.

5. West Tollgate Creek-PS CO. easement to Colorado Ave. (14): good candidate for sediment removal.

6. Piney Creek-Sampson Gulch to Gartrell (13): good candidate for sediment removal.

7. Cherry Creek Spillway-Illif Ave. to confluence w/ Tollgate Creek (12.71): good candidate for sediment removal, need permit.

8. Horseshoe Park-Buckley to PS CO. Easement (12): good candidate for sediment removal.

9. East Tollgate Creek-1st Ave to Chambers (11.67): good candidate for sediment removal, need permit.

10. Meadowood Creek-Illif Ave. to confluence w/Tollgate Creek (11.58): good candidate for sediment removal.

*11. Piney Creek-Gartrell to Arapahoe (11.5): Portions of this are currently being addressed by a CPD project.

12.West Tollgate Creek-Colo. Ave to Mexico Ave (11.5): good candidate for sediment removal & adjacent to #5 above.

Stormwater Sidewalk Snow Removal Areas

Location Code	Map Page	Location
SAN	**2F & 2G**	Sand creek walkover bridges, steps and approaches. **(Both)**
SAB	**3G**	23rd and Sable - East & West side - corners to property lines. **(Hand)**
	4P	19560 E. 18TH PL. - Pedestrian easement to Clyde Miller School **(Hand)**
WTG	**6H**	6th & Sable- Sidewalk from 6th Ave North to 761 Sable Blvd. **(Both)**
DP6A	**7K**	6th & Norfolk- South side- Intersection East to property line. **(Plow)**
		Kentucky & Airport Blvd - on Kentucky - North and South sides
COL	**10K**	of street from Airport to Homeowner's fence**. (Plow)**
SCC	**10M**	Easement- 974-972 S.Waco Way- East side between property lines. **(Hand)**
		Uravan channel from Fire station #9 to property fence North of
	10M 11M	Mississippi Ave. Includes walks that intersect the channel-Telluride,
ETT	**12L 12M**	Louisiana and Mississippi. **(Both)**
WTG	**12J**	Mexico Ave & Tollgate Creek- East and West sides of Mexico Ave**. (Plow)**
DPAR	**11G**	Arkansas Detention Pond from property line to property line. **(Hand)**
WES	**13E 14E**	Bike Path on Big Muddy- Yale Ave to Pacific Dr. **(Plow)**
CCS	**14J**	2469 S. Kittredge Way- Property line to property line**. (Hand)**
		1. Side Creek-sidewalks that intersect channel-Louisiana & Mississippi **(Plow)**
SCC	**11N 12N**	**2.** Bike path- South of Louisiana to walkover bridge **(Plow)**
		3. Walk on Dunkirk from Townhomes to Colorado Ave **(Hand)**
	14M 13L	**1.** Walkover bridge at Hutchinson Channel- Includes sidewalks to and
WTG	**15M**	from bridge **2.** Walks at Dartmouth & Hampden-both sides of bridges. **(Hand)**
		1. Unnamed Creek & Flanders- walks on East & West side of Flanders
NNC	**16P**	**2.** North & South side of Bates (Arrowhead Elementary) **(Plow)**
SVR	**17N 18N**	Summer Valley-**1**. Sidewalk along Reservoir, **2**. Sidewalk between reservoir and Bahama St. (across from Fire Station) **3**. Short section of sidewalk and easement south of Reservoir to Biscay Cir. **(Plow) 4.** Sidewalk and easement from Reservoir to S. Andes Way **5.** Sidewalk on Princeton. **(Hand)**
SVR	**17M**	Sidewalk section from S. Uravan St. to S. Waco WY. **(Both)**
WTG	**18L**	Tollgate&Mansfield-Walks North& South side of Mansfield Ave **(Plow)**
LNP	**17J**	Mercer & Milan- East side of Alicia Pkwy- walk that intersects channel **(Hand)**
		1. Sidewalk between 18197 & 18209 E. Grand Ave- continues back to
TRT	**20M**	4802 S. Tower Way. **2.** Walks at Grand & Telluride**. (Hand)**
		1. Carson Pond- All walks in detention pond area. **2** Path along Carson Street. **(Hand)**
DPCA	**18G**	**3**. Bike path East from Carson St. to S. Dillon Way. **(Both)**
DPSH	**19G**	Shop Creek bike path from Parker Rd. to State park property line. **(Plow)**

K Drive Resources

Spill Response Support
K:\Dept\Water\Divisions\Operations Compliance\Incident Response\RESOURCES\Spill Response Plan Information Resource Folder\Spill Communication Plan and Resources.pdf

Emergency Pumping Equipment Readiness:
pump readiness plan
..\..\..\Wastewater\Emergency Response Plans\PDF Emergency Response documents\Multiple PDF docs\pump readiness plan FINAL Copy 8-3-09 revised.pdf
SOP SMALL pumps
..\..\..\Wastewater\Emergency Response Plans\PDF Emergency Response documents\Multiple PDF docs\SOP SMALL pumps Final 5- 19- 09.pdf
6 and 8inch SOP Final
..\..\..\Wastewater\Emergency Response Plans\PDF Emergency Response documents\Multiple PDF docs\6 and 8inch S O P Final revised 5-19-09 .pdf

Flood Response Plan
..\..\COA Flood Plans\Flood Response Plan [2009-11-19]

Sediment Management Plan
..\..\Sediment\Sediment Management Plan revised 5-17-10 (2).docx

..\..\Sediment\Sediment Removal Matrix (2).xlsx

SLA'S
Aurora Water Irrigated Turf
..\..\Service Level Agreement\2012\PROS_AW_Turf_SLA_2012.pdf

Noxious Weed Management along Stream Corridors
..\..\Service Level Agreement\2012\PROS_AW_Weed_SLA_2012.pdf